

**DISCOURSE INTERPRETATION
AND THE TEMPORALITY OF STATES AND EVENTS**

by

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*To Morris Halle
and Creators of Reggae Music throughout the World*

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INTRODUCTION

There is a prevalent belief in the air that it is not possible to receive a Masters degree in linguistics from MIT. MIT does not have a Masters program in linguistics. It does not have Masters requirements. And there is no such thing as a Masters Thesis in linguistics. Most people share these beliefs. I shared them. I even think the faculty used to believe these things. Still the members of the faculty are not rigidly doctrinaire. They have offered a Masters to me as consolation for the (enjoyable) year and a half which I spent at MIT, studying linguistics and meeting interesting people. In return, I have written this essay.

This essay is my Masters Thesis. It is approximately 200 pages in length and divides into six chapters in addition to this introduction. It is a rough draft in every sense of the word. It is incomplete and unpolished. I composed it rather hurriedly between November 1986 and January 1987. Most of the ideas that were to be presented are expressed somewhere in the text, in some form. However, few of the sections have undergone sufficient revision to make them very presentable. Some parts of the text are first drafts and most others were typed directly into the computer. The argumentation, as a result, is not as precise as it might be. I think that the general lines of reasoning are fairly clear and straightforward, but that exposition has suffered somewhat. Quality of presentation has been sacrificed for completeness of argument. Some of the points should perhaps be explained in more detail, and if this were done, one might uncover unnoticed problems.

Aside from chapter one, the essay constitutes a single extended argument. The argument divides into three principle sections. The first part of the argument is given in Chapter Two. The second part is presented in Chapters Three and Four, with applications of the results in Chapter Five. The concluding section comes with Chapter Six.

Chapter One is not a part of the main argument. It is more of a preface (for this and typographical reasons, it is unlabelled, but begins on page one). The chapter considers some ideas presented in Partee(70). There Partee suggests that tenses might be used as referential expressions, with properties similar to those of pronouns. She argues that tenses can be used to refer deictically to intervals of time. We discuss this thesis in Chapter One along with the arguments Partee gives in support of it. Though the facts are suggestive, they do not actually support Partee's conclusion. Tense does not seem to behave as a referential expression, but rather as a predicate.

Like other predicates, each tense has a context independent meaning. As one might expect, the past tense applies to past eventualities, the present tense to present eventualities, and the future tense to future eventualities (ignoring skeptical arguments about the existence of future entities). What appear to be examples of reference to particular intervals of time really involve contextual restriction of the tense predicate. The context dependence of meaning is a very familiar phenomenon. In the example cited by Partee, the extension of the past tense predicate is narrowed, in the context, from the whole past to some subpart of the past. The past tense comes to describe a restricted domain of eventualities that is relevant to the context of the utterance.

The remaining parts of the essay develop the analysis of temporal phenomena presented in Chapter One. Past tense narrative "discourse" structures are considered. The temporal properties of the interpretations of these structures have been described in a number of formal semantic frameworks. These systems seek to demonstrate that the temporal component of discourse interpretation is determined by syntactic and semantic properties of the narrative structure. Temporal interpretation is therefore held to be a result of semantic and syntactic characteristics of structures. This essay develops a contrasting view of the phenomena. It is argued that temporal interpretation is the result of general pragmatic considerations supplemented with empirical knowledge. Temporal interpretation of discourse is not determined by the linguistic and referential properties of the structures themselves, but rather by independent non-linguistic knowledge and a wide variety of general non-linguistic principles of reasoning. What have been considered to be semantic properties of certain structures have in fact very little to do with language at all.

Contextual Restriction and Apparent Reference to Time

We are concerned here with some issues relating to reference and tense. In this section we are interested specifically in a view that tenses in natural languages have a referential use on par with the deictic use of pronouns. Partee(70) argues that tenses may be used deictically, to refer to particular intervals of time, intervals which are salient in the extra-linguistic context. This type of reference is thought to be analogous to the use of pronouns when they are used to refer to individuals which are salient in the non-linguistic context. Partee(70) was the first recent proposal along these lines, and since then, the ideas have been taken up in various capacities by Kamp(71, 79), Enc(82, 86), Barwise and Perry(83), and Partee(84).

Partee's Idea

The Example

By way of introduction, we'll begin with Partee and consider whether the points she presents support her conclusions. She cites the following two sentences:

1. I didn't turn off the stove.
2. He shouldn't be here.

And then comments:

When uttered halfway down the turnpike, such a sentence [1] clearly does not mean either that there exists some time in past at which I did not turn off the stove or that there exists no time in the past at which I turned off the stove. The

sentence clearly refers to a particular time--not a particular instant, most likely, but a definite interval whose identity is generally clear from the extra-linguistic context, just as the identity of *he* in sentence (2) is clear from the context. (On the second page, p. 602?)

In this passage Partee makes at least six distinct claims about the interpretation of sentence (1). She presents no independent arguments in the text of the paper to support any of these remarks. Rather she simply asserts that tenses may refer directly to intervals of time, hoping the analogy to pronouns is strong enough to carry the argument. The real question is whether this analogy is proper. To answer this question, we must consider the claims and see if they are true.

The Analysis

The first claim made in the passage quoted is that (1) cannot be interpreted by a representation such as (3) ["Such a sentence [1] clearly does not mean that...there exists some time in the past at which I did not turn off the stove."]:

3. $\text{Et} \langle \text{NOW} \neg [I \text{ turn off stove at } t] \rangle$
 (where the quantifier ranges over moments of time and takes wide scope with respect to negation.)

Partee is correct. When uttered in the circumstances described above, (1) is not adequately represented as (3). (3) asserts that there is some past moment at which I did not turn off the stove. The statement is trivially true assuming that there is more than one past moment and that achievement events, such as "turning offs," may ideally be considered to

occur at moments. The reasoning is as follows: between any two events in which a stove is turned off, it must be turned on again. Therefore one cannot turn off the stove all the times, and so there must be a moment at which I did not turn off the stove. The statement is also trivially true for a more incidental reason. Since I haven't been alive forever there must be times, namely before I was born, when I did not turn off the stove.

The other basic option available on a standard quantificational analysis is to render (1) as (4):

4. $\neg \exists t < \text{NOW} [I \text{ turn off stove at } t]$
 (where t is as above, and negation takes wide scope over the quantifier.)

(4) asserts that I never, in all history, turned off the stove, or, in Partee's words, "that there exists no time in the past at which I turned off the stove." Partee is also correct in rejecting this as a *complete* analysis of (1). But (4) does not seem to get (1) quite as wrong as (3). The problem with (4) is that it overstates the case. The intuition is that when uttered in context, (1) does not mean (4), but something less far reaching, not that I never turned off the stove, but that I didn't turn off the stove within some restricted interval of the past. Partee, I believe, tries to capture this intuition, when she writes, "The sentence clearly refers to a particular time--not a particular instant, most likely, but a definite interval..." It remains to be seen whether a *definite* interval is the object of reference, but we may wonder beforehand about the capacity in which Partee thinks of the tense as referring to an interval. She never gives an explicit formal representation of her intuitions. But if we take her to mean

that a certain definite interval is to replace the existentially quantified variable t in (3) and (4), she would be saying that (1) translates as:

5. [T<NOW] ¬[I turn off the stove at T]
(where T is an extended interval.)

(5) asserts that for some particular extended interval, I did not turn off the stove *at* that interval. Now this cannot be right. The difficulty is in the idea that the event occurred *at* the extended interval. Partee explicitly states that T is of finite, non-zero, duration. To assert or deny that the event occurs *at* such an interval then becomes peculiar, because, as Partee would agree, *turn off the stove* is an achievement VP and, like standard achievements, the events it describes, under familiar idealizations in semantics, occur at moments. To say that a momentary event occurs at an extended interval is nonsense.

We may have misconstrued Partee, but her discussion certainly does not rule out such a contradictory interpretation, and in fact suggests it. Her comment about tense referring to extended intervals much in the same way that pronouns refer directly to their referents suggests a picture of tense whereby the tense refers to an interval in lieu of quantification, rather than referring to an interval which acts as a restriction on an already present quantification. A more appropriate analogy between the restriction and the reference of pronouns, it seems, will associate the restricting interval with the [+male] feature of the masculine third person singular pronoun, given that this feature restricts the referent of the pronoun to be in a subset of possible referents.

Crucially, Partee's passage fails to express clearly the role played by the extended interval in the truth conditions of (1). We see it cannot play a role analogous to the existentially quantified variable over moments in (3) and (4).

We might consider taking seriously our intuition about the extended interval, that it is the period *during* which I did not turn off the stove; we might write (1) as (6).

6. $\neg[t \text{ in } T][T < \text{NOW}][I \text{ turn off stove at } T]$

T restricts the domain of the past, paring down the domain to some subset of past moments.)

(6) says that I didn't turn off the stove at anytime within this restricted interval. The analysis in (6) does not go against a standard theory of tense. If the theory has tenses quantifying over the set of past moments, then they may continue to do so. The interval T serves to restrict the domain of past times to some subinterval of the past. The quantifier ranges freely within this restricted area, and the sentence says that I never turned off the stove during this period of time. Events occurring or not occurring at past moments continue to make sentences true.

I believe Larson and Cooper consider examples similar to (1). They treat the restriction as a semantic property of the sentence and write it into the truth conditions. In the logical translation, they insert a predicate R of moments of time. $R(t)$ means that t falls within the interval R . (1) is represented by (7):

7. $R(t) \ \& \ \neg \exists t < \text{NOW} [I \text{ turn off stove at } t]$

This is a reasonable way to view things. But with the facts as they are, one wonders whether the phenomenon is not really pragmatic, rather than semantic and truth conditional. Should we bother to write the restriction into the truth conditions of sentences like (1)? Doing so implies that there are two effects which could be attributed to tense. First the sentence quantifies over past times, and second, the quantification is restricted to some subinterval of the past. The same double duty would arise if tenses were treated as indefinites. Past tense is most often treated as a general quantifier over past times. This means that we have no obvious semantic object to credit with the restriction. The fact is that the restriction seems *prima facie* to be a pragmatic phenomenon, and Partee suggests this much in a footnote:

It might be possible to construct a Gricean counterargument to this claim [that tenses refer], and contend that the sentence [1] asserts only that there is sometime in the past at which I did not turn off the stove, with the narrowing down to the relevant times explainable by conversational principles, particularly the principle of relevance. [p. 603]

(1), uttered in isolation, interpreted independently of pragmatic conditions, means that I never turned off the stove. For a stove I am familiar with, the stove in my home, this is almost certainly false. And an utterance expressing such an obviously false statement will not often be relevant in any conversation. But when speaking about a smaller period of time, the assertion is neither plainly false nor irrelevant. It is a real question whether I turned off the stove within some sufficiently restricted interval, a question which in context may not be irrelevant. Partee's footnote, and the correct analysis of (1), sees the restriction as a

pragmatic phenomenon due to Gricean principles. Certain conversations are about some events and not about certain others. A perfectly natural way for a conversation to be about certain events is for it to be about events which occur within a restricted region of the past. Thus relevance will often require that the domain of the quantifier be restricted to a part of the past.

I do not want to imply that a difference between an analysis which treats the phenomenon as a matter of direct reference, and another which treats it as restriction due to Gricean principles, is that the latter is an essentially pragmatic account, whereas the former is not. Because both uses are pragmatic.

Kripke argues that alleged referential uses of expressions such as Donnellan's definite descriptions simply underscore the existence of an important distinction, which Kripke makes between "Speaker's Reference" and "Semantic Reference." Speaker's reference is an intrinsically pragmatic concept. Kripke describes how we often use expressions to talk about certain individuals even though these individuals may not be the "real" semantic referents of the expressions. I, for instance, may be listening to the radio and hear someone whose voice sounds somewhat like our president's. Suppose it is really Casey Casem, and suppose, prompted by the broadcast, I say "Reagan must be talking about terrorism again." Though I use "Reagan" as the name of Reagan, I do, in some sense, refer to Casey Casem. In this case I use the name "Reagan" to talk about some person who is not the semantic referent of the expression. The speaker's referent, my referent, of the expression is Casey Casem, and this differs

from the semantic referent which is Ronald Reagan. The referential use of definite descriptions described by Donnellan is just another case in which the speaker's referent may differ from the semantic referent. For example, if I hear the voice on the radio and ask "What is our president saying now?" I may succeed in referring to Casey Casem with the phrase "our president," though he is not our president. What Kripke emphasizes in his paper is that these differences concern the speech acts performed by the speaker. They are inherently pragmatic. In each case the speaker simply wishes to talk about some particular thing and he or she uses the expression to do so. Kripke's reasoning will apply unchanged to any derivative use of tense.

Nothing new is involved in an account of (1) based on Gricean restriction. This type of pragmatic restriction is an extremely general phenomenon. It occurs with all types of expressions. Viewing tense this way does however make for somewhat less exciting conclusions. We have not been able to excise quantification from the semantics of tense. At the risk of overusing the example, let us consider a few more of Partee's assertions and see whether they are true of the interval, when it is seen to restrict the domain of the quantifier. Partee says that an interval is involved in the problem. We'll consider this point first.

Kripke and Kaplan remind that it is not always possible to identify the referent of a directly referential expression. Similarly it is not necessary that one be able to say something true about the referent. But in the case of (1), one has intuitions about which interval is involved. Enc(82) writes that this interval is "the interval before I left the house." Sentence (1), uttered in the circumstances Partee envisages, would probably be used to

say that I left the stove on. To express this content, (1) would have to mean that at no time after the stove was last turned on and before some other event, perhaps my leaving the house, did I turn the stove off. The interval which begins with the time the stove was last turned on and ends with my exit is a plausible candidate for the relevant interval. (New technological advances may make it possible to turn off appliances from outside the home, so given such advances, (1) could be equivalent to saying I haven't turned off the stove *yet*. This changes the interval so that it ends at the current moment. Any change due to the context will most likely effect the upper bound of the interval, not the lower bound.)

The interval as described is the one beginning with the time the stove was last turned on and ending at the time I left the house, and what I say is that at no point within this interval did I turn off the stove. This formulation still makes reference to times, the times at which certain events occur. But such reference is superfluous. The content of the utterance can be restated so as to make reference only to events and temporal relations among them. For instance, (1) states that there was no event describable as a turning off of the stove by me which occurred after the stove was last turned on and before I left the house.

[(The discussion given in the next three paragraphs is incomplete)] But someone might at this point interject, someone who has read Kamp and Russell, and point out that of course we can paraphrase talk of times in terms of talk of events, for Kamp and Russell showed how this is to be done. So my idea above is neither new nor very interesting. The idea may indeed not be interesting, I agree, but not because it reiterates a

prior mathematical result. The point is wholly independent of this result. Kamp followed Russell and defined intervals as maximal sets of overlapping events. Above we replaced the restricting interval with two events, no mention was made of sets of overlapping events. I believe that any intrusion of intervals into semantics can be described away by individual events or general sets of such events, as the two above.

Intervals of time are not events, and events are not intervals of time. The two sorts of entities have very different properties. The use of expressions in common speech to refer to intervals and events express important intuitive differences the two. It is one goal of this essay to understand something of the relation between events and times. The results of The Kamp-Russell construction should not be misunderstood. They did not show that events and intervals of time are identical things, that intervals of time are abstract, perhaps metaphysical, constructs from events. The intuitive relation is assumed. The result is that given an infinite structure of partially ordered events, there is an isomorphism from the set of maximal sets of overlapping events to the set of moments of time in a standard temporal structure. Because of the isomorphism between the two structures, certain statements about temporal relations among moments of time can be translated into logically equivalent statements about temporal relations among maximal sets of overlapping events. This does not mean maximal sets of events are the same as intervals. It means similar true or false things can be said about each them. The issue of identity is very complex. What, if anything, an identity statements means, and when it means this, are not our concern. The only important point, that will go unargued for here, is that the existence of an

isomorphism between two sets, given a limited set of relations defined on each, does not prove the members of the two sets to be equivalent. For there are many things to be said about times besides that they are ordered in certain ways. None of these statements or predicates is part of the structures.

But again specific questions about the Kamp–Russell construction are not relevant to the current example. Only two events define the interval. The structure of events itself is not isomorphic to an infinite set of densely ordered moments. Events can be simultaneous. They may also overlap. Moments can do neither.]

The picture has changed. The reference is only a restriction, the interval is really two events. Partee asserts that tense refers deictically, that is, directly to a certain interval. Since the interval is only two events, we can translate this claim to mean that the restriction comes about through an implicit reference to two particular events between which I did not turn off the stove. We mentioned a point of Kripke's and Kaplan's, that one need not be able to identify or speak truly of an individual to be able to refer directly to that individual. Still it seemed as if the interval could be described, and we did describe it, namely as the one whose lower bound was an event, the last turning on of the stove, and whose upper bound was another event, my exit from the house. The question is whether in the restriction of the domain of the past, we referred directly to these two events.

As it turns out there are no particular intervals to which we refer directly. And that we are able to identify the events via certain descriptions belies this. The following considerations tell against any direct reference to the events which bound the interval. Suppose that we did indeed refer rigidly to two events, e_1 and e_2 , and that our restricting interval was something like the closed interval with the first as a lower bound and the second as an upper bound. Though e_1 was in fact the last turning off of the stove, there are counterfactual circumstances, fully compatible with the utterance context, in which e_1 , though a turning on of the stove, was not the last such turning on. Perhaps this distinction was held by another event e_3 which follows e_1 . Suppose further that I turned off the stove sometime in between e_1 and e_3 , and never again before I left. In such a case would (1) be uttered truly, driving down the highway?

It seems not. (1) would be false, primarily because the stove was still on when I left the house. It does not matter that I turned the stove off at some point, what matters is that I did not turn it off inside the interval $[e_3, e_2]$. For e_3 has become the lower bound of the relevant interval. e_1 , not being the last turning on of the stove, does not play a role in the interpretation. It is of no consequence that I turn off the stove at sometime within the interval $[e_1, e_2]$. The lower bound of the relevant interval is defined by the property of being that last event which was a turning on of the stove. e_1 is referred to only insofar as it satisfies the description, and it therefore is not referred to directly.

There is one more point to consider. Partee says in the opening paragraph that the phenomenon exemplified by example (1) does not occur with the

future tense. Presumably this is because it is not possible to refer directly to future individuals or future intervals of time. But since (1) turns out to not involve direct reference, one would be surprised if the phenomenon did not occur with the future tense. Consider this situation: two bank robbers are driving down the highway on their way to rob a bank. One turns to the other and says, "I will not trip the alarm." This does not mean that he promises never in the future to trip the alarm, nor that he promises not to trip the alarm at a particular moment of time. Rather it means that within some interval, plausibly taken to be the time between the robbers entrance into and exit from the bank, that he will not trip the alarm. The case is completely analogous to the example in (1).

Section Conclusion

We can sum up the discussion in this way. Partee is correct when she rejects simple analyses of (1), if these analyses are all that is to be said about the example. On these interpretations, the past tense is treated as an unrestricted quantifier ranging over all past moments of time. Depending on the order of the quantifier with respect to the negation sign, the readings say either that I never turned off the stove or that at some past moment I did not turn off the stove at that moment. The first is probably false and the second is certainly true. And neither is a correct way to interpret (1).

Partee is incorrect in claiming that the sentence referred to an interval of time, if by this she meant that the reference involved more than events

and their temporal relations. One assumes that Partee did conceive of intervals as distinct from the actual events which bound them, because non-deictic reference to events has been part of semantics since Reichenbach, and by tacitly assuming that intervals are nothing above events, her examples would demonstrate nothing new. The remark in the footnote is accurate. The alleged reference to intervals is really only a restriction of the domain of the past tense to a subpart of that domain. And however that subpart is chosen, it is not referred to directly, contrary to another claim.

The final claim is that the interval in question is salient in the extralinguistic context. Given that the utterance does not refer to particular events or intervals, it refers to no particular *salient* events or intervals. In short, the example (1), which has been the sole example of direct reference to times by tense (the only one presented in the literature!) does not show what it was supposed to. The second simple analysis, which Partee rejects, coupled with Gricean principles, gives a correct analysis of the sentence.

The Generality of Contextual Restriction

The Gricean principle of relevance has similar effects in the use of nominal expressions. I have in mind the way the domain of common noun extensions are restricted in every day speech. To take an ordinary example, a student who utters (8) after finishing his exam does not say that every senior in the whole world flunked *this* exam.

(8) Every senior flunked.

Which would be absurd. He only says that some group of seniors flunked the exam. Most likely this group will consist only of the seniors in the class. But other groups are possible. He may refer only to the seniors in the class who took the exam at the time he did. In any case, the extension of the predicate *senior* must implicitly be restricted to arrive at a reasonable and relevant interpretation. The fact is that one almost never uses nominal expressions in such a way that their constituent common nouns (if there are any) have their most general extension.

What enables definite descriptions to meet the uniqueness requirement, a presupposition or implication or whatever, is often the flexibility with which common nouns adapt their extensions to context. Barwise and Perry call this the *efficiency of language*. If I describe a book to someone who is searching in my room, I may distinguish the book by calling it "the biggest book," "the red book," or "the book with the tear in the cover." By doing so I do not imply that it is the largest book in the world, or the only red one, for there are many red books, or the only book with a torn cover. My book does not satisfy any of these descriptions uniquely. But it may be the largest book in the room, the only red one, and the only one in my room with a torn cover. When someone uses a descriptive or quantified phrase, the extension of constituent nouns will be adapted to the context of utterance. When someone says that "No one fell asleep," or "Everyman arrived with a woman," or "Every child had a healthy breakfast," they are not saying things which are universal and false. Rather they may speak truly of some limited group of people, men, and children.

It seems that the effects which the Principle of Relevance have on the extension of nouns and tenses can be attributed to a difference between the speaker's reference and the semantic reference of the expressions. In the one case, the speaker uses the tense to describe some relevant set of events, and in the other case he uses it to describe some group of general individuals. A person who utters (1) while driving down the highway is not concerned about all the past times at which he did not turn off the stove. He is concerned only with some subset of the past events, and he says, speaking of this subset, that it did not contain a turning off of the stove by him. When I say "Every man arrived with a woman," I use the noun "Every man" to talk about all of the members of some limited group of men. The semantic reference of the past tense may include all past moments and that semantic reference of "man" all men, but I can use these expressions to refer to certain groups, just as I can use "our president" or "Reagan" to refer to Casey Casem.

One can ask a reasonable question about utterances in which the speaker uses an expression to refer to something other than the semantic referent of the expression. In such utterances, must the speaker refer directly to whatever is the speaker's referent? The answer seems to be no. We saw, in the case of (1), that the events implicitly referred to by the restriction are not directly designated. In Kripke (77) all of the examples involve names, pronouns, or definite descriptions, all of which may refer directly to an individual. But Kripke does not take the step and say, in all cases where the speaker's referent differs from the semantic referent, that the

speaker refers directly to the speaker's referent. Example (1) shows that such a move would not be right.

But Enc(82) makes just this mistake. There she argues that nouns and verbs are essentially indexical. They are indexical because the set of individuals to which a noun or verb refers may depend on the context of utterance. Enc considers the following examples:

7. Every lizard will die.
8. All rich men were obnoxious children.
9. Every fugitive is now in jail.
10. Everyone met a president.

She points out that in (1) the noun *lizard* may be used to refer only to present and future lizards; in (2) only present and past rich men are relevant; in (3), if we are to avoid contradiction, *fugitive* must mean past fugitive; and (4) may be about presidents, past, present, and future.

An important fact to realize about nouns is that they do not have to refer to present satisfiers of the predicate. They may also refer to past or future individuals. Enc argues for this persuasively. If one were to associate a set with a noun (N) as its semantic interpretation, one ought to choose the set of individuals x , such that for some time t , $N(x)$ at t . Nouns are tenseless predicates. Any narrowing down of the tenseless extension is attributable to semantic effects, such as embedding in an opaque context, or pragmatic principles, such as the principle of relevance.

Enc mistakenly believes that whenever the predicate is restricted to, say, past individuals, the noun phrase deictically refers to this group of

individuals. To see that this is false, consider example (9). The intuitively correct interpretation of (9) has fugitives referring to past fugitives. And clearly under different counterfactual circumstances different individuals will have been fugitives in the past. These counterfactual circumstances are fully compatible with a felicitous utterance of (9). An utterance of (9) in no way determines who the past fugitives were. The use of the sentence may determine that only past fugitives under discussion, but beyond this, one does not determine to whom the predicate applied. The same is true of the other examples. In each instance, a restriction on the extension of the noun is given in context, but this restriction does not make the predicate apply to any *particular* group of individuals. The context restricts fugitives to past fugitives. Past fugitives include Charles Manson, but it is possible that Charles Manson might not have committed his crimes. Whether he did or not is certainly not determined by a felicitous utterance of (9).

Tenses as Predicates and Direct Reference to Events and States

This section of the chapter was never written. Nevertheless, there are references to it in later chapters. To give these references some context, the general conclusions of this section are summarized along with the lines of reasoning leading up to them.

In this section, I intended to argue that direct reference to states is only possible if there is a prior reference to events. Direct reference to events is not dependent upon any further reference.

Deictic reference to events is as common as deictic reference to individuals. We often speak of events with the deictic pronouns *this* and *that*. Reading an old newspaper, I may ask my friend if he remembers *that* accident. I refer deictically to an accident, that we both observed as children. Discussing a football game, I may ask a friend if he remembers *that* great catch by Stanley Morgan. The phenomena of improper description, noted by Donnellan, also occur when events are the object of reference. I may talk of a certain "great catch by Morgan" in yesterday's football game. However, I may be mistaken, and my friend might correct me, saying "It was Al Ladd who made *that* catch, not Stanley Morgan." If he is right, then I have referred directly to a certain event, a catching of a football, but misdescribed it as an act of Stanley Morgan's.

The general point arises that most of our past tense descriptions are not standard existential descriptions, but instead involve direct reference to particular events. I may recount my exploits in a baseball game, saying I hit a home run (or simply "homered"). I do not make a simple existential statement to the effect that there exists a past event of hitting home run of which I am the agent. Rather, I refer directly to the particular act: a particular event of homering done by me. Someone who is acquainted with my game, may correct me, and point out that I did not hit a home run, but only a triple and scored on an error. That person corrects my description of a *particular* event. When we describe events with which we are familiar,

we generally refer directly to those events, instead of asserting the mere existence of an event with such and such properties.

The issue of direct reference to states is much more subtle. States are temporally extended entities just like events. However, unlike events, states are homogeneous. Events are indivisible. Events are discreet, countable, entities. Distinct events can be distinguished in the sameway distinct rubber balls are distinguished. When an event is referred to directly, there is no ambiguity: one can, as it were, take the event as a whole. States are more like mass objects, such as water. Portions of water have to be delimited by some container. To refer to a portion of water, the boundaries of the volume must be determined by some external object. If a mass of water were simply given, it would be impossible to distinguish a particular portion for purposes of direct reference. Similar problems arise for direct and indirect reference to states. Since states are homogeneous, there must be something which delimits a certain duration of the state. These containers, delimiting entities, are events. One can only individuate a certain state when its boundaries are determined by some events, perhaps the beginning and ceasing of the state. Direct reference to a state is only possible through a direct reference to the events which determined the states' duration. When we speak of *that* state of John being happy, we refer to a state which is either simultaneous with a certain event or has its extension delimited by events, between which it holds. Later, the stronger argument will be made that states only exist when they are delimited by events.

CHAPTER TWO

The Temporal Interpretation of Discourse

Introduction

This chapter is concerned with the temporal interpretation of eventualities described in extended discourse structures. The phenomena we consider have been discussed by a number of writers. Partee(70) introduced the topic into the literature. A decade later, the subject was given a rich and interesting exposition in Hinrichs(83). In this chapter, we concentrate on the theory of Hinrichs(86), a revised version of Hinrichs(83). We discuss the internal workings and the predictions of the theory. Hinrichs' theory, as we will show, is fundamentally flawed. It does not give rise to correct empirical predictions and its conception of the nature of the phenomena is theoretically inappropriate. The problems of the theory are discussed in detail in order that we may better understand the phenomena and develop a correct account of the facts. The phenomena are reanalyzed and an explanation is put forth, which accounts for the facts, while avoiding the problems implicit in Hinrichs' theory.

The Phenomena

We begin with Partee. Partee(70) makes the claim that tenses are, in many ways, very similar to pronouns. The paper argues for certain uses of tense which parallel those of pronouns. Pronouns have two principle uses. They can either refer directly to individuals in the extra-linguistic context, or be bound by other expressions and receive their referents at second hand

from the linguistic context. In between these two extremes, there is a middle ground in which the full referent is determined in part by both the linguistic and non-linguistic contexts. The thesis of Partee(70) is presented in two parts. First, it is argued that tenses can be used referentially, in the manner of a deictic use of pronouns. This claim, that tenses sometimes deictically refer to intervals of time, is discussed in the first chapter of this essay. For the second thesis, Partee(70) has it that the tenses may be anaphorically bound, on analogy with pronouns.

Partee(70) cites phenomena which seem to demonstrate an anaphoric use of tense, on which tenses are bound, and receive their referents derivatively through antecedent tenses. The examples in (1) are representative:

- 1a. When John fell of the tree, he broke his leg.
- b. When John went to sleep, the bed was cold.

Partee notes that the eventualities described in the main clauses of (1) do not hold or occur at any time, but rather take place at what appear to be definite intervals. The event of John breaking his leg in (1a) occurs at the time he hits the ground, after falling out of the tree. The bed is cold in (1b) at the time John goes to sleep. Partee takes these facts as evidence of tense binding.

With this suggestion, the notion of temporal anaphora is introduced by Partee(70) to describe apparent dependencies of tense morphemes, temporal adverbs, and temporal conjunctions on one another. Hinrichs(86) develops Partee's ideas. He adopts Partee's basic assumptions, that tense

is a referential expression, which can bind and be bound by other temporal expressions, and develops an account of temporal anaphora in discourse based on these ideas. The linguistic domain at issue is past tense "narrative" structure. This structure consists of a series of sentences in the past tense, in which eventualities described by sentences and verbs are often interpreted as bearing certain temporal relations to intervals, denoted by adverbs and events of other sentences. The apparently semantic dependency between temporal expressions is what Partee and Hinrichs call temporal anaphora.

Partee considers two varieties of temporal anaphora. One involves temporal conjunctions and tense morphemes, as in (1), and the other temporal adverbs and tense morphemes, as in (2). Temporal conjunctions are prepositions such as *when* which, according to Partee and Hinrichs, relate tenses from different clauses:

2. Yesterday John went to the store.

The idea, in (2), is that the temporal adverb *Yesterday* binds the tense in the subsequent clause, and thus determines the temporal position of the described event. Hinrichs considers a much wider range of dependencies. He discusses all nine binary combinations of tense morphemes, temporal adverbs, and temporal conjunctions. This chapter concentrates on what Partee and Hinrichs describe as the binding of one tense morpheme by another, "tense morpheme - tense morpheme anaphora."

The Facts

Examples of temporal dependency are very common. Temporal dependencies often hold among the interpretations of sentences uttered in the past tense. A speaker uttering a series of past tense indicative sentences will generally describe a series of events, and associated states, ordered in time. Past tense discourse structures are often narrative structures. Classical narrative structures found in fictional work, especially the genre of detective novels, involve clear cases of temporal dependency. The events described in these narratives are generally punctual, and follow one other in an orderly way. We will use the terms "narrative" and "discourse" interchangeably as names for structures of past tense sentences. We do not assume that events described in narrative must be related temporally. This may be true, but a definition of narrative is not at issue.

Hinrichs' generalizations distinguish between the aspectual classes of verbs. Following Vendler(67), Hinrichs divides verbs into (those which describe) accomplishments, achievements, states, and activities. Accomplishments, or what Bach(82) calls "extended events," include *house buildings, walkings from one place to another, any part of the rotation of the earth around the sun, writing an article* and so on. These events span a non-zero yet finite period of time. Achievements, on the other hand, are events which occur in an instant (or at least seem to). Achievements include *winning a race, noticing someone, departing, and beginning*. Activities, or process, verb phrases include *run, push a cart, and sip a glass of water*. Intuitively activity phrases describe dynamic, but relatively homogeneous eventualities. *Love, be dark, and be a tall man* are stative verbs. States are static;

they describe temporally extended properties. Hinrichs' rules treat accomplishments and achievements as one class, and activities and states, as another. We use "events" as the general term for accomplishments and achievements, while Vendler's states and activities are termed "states." "Event" and "state" are both used ambiguously to refer to the linguistic expressions, verbs, verb phrases, or sentences, and the eventualities described by these expressions.

The following example illustrates the phenomenon Hinrichs wishes to describe:

3. John took off his clothes [e_1], went to the bathroom [e_2], took a shower [e_3], and went to bed [e_4].

(3) consists of a single sentence with four conjoined verb phrases. The verb phrases all describe eventive acts of John's. The series of John's actions in (3) do not occur at arbitrary times. They occur in succession. He first takes off his clothes, and then goes into the bathroom, and then takes a shower, and finally, when he is finished, goes to bed. One event follows another, there is no overlap. The same dependencies hold irrespective of whether the verbs are in the same or succeeding sentences. The sentences in (4) show dependencies identical to those found among the verb phrases in (3):

4. The girl brushed the dust off the leather cover [e_1]. She opened the volume to the second chapter [e_2] and began to turn the yellowing pages [e_3]. She stopped at the sound of someone approaching [e_4].

It is important to note that, in both cases, the events are ordered in time. Secondly, they are not ordered randomly. They are ordered in the way they are presented. The events described in the next sentences follow, at some temporal distance, the events described in sentences which come before. This is a fact which Hinrichs seeks to explain.

Hinrichs cites the discourses below as evidence for his generalizations about how states are temporally related to surrounding eventualities:

5. He went to the window [e_1], and pulled aside the soft drapes [e_2]. It was a casement window [s_1] and both panels were cracked out [s_2] to let in the night air. The apartment was on the second floor [s_3]. The window itself was a scant five feet above the roof [s_4].

6. Jameson entered the room [e_1], shut the door carefully [e_2], and switched off the light [e_3]. It was pitch dark around him [s_1], because the venetian blinds were closed [s_2].

Discourse (5) demonstrates how states may overlap preceding events or preceding states. The states in (5), s_1 - s_4 , are most naturally taken to overlap each other and the two events, e_1 and e_2 ; we assume the window was a casement window, the panes were open, the apartment was on the second floor, and window was at its current height before, during, and after the time Jones went to the window and opened the drapes. States are not required to follow upon other eventualities. Overlap is a possibility. There are examples, however, where states follow previous eventualities. In (6) State s_2 overlaps all of the preceding eventualities, but, since the room becomes dark only after the light goes out, the state s_1 seems naturally to follow the event e_3 .

Apparently states have more freedom than events. They seem to be able either to overlap or follow eventualities described by preceding sentences. But there are generalizations within this observation. States may overlap or follow eventualities, but they must overlap each state introduced since the last event. The eventive sentences in a discourse seem to divide the discourse into a set of equivalence class of sentences. Each eventive sentence is associated with the class of sentences that contains it and all stative sentences which follow, up to the next eventive sentence. (The first such class may include any states introduced before the first event.) The states in (5) are an example: they must all overlap, though it is not determined whether they must overlap the events.

Hinrichs' Theory

Hinrichs' first observation is that in narrative structures such as (3) and (4), events (achievements or accomplishments) described in successive sentences must occur after one another if the discourse is to be true. His system deduces this statement as a consequence. The rules of the system predict that, for ρ_i and ρ_j sentences ordered in a discourse, $j > i$, i.e., ρ_j after ρ_i , and describing events e_i and e_j respectively (and ρ_j without temporal adverbs), e_j follows e_i . His second observation concerns states. States in succession must all overlap. Furthermore states may overlap or follow any preceding event. If ρ_1, \dots, ρ_n are successive sentences in a discourse (all, except perhaps ρ_1 , without adverbs), describing states s_1, \dots, s_n , then s_1, \dots, s_n mutually overlap. If ρ_i and ρ_j are sentences ordered in a discourse, $j > i$, describing an event e_i and a state s_j , respectively, then s_j overlaps or follows e_i .

The details of Hinrichs' system involve a fair bit of formalism. The mechanics of the system are quite simple, however. At the heart of Hinrichs framework is the notion of a reference time. A reference time is simply an event without content. It is an empty event whose only properties are its relations to other events. A reference time is determined by the framework for the beginning of each discourse. Since the narrative discourse is in the past tense, the system specifies that the reference time be prior to the speech time. There are three basic routines which apply after a past reference time is established. Which one applies depends on whether a state, event, or temporal adverb is processed:

7i. If the expression encountered (the element with the greatest scope in the remaining discourse) is a temporal adverb, create a new reference time corresponding to the interval denoted by the adverb.

ii. If the expression encountered is an eventive verb or sentence, the event described falls within the current reference time. The reference time is updated to a new duration (wholly) later than the previous reference time, yet prior to the speech time.

iii. If the expression encountered is a stative verb or sentence, the state described is specified to (wholly) include the current reference time. No new reference time is introduced.

We can test the machine on the discourse in (6) (repeated here):

6. James entered the room [e_1], shut the door [e_2], and switched off the light [e_3]. It was pitched dark around him [s_1] because the venetian blinds were closed [s_2].

The interpretive process begins with a reference time r_1 specified to be prior to the speech time (the moment of utterance). This is the initial state. The first verb phrase of the sentence is processed by (7ii), and e_1 is placed within the reference time r_1 . The reference time is shifted

forward to a new interval r_2 . Procedure (7ii) then processes the second verb phrase of the sentence, and places e_2 within r_2 . A new reference time r_3 is created. A third application of (7ii) to the rest of the sentence places e_3 inside r_3 . And a new reference following r_4 is introduced. When the first state description is encountered, the process places the state s_1 so that it includes the reference time r_4 . Another application of (7iii) places the state s_2 so that it too includes r_4 .

The results of the process, for each step, are given below (where **NOW** is the speech time, $x \Sigma y$ means x includes y , and $x > y$ means y precedes x).

- 8i. $r_1 < \mathbf{NOW}$ initial state
- ii. $r_1 \Sigma e_1, \mathbf{NOW} > r_2 > r_1$ (7ii)
- iii. $r_2 \Sigma e_2, \mathbf{NOW} > r_3 > r_2$ (7ii)
- iv. $r_3 \Sigma e_3, \mathbf{NOW} > r_4 > r_3$ (7ii)
- v. $s_1 \Sigma r_4$ (7iii)
- vi. $s_2 \Sigma r_4$ (7iii)

The complete structure has $e_1 - e_3$ in order, all prior to the moment of utterance, with s_1 and s_2 overlapping the reference time r_4 , which follows e_3 .

Counterexamples

Some important predictions of the theory are:

9a. Events described in the same discourse will always wholly precede or follow one another. This is insured by the provision that events occur within the reference time and that, for each event processed by the system, a new reference time wholly after the old one is created. Since reference times are disjoint, events falling within them are also disjoint.

However we seem to have different interpretations for these two cases. Hinrichs mistakenly, I believe, reads (32), and (11i) too, I would presume, so that inviting old friends is something the Smiths did before they threw a party. But this is incorrect because inviting people is quite an integral *part* of throwing a party. Inviting friends, like buying food, and arranging music, takes place during the time that the party is "thrown." Throwing a party, as I see it, is something more than the festivities, it extends before the festivities into the preparations and perhaps after into the clean up. Clearly these judgments are soft, dependent as they are on beliefs about the world. My judgments are certainly plausible, if not universal. What makes Hinrichs' interpretation especially unlikely is that there seem to be no other clear examples of sentences, without temporal adverbs, that describe events which occur before an event described by a preceding sentence.

But if (11i) is unconvincing, the examples in (11ii) and (11iii) are clearer. In (11ii) the two events of me reading chapter three, or the one event of me reading chapter three twice, are likely to occur within the span of time when I was reading the whole book. Similarly in (11iii) Sam gets drunk at Mary's party, and therefore sometime during the party. The events described in the second sentences occur while the first events are in progress. They do not follow the first events. These examples count against Heinrich's generalization, which states that an accomplishment or achievement must follow other accomplishments or achievements which precede it in discourse. All the main verbs are accomplishments in (11), and yet the second events do not follow the first.

There are also counterexamples in which the events overlap. The phrases in the third sentence of the discourse below are of this sort.

13. It was near the end of our sixth grade year. Robert walked out on stage with a unicycle, three balls, and a harmonica. *He rode the unicycle, and, with his hands, he juggled, and, in his mouth, he played the harmonica.* Everyone was astounded.

Anyone who knows Robert, and even those who don't, will interpret the italicized sentence to mean Robert rode the unicycle, juggled, and played the harmonica all at once. Our knowledge of the world suggests this interpretation. We know people are capable of doing things simultaneously with their mouth, hands, and legs. We know it is impressive to ride a unicycle, juggle, and play an instrument at the same time. And we know people do impressive things on stage. We conclude readily enough that Robert performed his feats at the same time.

Another set of examples are narratives whose sentences describe simultaneous events. Within some limit of precision, we can say with (14) that people danced as long as the song played:

14. The party was wonderful. We played the "La Bamba" song and everyone danced.

In other counterexamples, a single event is redescribed in different sentences. Since the events described by the sentences are the same, the sentences describe simultaneous happenings:

15. John knelt at the edge of the stream and washed his face and hands. He washed slowly, feeling the welcome sensation of the icy water on his parched skin.(From Dowty(86))

The event of John's kneeling at the edge of the stream and washing himself is described in both sentences. Though the two sentences say different things, they say those things about the same event.

Counterexamples With Temporal Adverbs

The first sentence of (16) is a counterexample to Hinrichs' prediction about the interpretation of sentences describing events and adverbs:

16. Yesterday James entered the room [e_1], shut the door [e_2], and switched off the light [e_3]. It was pitched dark around him [s_1] because the venetian blinds were closed [s_2].

(16) is discourse (6) with the adverb prefixed to the front. The interpretive process begins with a reference time prior to the speech time. The temporal adverb triggers the creation of a new reference time corresponding to Yesterday. Process (7ii) then places the first event e_1 within the reference time and creates a new reference time after yesterday. The system places the next event within this new reference time following yesterday, and so on with the third event of the sentence. On this interpretation, John enters the room yesterday, but shuts the door and switches off the light some time after yesterday (prediction 9b). But this is not what the first sentence means. All three events occur in succession, all during yesterday. In order to handle this and similar sentences correctly, the system might be redesigned initially so that individual events do not create new reference times which follow previous ones, when these events are within the "immediate" scope of the same sentential adverb. Yet this modification is not sufficient because, as

(17) demonstrates, events described in sentences after the adverb may still be interpreted to fall within the interval denoted by the adverb:

17. John went to the bank yesterday. He took out three thousand dollars.

The facts do not depend on the scope of the adverb. The events described by the second verb phrase in (16) and the second sentence in (17) are naturally thought to occur during yesterday. Whether the next events fall within or follow the interval denoted by an adverb depends on the content of the individual sentences. In (18) the events described in the second sentence occur on the same day, while the events described in the fourth sentence occur the next day:

18. Last night, all John did was study. When he finished, he was confident. He slept soundly. He woke up feeling good, took the test and passed with flying colors.

It is not clear how to capture the relevant generalizations within Hinrichs' framework, i.e., when only the only data are aspectual class, referents of temporal adverbs, and scope relations.

Counterexamples With State Descriptions

Hinrichs' basic observations about state descriptions (see (9c)) seem to be accurate. But the way he derives his predictions leads to some unfortunate and false consequences. The place where Hinrichs goes awry is in the details of the system. The skemata in (10) show exactly where Hinrichs goes wrong. His system requires that if a state is to overlap an event it must still span beyond the event into the future. This is insured by the

forward moving reference time. This conclusion is false as (19) demonstrates.

19. I lifted the stone [e_1]. It was heavy in my hand [s_1].

From what we know of these sentences it is evident that s_1 overlaps e_1 . It is equally clear however that the state ceases when the event concludes; the state does not span beyond the event either into the past or the future; the two are temporally coextensive.

Cases (11)-(19) show that all the predictions in (9) fail. These types of examples can be multiplied. They conflict with the theory in that they may be part of a discourse and yet possess readings which are definitely contrary to the theory's empirical predictions. In (11) the events are included within preceding events, in (13) they overlap, in (14) and (15) they are simultaneous, and in (19) the state does not extend past a preceding event.

Response to Counterexamples

There is something nagging about these examples. They seem too widespread and too obvious. Perhaps we have missed something. Partee even mentions sentence (11iii), but is not disturbed that it contradicts the predictions of Hinrichs' theory which form the basis of her own. Given this odd state of affairs, a simple objection may seem in order.

Modes of Discourse Structure

Partee and Hinrichs would acknowledge that the examples mentioned above have the full range of interpretations we attribute to them. The raw data as a whole, they agree, do not conform to the predictions of the theory. When the full range of data is admitted, many counterexamples arise. They defend the system, however, on the grounds that the scope of the theory is limited. The theory presented in Hinrichs(86), has no great aspirations, it is not meant to account for all of the temporal relations among eventualities described in every narrative. It only applies to some forms of narrative. Many structures fall outside the province of the theory. The interpretation of these uncountenanced structures do not have to conform to predictions.

According to Partee(84), there are general classes of narrative structures. Some of these classes conform to the theory's predictions, while others do not. Different classes are said to belong to different "modes" of discourse organization. The different modes are distinguished by the temporal orders in which they place events, the orders being

determined by abstract linguistic principles. As Partee(84) presents it: "...simple linear progression is just one mode of discourse organization. Let us assume then that 'simple linear progression' is one possible value, probably the unmarked one, of a higher-order parameter of discourse structure..."[p. 260] The counterexamples presumably belong to non-linear forms of discourse. This assumption, that there are different types of discourse structures, is all that defends the theory against the plethora of counterexamples. For if there are no significant reasons to distinguish the good examples from the bad, then the bad ones are very real problems for Hinrichs' system. The pivotal thesis about the nature of discourse is presented and assumed completely without argument.

Partee(84) and Hinrichs(86) neither explain nor justify the assertion about different modes of discourse, that "'simple linear progression' is one possible value...of a higher order parameter of discourse structure..." They do not say what a higher-order parameter of discourse structure is, nor why we should believe in them, nor do they give the reasons for distinguishing the linear progression mode as one of its values. In short, no reasons are given for why narrative structures which conform to the theory should be distinguished from those which do not. We are given no reason to disregard the counterexamples.

The supposition that narrative structures divide into distinct modes seems to be a rather weak stitch in the theory. Nevertheless we will develop it in as much detail as possible to see if it is substantial. The main reason why the supposition has to be justified is because the theory

would be empirically uninteresting if linear narrative were simply stipulated to be the object of investigation.

Narratives whose interpretations place described events in linear temporal order may constitute a legitimate empirical domain, but this domain in itself is arbitrary and undistinguished. If the supposition is not derived from more basic considerations, the theory changes in nature. Linear progression of events is to be distinguished from all other forms of progression. Narratives which order events in sequence are the objects of explanation. The theory is defined only on this domain. Originally, as we conceived it above, the succession of events in discourse was an empirical fact to be explained by the theory. The theory made this prediction, and, the interpretations of some examples conform to the prediction. With the new supposition, succession in discourse is still a fact about the interpretation of narrative structures, but it is not a fact to be explained by Hinrichs' theory. The theory applies to examples of this sort by definition (or supposition). That there are structures in which events follow in order is assumed, not derived.

The supposition supplemented theory does not make predictions about all narrative structures, but only a restricted subset of structures. The theory applies only to narratives whose interpretations order events in sequence. Its predictions are of the form: If structure **X** is a linear structure, then... For instance, the theory predicts that if the interpretation of a structure orders events in sequence, then states in the interpretation either overlap or follow preceding events. The predictions are simply correlations between linear order and other temporal

properties an interpretation might have. The problem is that it is not exactly clear why we should be particularly interested in linear narrative or in the relation between linear order and other temporal properties. Such an object of investigation appears to be artificially restricted. It is like building a linguistic theory for only one language. We could conceivably develop a theory of syntax which only applies to French or English, but why? Why would we want to do this?

Linear progression is alleged to be one value of some parameter. The obvious questions are: what type of parameter is this, and which parameter is it? But before these questions are addressed we should clarify the relation between the linear progression and the empirical content of the parameter. The empirical content of a parameter is determined by the role the parameter plays in a correct explanation of a domain of facts. In syntax research, for instance, the domains are the different languages. Languages differ on the basis of the values of the parameters. Syntactic parameters refer to characteristics of syntactic structures. Parameters such as the one referring to the order between a head and its complement are postulated because many facts in language depend on this choice. By assuming different values, we can predict widely varying sets of facts. The different choices have empirical consequences and are postulated to *explain* the facts in some domain. Parameters are not of the form *X* is French, rather the facts which are "French" are isolated independently and explained by choices of parameters. Similarly the choice of Partee's discourse parameter is not "linear" or "non-linear." Linear progression is not a value of the parameter. If linear discourse forms an independent factual domain, the parameter should not simply

name this domain, it must derive the properties of linear discourse as consequences. The parameter must make reference to other concepts, and in conjunction with other principles, form a principled explanation of the phenomena of linear discourse.

But once we begin to think about what the parameter would be and what it would refer to, the idea becomes suspect. Syntactic parameters can refer to properties of independently motivated syntactic representations. If there are semantic parameters, they may refer to properties of relations, such as the predicate-argument relation and argument-modifier relations. But what would a higher-order parameter of discourse structure refer to? What are the independent properties of discourse structures that a parameter might be concerned with? The narrative structures that Partee and Hinrichs wish to distinguish do not differ syntactically. They are not structurally distinct. However, they do not seem to be semantically different either. The same predicate-argument relations are present in both the valid cases and the counterexamples, similar words are used, and they share other obvious semantic properties. Beyond the objects described by syntax and structural semantics, which include nominal anaphoric relations, narratives do not have any obvious structure. There are no other structural ways in which narratives differ.

The only potential influences outside of syntax and structural semantics are pragmatic. Pragmatic influences are influences which derive from conversational conventions and common knowledge taken from experience. Different conversational conventions can be isolated and described in a rough manner, but our knowledge of them is essentially unstructured, and

the descriptions of these conventions are presented in non-structural terms. Principles of conversation should perhaps be thought of as a special type of common knowledge which concerns the use of language and communication. Common knowledge, if structured, is not structure in a way relevant to the study of language. One cannot predict when a certain conversational convention is to be employed in the interpretation of a certain sentence, nor what elements of general knowledge influence the interpretation, nor how the interpretation is influenced. Any claim that certain pragmatic principles apply to certain discourse structures and not to others is unsupported by the evidence. There is no evidence to suggest that pragmatic principles apply to distinct domains, and even less to suggest that they apply to domains defined by the differences among narrative structures.

We must assume pragmatic principles are employed in interpreting all narrative structures. Narratives cannot be distinguished by whether a certain principle was used in their interpretation. They can only be distinguished, if at all, by the effect pragmatics has on their interpretation. The distinction between linearly ordered structure and others may be drawn from how pragmatics effects interpretation. Partee describes linear progression as the unmarked case of discourse structure. This suggests that ancillary pragmatic influences distort the interpretations of structures in the marked periphery, making them non-linear. The core examples are unaffected by disruptive factors.

The Response

The counterexamples appear to depend on some special interpretive features, features that seem to be lacking in sentences which are in accord with Hinrichs' theory. The second sentences in (11) each add descriptive content to the first sentences. We learn more about the Johnsons' party in (11i) from the fact that they invited all their old friends. The second part of (11ii) informs that in reading the book carefully, I read chapter three twice. In (11iii) the first sentence says Mary threw a party, and the second sentence says what happened at that party. The events mentioned in each of the second sentences are, in a way, part of the events described by the first sentences. (If a party is something more than the events which occur at and during it, Sam's getting drunk is not exactly a *part* of the party. But it is essentially related to the party, and this is all that is important.) The connection between the two events is why the second event is temporally included within the first event.

It is plausible that the connection between the events is an empirical one. One knows that reading a book involves reading through all of the chapters, and on this basis, reading the third chapter is seen to be a part of reading a whole book. Pragmatic principles of relevance and informativeness suggest that the second event, reading chapter three twice, is related to the event of reading the whole book. This leads one to place the second event as part of the first. Whether knowledge that a chapter is part of a book, or more generally that reading a chapter is part of reading a book, is empirical is not certain. The empirical basis of the knowledge responsible for connecting Mary's party and Sam's getting drunk is much clearer though. While a semantic account of the expression *a chapter* plausibly

includes a description of chapters as parts of larger works, e.g. books, thereby suggesting, when aided by conversational conventions, that reading the third chapter is part of reading a book, no reasonable semantic account of (11iii) relates the events of Mary's party and Sam's drunkenness. It is no facet of the meaning of *party*, narrowly construed, that one gets drunk at them. Other things one knows about parties may support such an inference, but that does not change the fact that the meanings of "Mary threw a party" and "Sam got drunk" do not alone, nor with conversational principles, affect a relation between the two events. Extra-linguistic information about parties and drinking, over and above the meaning of sentences, is what the objector does not like (Quine's arguments notwithstanding).

Gricean conversational principles play a very strong role in the interpretation of these sentences. Grice's principles state that the context must be relevant to each utterance. The surrounding context in example (13) strongly influences the interpretation. That context implies that Robert's actions were somehow impressive, and this encourages one to assume that his acts occurred simultaneously. Other sorts of knowledge about bodily mechanics, theatrical performance, and age, also suggest this interpretation. If any of this information were different or not present, the interpretation might be different. Knowledge clearly accompanies our interpretation of examples (14). It is assumed that people dance to music at parties. People usually dance only when music is playing (dancing without music is looked upon as a social aberration). We assume, therefore, that people danced at the same time the "La Bamba" song was playing and only then. In (19) the knowledge that lifting a stone implies

supporting a certain weight helps us to the conclusion that the heaviness of the stone spans the event of lifting. Knowledge that one ceases to support an entity when it is put down tells that the state of heaviness does not extend beyond the event of the lifting.

The first step in THE OBJECTION is to establish a difference between the type of extra-linguistic knowledge that one has of the counterexamples and the type of information that forms the data of Hinrichs' theory. The idea is that the former knowledge is empirical while the concepts and principles of Hinrichs' theory are more narrowly semantic. On the surface, this is a plausible position. Hinrichs' system refers to a number of concepts, none of which are wholly extra-linguistic or empirical. Reference time is a theory internal concept. Speech time, though a common notion from speech act theory, is not used in this way. Hinrichs' use of the term is related to speech act theory only when his theory is applied to a particular utterance. Within the theory, it is merely a contextual variable. The objector would consider aspect to be a semantic property of linguistic expressions. Grammatical tests, based on tense and aspect, define aspectual class.

Hinrichs' theory makes use of far less semantic information than the meanings of sentences narrowly construed. The only pertinent semantic properties of the sentences are the interpretations of temporal adverbs (which determines changes in reference time) and the aspectual classes of the main verbs, defined by grammatical tests (which determine the relation of an eventuality to the reference time). Scopal relations are syntactic. The theory does not consider other facts such as the identity of

the event predicates, the verbs, nor does it set any identity conditions on the subjects of distinct sentences, nor do questions of agency arise. The theory's needs are very limited and so do not encompass overtly non-semantic, worldly knowledge. In terms of direct knowledge about the interpretation of the sentential and verbal components of the discourse, it appears that one needs to know only the aspectual class of the main verb, scope relations, and the referents of temporal adverbs to apply Hinrichs rules. (Dowty would dispute this, perhaps, he claims, in Dowty(86), that the aspectual class of the sentence is relevant. There he discusses how to derive the aspectual class of larger constituents from more basic ones, the primitives being verbs. His complications are not major, and we will ignore them.).

Hinrichs' theory does not rely on the interpretation of individual sentences. It assumes what I call a "two road" approach to discourse interpretation. A discourse is first a set of sentences, but a set taken in serial order and considered as a unit. There are two parts to discourse interpretation. The first, the "low road," is the interpretation of the individual sentences, which may involve non-semantic knowledge. The components on the "high road" structure the individual interpretations into the interpretation of the complete discourse. That the two parts are not necessarily disjoint is clear from the existence of cross sentential anaphora, which determines the referent of an anaphoric element from the referent of an antecedent in another sentence. Hinrichs' theory orders primitive interpretations. Hinrichs(86) does not present a complete theory of the truth conditions of an entire discourse. It is concerned only with how the eventualities described by individual sentences are related.

It does not interpret individual sentences. As such, one might argue, the theory does not need to rely only on extra-linguistic concepts, it can do with a classification of the verbs, and the referents of temporal adverbs. Nothing more specific about the meanings of the sentences is presupposed.

The objector is made happy by all of this austerity. It puts him in a strong position to maintain a division between extra-linguistic knowledge such as that connecting an event and its subparts and the meager conceptual resources of Hinrichs' theory.

Hinrichs' theory, if it is to escape the counterexamples, must take one of four positions with respect to the influence of pragmatic factors. The four responses come from the four ways for two distinct factors to cover the domain of data. The data divides into those facts which accord with Hinrichs' theory and those which do not. The counterexamples are neither syntactically nor semantically (in the narrow sense) distinct from the examples which agree with Hinrichs' theory. If the core cases are to form a legitimate, independent, non-trivial domain, there must be some independent way to distinguish the cases that agree with the theory from those which do not. Hinrichs' theory must be shown to describe a limited, but well-defined and independently motivated empirical area. (If agreement with the theory is the only criterion for inclusion within this area, the definition is circular, and adds no support to the theory; the counterexamples are in this case true counterexamples). The possible responses are listed below:

20a. It can be maintained that Hinrichs' theory only applies only to a certain set of core cases. Pragmatic and empirical knowledge would not

affect the interpretation of these core examples. In the central domain, events follow events, states overlap other states, states overlap and follow events, and facts are generally in accord with the theory's predictions. Outside of this area, there is a marked periphery. The facts that fall outside the core, within the periphery, result from the influence of certain empirical assumptions and the effects of pragmatic conventions. Facts in this area may not be chaotic, but they need not satisfy the predictions of Hinrichs' theory. This position maintains that pragmatic influences are lacking in the domain in which the theory yields correct results. The periphery is the set of narratives which is influenced by pragmatic knowledge.

b. A second possibility assumes that pragmatic influences are universal, but maintains that, in addition to pragmatics, there is another level at which some temporal facts are determined. Aspectual class and pragmatics both influence temporal order in all cases. Generalizations about temporal order can be made at both these levels. Hinrichs can maintain that his is the correct theory of the effects of aspectual class on discourse interpretation. But he must acknowledge that pragmatic factors also effect temporal order. Sometimes the influence of pragmatic factors and aspectual class will be constructive, the predictions of the pragmatic theory and the aspectual theory will agree then. Sometimes however they disagree. The counterexamples are cases where pragmatic influences override the affects of aspectual class. Presumably there will be cases where aspectual class wins out, and overrides pragmatics. In these latter cases the interpretation will turn out to be counterintuitive, insofar as pragmatics results from our intuitions about what is regular.

Responses (c) and (d) are middle positions between (a) and (b):

c. This response assumes that pragmatic influences are limited to the periphery, while aspect influences the interpretation in all cases. In the periphery, pragmatics overrides the contributions of aspectual class. The advantages of this response are that it resolves the ambiguity, present in (b), between the affects of pragmatics and aspectual class; pragmatic influences determine temporal interpretation whenever they are present, i.e., in the periphery. The marked periphery is defined as those examples which are influenced by pragmatics.

d. This response is the mirror image of (c). Here pragmatics is ubiquitous, while aspect affects only a limited range of examples. On this view, aspect determines temporal order whenever its influences are found; it

overrides pragmatics in all cases. The marked periphery is defined as that area where aspectual influences are lacking.

STRATEGY FOR COUNTER-COUNTERATTACK

A response to these objections to the counterexamples can take a number of forms. The sole criteria is that the response be a complete one which rules out all forms of THE OBJECTION. It should reveal that none of the possible objections, theories (a)-(d) above, is the correct way to conceive of the phenomena. This can be accomplished with different types of argumentation. The argument given here will be direct, yet extended and intricate.

The conclusion can be summarized as follows: the temporal component of the interpretation of narrative structure is fully and uniquely determined by pragmatic considerations. The phenomena which represent the temporal facts of discourse are explained by a theory which refers only to our beliefs about the entities described in the discourse. These beliefs include our knowledge of conversational conventions, conscious beliefs formed on the basis of empirical experiences, and some tacit and often unarticulated beliefs about extremely abstract objects. These beliefs are applied together, and through their mutual influence, they determine the temporal interpretations of past tense narrative structures.

We include, among general pragmatic knowledge, knowledge of aspectual class. This assimilation is argued for in the final chapter of this essay. The argument responds to the basic assumption of THE OBJECTION. Those

who wish to maintain a sharp distinction between the type of information employed in Hinrichs' analysis and the information which influences the interpretations of the counterexamples, argue that aspectual distinctions derive from narrowly semantic considerations and are to be distinguished from more general empirical considerations. Verbs of different aspectual classes can be differentiated by their ability to appear in certain linguistic environments. Aspectual classes can be defined in this way, by these environments, each class being identified with the contexts in which verbs of those classes appear (a painfully structuralistic approach). The different theories in THE OBJECTION assume this conception of aspect, and, for this reason, maintain that aspectual facts are narrowly semantic.

There is, of course, another way to view the issue. The ungrammatical, negative, examples in the aspectual paradigm may be ill-formed for pragmatic reasons. These tests include placing verbs in the progressive aspect (achievements and states are marginal), the imperative (achievements and states fail), in the context *finished*_____ (achievements and activities fail), and in other contexts. The observed facts are similar to the facts of discourse interpretation. They are often unclear. Under certain assumptions a verb may occur in a context, while under other assumptions it may not. Certain verbs are thought, on this basis, to be ambiguous between different aspectual classes, or, at least, to have ambiguous uses.

To say aspect is a linguistic property is to predicate aspectual distinctions primarily of linguistic expressions. However, as noted, the terms are often used ambiguously to refer to the linguistic expressions and

the eventualities they describe. We argue aspect is a pragmatic property. This means aspectual predicates apply first and foremost of eventualities, entities in the world, and only secondarily to linguistic expressions. We show that the relevant aspectual properties of discourse can be derived from deep assumptions about what language describes. Events and states are very different types of things. It is our knowledge of them, their properties, and the manners in which they differ, that accounts, in part, for our intuitions on the temporal interpretations of sentences and extended narratives.

Aspectual knowledge is not fundamentally different from general knowledge of the world. It is simply a very abstract sort of empirical knowledge. We can classify influences based on aspect along with the wider pragmatic influences of forms of knowledge. A fact which emerges below is that aspectual knowledge and influences, though not fundamentally different from other sorts of knowledge can still be separated and isolated. The influence of general knowledge can be abstracted away from the interpretation of some examples, leaving behind bare aspectual effects. By doing this, we can distinguish aspectual facts and describe them apart from the effects of other influences.

If our enterprise of reducing aspect to precisely described properties of things is successful, it undermines THE OBJECTION. As it is presented, THE OBJECTION seeks a dichotomy between aspect and other forms of knowledge. If aspect too, can be seen to derive from common knowledge, then there are no grounds for maintaining a categorial distinction between the two. Still this does not close all avenues to one who wishes to defend

the theory against the counterexamples. The components of THE OBJECTION can be reformulated with different assumptions about the nature of aspect. The strongest form of THE OBJECTION is given above. In this form, aspect facts are distinguished from other facts, as linguistic facts are distinguished from facts about the world. The influences behind the counterexamples are held to be of a wholly different nature than the phenomena described by Hinrichs' theory. However the separation between aspectual knowledge and common knowledge does not have to be presented in such a rigid form.

A weaker proposal is possible. As we show below aspect is easily separated from contextual influences. THE OBJECTION can still distinguish aspectual influences from other influences, within the context of pragmatics. The revised objection has it that Hinrichs' theory describes the effects of aspectual information, whether this information is linguistic or empirical. The counterexamples are effects of other forms of pragmatic knowledge. Aspectual influences are rather unlike most pragmatic influences in so far as they can be both cleanly isolated and clearly described. Since aspect is a relatively special type of common knowledge, it is not unreasonable to want to develop a theory of its effects. The objector maintains that Hinrichs' theory does just this.

The Structure of the Argument

In anticipation of the conclusions of the final chapter, THE OBJECTION can be reformulated on the weaker terms. It is granted that knowledge of aspect is not fundamentally different from general knowledge of the

world. Each version of THE OBJECTION, (a)-(d), assigns the effects of aspectual knowledge, now considered as a special type of general knowledge, and the other forms of common knowledge to different domains of evidence.

The first step in the argument is to isolate the influence of aspect on interpretation. We consider examples in which our knowledge of the world does not favor placing the events described in a narrative in any particular order. Examples of this sort include narratives whose verbs are nonsense words specified only for aspectual class. These are examples in which our general knowledge of the word, non-aspectual knowledge, does not affect the interpretation in a definite manner. What is left of the temporal interpretation of these stripped down examples is the effect of aspect.

We argue, or at least strongly suggest, that what remains of a series of past tense statements once empirical knowledge of and connections among the eventualities are removed does not constitute narrative. Empirical knowledge which gives rise to connections between described eventualities is a necessary condition for the existence of narrative structures. A series of sentences without connections among them is just that, a series of sentences. The individual sentences form mutual linguistic contexts for one another, but those contexts are not what anyone would describe as narrative contexts. Narrative context is something more. Its existence presupposes special assumptions about how the described eventualities are related, or more generally, that they are related.

Without empirical connection, we are left with a set of sentences presented sequentially. Each of these sentences has its own interpretation. This interpretation bears a relation to those of surrounding sentences. For each eventuality described, there is a fact which is the temporal relation that the eventuality bears to surrounding eventualities. Even if the eventuality is not interpreted in any particular temporal relation to others, this represents a fact. The facts about the temporal relations of events in these degenerate narratives are the data on what aspect contributes to the temporal interpretation of narratives.

The temporal properties of narratives, in which conceptual influences are removed, are discussed below. Let us just note here that the data do not conform to the predictions of Hinrichs' theory. The implications of this for the continued survival of THE OBJECTION are rather clear. The forms of THE OBJECTION are defined by the domains in which they assert general pragmatics and aspect effect interpretation. Version (a) states that general knowledge and knowledge of aspect effect disjoint domains, with aspect determining the interpretation of examples in conformity with Hinrichs' theory, and general knowledge responsible for the counterexamples. According to version (b), general knowledge and knowledge of aspect contribute the interpretations of all examples. In version (c), general knowledge has influence only on the interpretations of the counterexamples, while aspectual influence is ubiquitous. In version (d), the influence of general knowledge is ubiquitous, while aspectual influence is limited to examples that accord with Hinrichs' theory.

The tenets of THE OBJECTION are rather vaguely stated. They could assert a number of things. If they were only concerned with well-formed narratives, then every version of THE OBJECTION fails when it is shown that general knowledge is essential to the character of narrative. Each version assumes that knowledge of aspect influences the interpretations of structures independently of general knowledge. If it is presupposed that the structures for which aspect determines the interpretation are narrative structures, then this presupposition is false, because narrative does not exist without general knowledge of what is narrated.

THE OBJECTION could be concerned with structures of sentences in general. In this case, each version states that knowledge of aspect inclines one to order events described in sequential sentences in ways that conform to the predictions of Hinrichs' theory. This is the most reasonable form of THE OBJECTION. Every version fails again, because when general knowledge is removed the order that remains does not conform to the predictions of Hinrichs' theory.

One can go on and form more interpretations of THE OBJECTION or give more detail the versions mentioned above. However, these revisions rapidly lose significance. THE OBJECTION and the line of argument which leads to it are just not substantial enough to support detailed workings out of all the possible interpretations. (It is like the problem of significant figures in calculation. The result can only be detailed to a level determined by the ingredients.) Once it is shown that series of sentences do not conform to Hinrichs' theory, when general knowledge is abstracted away, we must conclude, with all due respect, that the objection cannot be

maintained. Hinrichs' theory is simply not a correct theory of temporal interpretation of discourse, at any level.

The remainder of the argument in this essay is concerned with the reduction of the temporal properties of extended narratives to general knowledge and pragmatics. In this chapter, we consider the interpretations of incoherent narratives and narratives in which general knowledge does not have a determinate effect on temporal interpretations. We take account of the temporal facts that remain in these purely aspectual narratives, and describe them. In the next chapter, we attempt to isolate the properties of individual state descriptions and event descriptions which account for their contributions to the interpretations of extended discourse. In chapter four, we show that the combined influence of the intrinsic properties of state and event descriptions and general knowledge is sufficient to determine the temporal properties of extended narratives. This involves deducing certain general conditions on temporal interpretation from more basic and intuitive interpretive principles. The goal is a system in which nothing has to be stipulated. Chapter five, applies the ideas developed in chapters three and four to the analysis of "sequence of tense" phenomena. Chapter six, the concluding chapter, presents an analysis of aspect in terms of tacit beliefs we have about time and change. We derive the properties of states and events isolated in chapter three from basic beliefs. It also accounts for a number of other intuitions that we have about the nature of states and events. This chapter is the most abstract and philosophical of the essay. It completes the explanation of temporal interpretation in terms of pragmatic considerations. The empirical effects of aspectual distinctions are explained in terms of our beliefs about wordly objects.

The Role of General Knowledge

Coherence

It is a real question (of perhaps an amorphous sort) whether a given series of sentences is or is not a narrative structure. Not every series of sentences is a narrative. To be a proper narrative, a set or series of sentences must satisfy some well-formedness conditions. It would be foolish to attempt to give an explicit statement of the conditions on narrative, for judgments will most certainly depend on an aggregate of pragmatic factors. A detailed description of the concept of coherence is not a matter for semantics. Coherence, if it belongs to any field, is primarily a concept from a theory of the representation of knowledge, such as Artificial Intelligence. What is clear however is that some concept of coherence plays an essential role in our interpretation of narrative structures and discourses. The interpretations of the sentences must "cohere"; they must make sense as a whole. A series of completely disconnected sentences, randomly plucked from a shelf of adjacent books, is not narrative; the whole will almost certainly be incoherent.

Coherence is much like many other other concepts related to our reasoning. What we believe about the world effects our intuitions about whether a certain series of sentences is coherent. What it means for something to be coherent on any given occasion may also reflect the effects conversational principles, such as relevance and sufficient information. And such effects are unpredictable. Judgments will vary. When presented with a series of

past tense indicative sentences, some persons may describe the series as perfectly coherent, others may find that the sentences do not fit together in a sensible way. For the former, the series is a narrative, for the latter, it is not. Judgments depend on prior empirical assumptions about what is possible, reasonable, or makes sense. In general, though, people understand narratives in similar ways, and communication is so often possible because we interpret a series of past tense statements by another as constituting a coherent story.

Events, Descriptions and The Contribution of Connection

In this section we consider narratives that describe events. We attempt to draw a distinction between those structures for which general knowledge contributes something positive to temporal interpretation and other structures for which the contributions of general knowledge are not present. By considering structures of the latter sort, we can determine what remains of temporal interpretation once knowledge of empirical connection is filtered off. The primary examples of connectionless structures are incoherent narratives and narratives constituted from dummy words. In what follows, we use the term "coherence" loosely; no attempt will be made to define it. It is assumed that the meaning of the term is intuitively clear.

The sentences below are an example of incoherent narrative (sort of an ostensive definition):

21. Ada ran to the window. Germany invaded France. She sat in the cafe and finished the article. After she bought three cars, she woke up; it occurred to her: "3+3=6."

Each of the phrases makes sense in isolation; they are all well-formed. But the whole structure still does not make sense. The incoherence of the whole springs from the lack of connection among the parts, the constituent sentences. For a person with reasonable beliefs, the sentences do not describe eventualities that are related in any meaningful way. First, it is difficult to see what Germany's invasion of France has to do with the other events, which are the actions of some female. Second, it is unclear how the individual acts of the subject are related to one another; the sequence of events: running to a window, finishing an article (while sitting in a cafe), buying cars, waking up, and having an idea is not a familiar one we associate with a connected course of events. That is to say, the series does not cohere. There are many sources of ill-formedness in a discourse, but a crucial one is that the events described do not in some sense conform to our knowledge of which events are connected and which events lead to which others in the world. Again someone who has some special or strange beliefs may find this narrative perfectly interpretable.

An important thing to note, with respect to this example, is that we do not readily interpret these sentences to describe an ordered series of events. The incoherence affects temporal interpretation. Since the sentences' contents are so disparate, we do not relate them temporally. We do not think of Ada running to the window, Germany invading France, then her sitting in a cafe, et cetera, et cetera, all occurring in order. Each of the

sentences is interpreted individually, but they are not related to one another. Perhaps, at first, there is an inclination to order the events, but this does not last for long. Once it is realized that the description is incoherent, the structure lapses into disarray. There is the invasion, the waking up, the idea. There is only the random series of sentences, which alone is not a narrative structure.

In contrast, the series of John's acts described in (1) are perfectly coherent:

1. John took off his clothes, went to the bathroom, took a shower, and went to bed.

The course of events described in (1) is very familiar. It is one we connect with ordinary life, unlike the events described in (21). It is not uncommon for someone to take his clothes off, go to the bathroom, take a shower, and go to bed. These events have an intuitive connection. The exact statement of the connection is unimportant. They are all actions an individual might undertake, and it would not be unusual for someone to undertake them in sequence. As far as a relevance is concerned, these events seem to be intuitively related. When we think of a set of events that would be described by (1), we think of them as following one another, perhaps at some temporal distance. (1) therefore describes a series of events which conform to Hinrichs' generalizations.

A more interesting case is given in (22). The second, third, and fourth sentences in this example all have different subjects. Sentences with different subjects often describe events which are not temporally related:

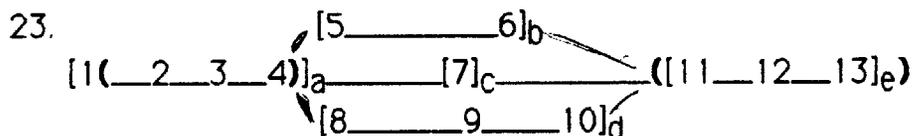
22. The three Princes left the castle early one summer morning. Prince Valiant went to Venice and married a beautiful woman. Prince John rode into the woods. Prince Morris travelled to Rome, discovered a gold mine, and bought a bank.

In (22) though Prince Valiant went to Venice before he married, and Prince Morris travelled to Rome before discovering a mine, it is possible that Prince Morris made his discovery before, after, or at the same time Prince Valiant got married. Morris's discovery may bear any temporal relation to Valiant's marriage, and the interpretation of the discourse does not determine any particular one. The natural interpretation of the discourse does not place the marriage in relation to the discovery. The two events are not ordered with respect to each other; the discourse is silent on the matter. How Valiant's marriage is related to Morris's fortune cannot be known unless one has independent information about the *specific* events; general knowledge will not suffice (the order of events is determined only if the verbs are used in the referential sense described in chapter one). Apart from the Prince's departure, one doesn't know how events involving different princes are related.

These examples suggest that to be related temporally, events must have some other connection which determines their temporal relation. If two events have a common agent, there are suppositions one might make about how the acts of a single individual are related in time. Events whose agents differ lack this type of connection. There is nothing to relate the acts of the different princes. Nothing stated in the discourse, and no extra-linguistic knowledge of the events described in the discourse connect the the acts of one prince to those of the others princes. Described

events bear temporal relations to other events only if there is something to determine those relations. In (22) there is no reason to believe that the actions of the princes are related in any particular way. Consequently, the events are unrelated when the discourse is interpreted.

Two things are important to note. First, even though the acts of different princes are not comparable, the acts of each individual prince are temporally related. Second, though the events in (22) violate in some way the most general coherence conditions, they still make sense as parts of the interpretation of the larger discourse. What this suggests is that discourses need to be broken into parts. Each discourse may consist of subdiscourses, and each subdiscourse may include further divisions. Events are directly ordered only when they are all part of the same primitive discourse. Events are ordered derivatively when they are part of discourses which are themselves ordered. The skematic below represents one possible case:



Model (23) consists of five subdiscourses $a - e$. Discourses b , c , and d are not ordered with respect to one another. Discourses b , c , and d are all ordered after a and before e . Events within each individual subdiscourse are ordered amongst themselves, and, in addition, are ordered with respect to other events in subdiscourses which are related to the containing subdiscourse. With the parenthesis left off, (23) is a model of discourse (22).

When interpreting a narrative, we fit each new sentence together with the the narrative in its current state. The story builds this way. The person interpreting sees whether each new addition adds something, in a constructive fashion, to the interpretation of the whole discourse. He asks, at some level, "Does this make sense?" "Does this fit together?" "How is this related?" In (1) the descriptions do make sense, and the events do fit together, each event bears some temporal relation to each other. In (21), the structure does not make any sense, the sentences do not form a coherent whole, and the events are unrelated. In (22) the discourse is divided into subdiscourses of related sentences. Within each subdiscourse the events are connected and related in time.

There is other evidence that empirical knowledge is essential to determining the temporal order of events described in narrative. The argument follows a similar one in syntax. Much of the semantic information that accompanies a lexical item is irrelevant to the syntactic well-formedness of sentences which contain that lexical item. So it is possible to have intuitions about the grammaticality of sentences, even if one does not know the meanings of all the words. Some things such as the category and the selection frame must be known, but very little else. We can have intuitions about a sentence containing nonsense words, when we know some basic syntactic facts about the lexical items.

Similar things are not true of narrative structures. Without the knowledge of what verb is employed, it is impossible to know the temporal order of the described events. The following example makes this clear:

24. John babrunked a harmonica, glubbed a unicycle, and isled a violin.

If *babrunked* means *played*, *glubbed* means *rode*, and *isled* means *bowed*, then in a suitable linguistic or extra-linguistic context, for instance, if the discourse were about what happened at a fair, one would assume that John did all these things at once. If, on the other hand, *babrunked* means *fixed*, *glubbed* means *bought*, and *isled* means *lost*, then, in most contexts, one would assume that the events occurred in succession. There are no intuitions about the sentence unless the meaningless items are given some interpretation. In the absence of any information about the verbs, there may seem to be a tendency, as predicted by Hinrichs' theory, to order the events in succession. But this tendency is only habit. Whatever inclination there is to place the events in order exists only because most of the sentences that we hear or read describe successive events. Why is this so?

Hinrichs' Theory As A Special Case

We may think that we have intuitions about narratives containing non-sense words, but if one reflects it appears that these intuitions apply most stringently to only one type of examples. Most of the examples cited by Dowty and Hinrichs have one principle actor:

From Dowty(86):

25. John entered the president's office. The president walked over to him.

26. John moved to Boston. He took a job in a steel mill. His boss became his close friend.

From Hinrichs(86):

27. John bought himself a one-way ticket, bought himself a new pair of shoes, and hopped on the bus.

28. The elderly gentleman wrote out the check, tore it from the book, and handed it to Costain.

29. The man arranged the stiff linen, filled two tumblers from a huge cut-glass pitcher, and set them in their proper places.

Both sentences in each of the discourses, except two, have the same subject. In (25) and (26) where the sentences have different subjects, the subject of the first sentences is the patient of the second. All of the examples conform to Hinrichs' predictions: the described events are assumed to occur in succession. The examples in (13) suggest why this should be so. (13) violated the strict precedence condition because Roberts' acts were the sort of acts that naturally happen at the same time. Most actions are not like this. We assume, generally and correctly, that people can do only one thing at a given time. This assumption, coupled with the non-precedence condition (discussed in chapter four), leads us to interpret a series of acts by a single person as though they occur in a non-overlapping sequence. If the distinct events are not, strictly speaking, the acts of a single person, for instance when a person is the agent of one event and the patient of another, as in the last sentences of Dowty's examples, we still assume, generalizing, that a person is involved in one major event at a time. The potential for overring the strict succession generalization is directly related to the possibility of a person being

involved in the two events at one time. The potential is high in (13) and low in (25)-(29).

It is easy to see how some writers mistook these pragmatic dependencies for real semantic dependencies. We are so used to hearing sentences as part of a discourse, that we do not notice the implicit connections among sentences. The connections are so common, so casual and ordinary, that they are often overlooked. When generalizations seem to appear, they may be attributed to the noticeable properties which the sentences have in common. The real influences behind the generalizations may be overlooked.

Section Conclusion

A number of different examples have been considered. There is a clear difference between the interpretations of two groups of structures. On the one hand, we have coherent narratives. In coherent narrative, the general knowledge that we have of the events described fit together to form a coherent unity. Either we are familiar with a sequence of events similar to the one described, in which case we interpret the structure according to our empirical knowledge, or we generalize from our experiences and order the events so that the interpretation is intuitively natural. The other group consists of incoherent narrative and structures where the verbs are uninterpreted. In these cases, our common knowledge certainly does not help in forming a determinate temporal interpretation. The contributions of general knowledge are varied. In some incoherent narratives, such as (21), the series of events described is so ill-conceived that our general knowledge encourages us not to assume that the events occur in order. (It

is unlikely that someone would buy a car, wake up, and have a trivial idea, all in a, suggested, narrow time frame.) In other examples, such as (24), some events are ordered and others are not. For the unordered events, for instance, those at the junction of different subdiscourses, it is not that we have reason against ordering them in sequence. We simply have no reason to order them at all. Similarly in the narratives with dummy words, we have a complete lack of knowledge of what is described. We have no knowledge which blocks linear order, but at the same time, there is no knowledge to encourage it. Whatever events are described by the verbs are left temporally unordered.

The first thing we wished to show by this discussion is that THE OBJECTION to the counterexamples cannot be maintained. The actual results of this section are far stronger than is necessary to disprove Hinrichs' theory. All that had to be shown was that, when general knowledge is not countenanced, the temporal interpretation of a series of sentences does not conform to Hinrichs' predictions. We found that when general knowledge is not countenanced, there is no order at all among events. Aspectual class alone, at least in eventive sentences, does not determine a temporal relation among events.

This last fact is important: the aspect of the verb alone does not encourage one to place events in any particular relation. This fact may seem trivial, but it is not. It must be explained why events have this property, this ability to separate. The situation is different with states, as we shall see.

State Descriptions and The Rubber Band

In the case of eventive sentences, it might be said that the difficulties with Hinrichs' investigation are the result of considering a too limited range of data. Within the restricted array of examples Hinrichs considers, there is a great deal of order. Events always follow one another in strict linear order. There is no overlap. Hinrichs' theory is factually correct for this domain of evidence. Outside of this area, the theory breaks down. There is anarchy. Events overlap one another, are included in one another, are simultaneous with one another, or are not related at all. The stative facts are even less flattering to the theory. No factual evidence supports the primary prediction about the temporal properties of state descriptions. None of the examples cited in either Hinrichs(86) or Dowty(86) support their central claim about how states are related to surrounding eventualities. In each case, the example cited is either misinterpreted or some crucial property is ignored.

Hinrichs' predictions about states are given in (7b) above. A state is required to overlap the current reference time. If an event is presented before the state, then the reference time follows the event. The relation of the state to the event is, therefore, not fully determined. The state might come after the event, it might overlap the event, or might start just when the event ends and be temporally contiguous with the event. Given that the reference time follows the event, and the state overlaps the reference time, the only requirement on the state in its relation to the event, is that it follow the event, at least in part. The primary relation is succession. Overlap can only come if there is succession in addition. These

are the primary predictions of the theory regarding states. Hinrichs never expresses this prediction in detail. His system cannot even represent temporal contiguity. He only discusses two cases. The treatment of states is seen as allowing for the possibility that a state may either follow an event or overlap an event. There are valid examples of states overlapping just previously introduced events. However there are no examples of a state following the prior event and not being temporally contiguous with it (when the state description lacks a temporal modifier). (Dowty's theory of temporal interpretation is slightly different from Hinrichs'. However, they are both motivated by the apparent observation and share in common the prediction that states can follow events.)

The following narratives are representative of the structures which lead Hinrichs and Dowty to assert that states can come after events:

30. Mr. Darby slapped his forehead, then collected himself and opened the door again. The brush man was smiling at him hesitantly.(Hinrichs(86))

31. Away in front, the engine whistled, the trees, hills, and road slid sideways, and were gone. (Dowty(86)).

6. Jameson entered the room, shut the door carefully, and switched off the light . It was pitch-dark around him , because the venetian blinds were closed. (repeated from above)

32. This time she was pushed out of the frightening fifth dimension with a sudden and immediate jerk. There she was, herself again, standing with Calvin beside her. (Dowty(86)).

In (30), Hinrichs believes the state of the brush man smiling follows the event which is Mr. Darby's opening of the door. The two eventualities are held to happen in succession. The complete situation, described in (30), would be as follows: Mr. Darby slams the door, perhaps he pauses, he

composes himself and then he opens the door again. If the state wholly follows the last event, and is not temporally contiguous with it, then there is a pause between the time at which Mr. Darby opens the door and time at which the brush man begins to smile. When Mr. Darby opens the door, the salesman is not smiling, the salesman waits, then smiles. This is the interpretation when the state follows the event. It is not an interpretation I would naturally associate with this narrative.

My intuition is that the state overlaps the event and maybe extends beyond the event. The brush man is smiling while Mr. Darby is opening the door and continues to smile after the door opens. The state is not disjoint from the event. It is best to conceive of the situation described in (30) from the perspective of an observer above the scene. An omniscient observer sees Mr. Darby slam the door, sees him pause and gather himself together. He sees Mr. Darby opening the door, the salesman noticing this and preparing a nervous smile. Forcing the state to come after the event, after a temporal pause, gives the discourse an unnatural interpretation.

It is easy to see how someone might think that the state follows the event. This is the intuition from Mr. Darby's perspective. Mr. Darby does not see the salesman again until the door is opened. He cannot see the salesman smiling until after he opens the door. So as far as Mr. Darby's awareness of the state is concerned, the salesman begins to smile only when the door is opened. For Mr. Darby the state is temporally contiguous with the event; it is not natural, even from the perspective of Mr. Darby, for the salesman to begin smiling after the door is opened. One would have to use an event description, as in (33), to describe this situation:

33. Mr. Darby slapped his forehead, then collected himself and opened the door. The brush man began to smile at him hesitantly.

These examples are not nearly synonymous. In (33) the event of the smiling occurs, quite naturally, after the door opens.

The narrative in (31) appears to present an example of a state following an event. First, the road, hills, and trees slide sideways, and then they are gone. The state of the entities being gone follows the event of sliding. This seems to be a positive example for Hinrichs' theory. To all superficial appearances, this narrative vindicates the prediction that states can follow events. But there is a problem. Example (31) does not describe a state. On the reading described, the verb phrase *were gone* has an inchoative interpretation. It describes the event which is the change to the state of being gone. The phrase *were gone* can very easily, and without large scale changes in meaning, be replaced by the word *disappeared*:

34. Away in front, the engine whistled, the trees, hills, and road slid sideways, and disappeared.

The phrase *were gone* is not used as a state description. It describes a happening, an event. The state of being gone follows the sliding, because it is caused by the event of coming to being gone.

The narratives in (6) and (32) are the only real examples cited by Hinrichs or Dowty in which a state follows an event. In (6), The state of darkness follows the turning off of the lights; the room is dark only after the lights are turned off. In (32), the woman is there, with Calvin, after she is pushed out of the fifth dimension. There is no overlap. The room is not

pitch-black during or before the time the lights are turned off, and the woman is not "there" before or during the time she is pushed out of the fifth dimension.

Hinrichs and Dowty are very astute. For they have happened upon the only type of example capable of proving their point. The narratives in (6) and (32) are examples of a particular type, the only type in which a temporally unmodified state follows an event. The event in these examples stands in a causal relation to the state. In (6), the state of pitch-blackness is caused by the light going off. In (32), the woman comes to be where she is as a result of being pushed out of the fifth dimension. Only when this relation obtains between an event and a state does the state follow the event.

It is our knowledge of causal relations, empirical knowledge, which leads us to interpret these sentences the way we do. We know (ignoring continuous causation) that effects can only follow causes. Whenever a narrative is encountered for which our general knowledge tells us that a state is caused by an event, we place the state after the event, in a relation of succession. This temporal relation is determined by general knowledge of the described eventualities. What we know of causation also explains why these examples do not really bear out the predictions of Hinrichs' theory. A state caused by an event does not follow that event at a temporal distance. The state comes right after the event. Our intuitions about effects is that they are temporally contiguous with their causes. There is no gap between the events in (6) and (32) and the succeeding states. The room is pitch-black as soon as the light is turned off, and the woman is "there" as soon as she is pushed out of the fifth dimension. The

prediction that a state can arbitrarily follow an event is unrealized, in the examples cited by Hinrichs' and Dowty.

Causation is a special relation. It is about the strongest relation that can obtain between two eventualities, as regards its ability to determine a temporal relation between its two relata. Weaker empirical relations between an event and a state are not able to force the state into the interval after the event. Even when general experience encourages us to interpret a state as coming after an event, the state resists. The state in every instance not involving causation overlaps the event. Consider the narratives in (35) and (36):

35. Immanuel walked up the outside stairs, entered the house, and sat down.

36. Immanuel walked up the outside stairs, entered the house, and was sitting down.

37. There was a party. The car slammed into the wall. John was taking a test. He wore a blue shirt. Dave turned on the light. Germany was invading France.

This narrative in (37) is as incoherent as the structure in (21). (37) describes a number of states and events. The eventualities are not intuitively connected in our understanding. We do not normally think of the states as accompanying the events. For instance, while cars may slam into the walls during parties, no common knowledge of either the state or the event leads one to connect them. Similarly, though there are certainly quite a few Daves who turned on lights while Germany was invading

France, the two eventualities are not generally associated. The narrative is incoherent because the described eventualities are not connected in familiar ways. Our experience does not encourage us to relate them to one another.

When narratives describe events, and there is nothing to connect the events, they are left unordered. Each event description is interpreted in isolation. There are may be no particular temporal facts to describe incoherent eventive narratives. But there is an intuition that state descriptions are different. We have no more reason to connect the states in (37) than we do the events in (21), but the facts are not the same. Even though the states have nothing in particular to do with the events in (37), the inclination to connect them remains. We think of the car slamming into the wall during the party. John also is taking his test and wearing a blue shirt while the party is in progress. Germany is invading France at or just after the time that Dave turns off the light. The states are assumed to hold around the time of the surrounding events. The states attach to the events without encouragement from the context.

We have similar intuitions on narratives consisting of nonsense words. When real state descriptions are replaced by dummy verbs, specified only for stativity, the intuition remains:

38. John washed the dishes. Bill was gleeking and blurging. Susan entered. John was igfeding.

Bill is *gleeking* and *blurging* at the time John washes the dishes, no matter what *gleeking* and *blurging* mean. John is *igfeding* while Susan

enters, no matter what verb replaces *igfeeding*. In this type of example, we have can have no knowledge of what is described by the verbs. The sentence does not present any information which can be supplemented by general knowledge. This is, to say, there can be no independent reason for attaching these nonsense states to the events around them. The facts are purely aspectual. States attach to events because they are states, and for no other reason.

Section Conclusion

The implications of these facts for Hinrichs' theory are unclear. To escape THE OBJECTION, we have to show that the pure aspectual facts do not conform to Hinrichs' predictions. This is easily done for events. Hinrichs' predictions about events are clear, and that the data disagree is similarly clear. What the theory predicts for states is less determinate. States may either follow or overlap events, but if they overlap, then they must extend beyond the events into the future. We will discuss in chapter four why a state cannot precede an event described before. Excluding this option, the only possible counterexamples to the generalization are interpretations in which a state overlaps but does not extend in the the future of an event. This rather precise interpretation is present with example (the rock and etc*) above. However the intuitions on the incoherent and nonsense narratives are not so sharp. It seems that the states described in these cases hold at the same time as the events. They are roughly simultaneous. I, at least, do not have an intuition of the state stretching beyond the event. Though the data do not clearly contradict Hinrichs' predictions, they certainly do not seem to support it.

When empirical connection is taken away, state and event descriptions behave very differently. When a series of event descriptions, presented in narrative form, lack intuitive relation, they are all interpreted independently. No temporal order is determined among the events. Described states do not fall apart, when there is nothing to hold them together. Stative phrases describe the conditions which hold when events occur. They describe states temporally connected to events, though common knowledge suggests no specific interpretation. These are the aspectual facts. We discuss them more fully below.

CHAPTER THREE

The Temporal Determination of Static and Event Descriptions

Introduction

We would like to give some empirical substance to the intuition that states and events have different temporal properties. It has often been remarked that states are intuitively timeless, changeless, constant, and that they do not "move time forward". Events, on the other hand, intuitively involve change. They are temporal and have intrinsic duration. Events are "dynamic," they happen, while states are static and only "hold."

Most of the discussion has remained at this vague level of intuition. Very little content has been added to these ideas and impressions, either in the way of descriptive elucidation or empirical grounding. When empirical questions are broached, these intuitive differences between states and events are pushed aside. States and events are treated alike. The situation semantic framework of Barwise and Perry(83) pins a great deal of structure on situations (events and states), but does not draw a significant distinction between what is dynamic and what is not. Hinrichs(86) acknowledges all of the intuitive differences between states and events, but nevertheless treats them both in the same way, for reasons of "theoretical simplicity," as he says.

The fact is, however, that states and events are never treated on equal footing, even when they are "being treated alike." What happens is that both

states and events are treated like events. We have a better intuitive grasp of the temporal nature of events. We understand that they have duration and involve change, and are in some ways very similar to intervals of time. We are at a loss to explain what it means for a state to be changeless and atemporal. So the properties of states are ignored. States in most frameworks are simply squeezed to fit into the conceptions we have of events. States become homogeneous events. They have extension and duration and all the other temporal characteristics of events. They are just events with constant content. An effort may be made to remove the notion of change that comes with events. For instance events must have beginnings and terminations, which are points of change. Usually states are represented as durations with the implicit beginning and ends. One might think, though of removing the end points of states, and modeling them temporally as open intervals, without boundaries, in contrast with events which are closed intervals and have endings. Bennet(78) assumed a picture of states which is similar to this. Yet he still retained the event-like property of extension and position in time for states, thus treating states simply as events without endpoints.

Here we would like to investigate the temporal properties of events and states in more detail. The goal of the discussion is to give some empirical grounding to our intuitions. We would like to see how the temporal properties of states and events are manifested themselves in language. The vast majority of the discussion is dedicated to understanding the temporal properties of states, because they are less well-known, more subtle, and more difficult to apprehend. The intuition that states are not intrinsically temporal is mirrored in the data which suggests that states acquire their

temporal properties at second hand, through other temporal entities in the surrounding context. Intuitively temporal properties are exhausted by duration (extension) in time and position in time, the set of relations an entity bears to other temporal entities. To say that states acquire their temporal properties from events and intervals in the context means that the duration and position of states, as described in language, are given and determined by external events and intervals which are salient in the linguistic and non-linguistic context. The position and duration of a state are either exactly those of the determining event/interval or are very closely related to those of the event/interval.

The facts we discuss come in the form of intuitions on sentences which describe states, events, and intervals. The meanings of some acceptable sentences, and intuitions on both acceptable and marginal examples, suggests there is a dependence relation of states upon events, intervals, and other intrinsically temporal entities. The facts are soft and often unclear, as with all other cases we have discussed. No really precise description of the temporal property of states is possible on the basis of the data. The phenomena are not general enough nor orderly enough to support strict generalizations. To state any result, a great deal of intuitive idealization is necessary. We will idealize whenever possible, but for the most part, we will rely on ostensive definition, defining the properties of states by pointing to instances where these characteristics effect the interpretations of the examples. The description of the properties is refined in the course of the discussion.

The Facts

The phenomena in question is very easy to isolate. There are two key facts, from which everything else follows. The first is that state descriptions cannot be fully interpreted, when isolated from temporal entities in the surrounding context. The data suggests that state descriptions are intrinsically incomplete and that an event or interval of time is needed to fill out the interpretation of the state. Context here includes both linguistic and non-linguistic material. The most revealing examples are out of context past tense state descriptions. We have an intuition about such sentences that they are somehow incomplete, we feel that something is missing from the interpretation, some important part of the interpretation.

(The examples must be taken out of context so they can be interpreted on their own merit. A token is interpreted out of context, when there is no relevant information to be extracted from surrounding linguistic material or extralinguistic reality. In practice this usually means that the sentence is neither preceded nor followed by pertinent linguistic material and that nothing in the external context can add to or aid the interpretation. Not all information in the context will be relevant to the interpretation of these examples, and this discussion can be conceived as much as an effort to isolate what is important in the context as an effort to describe what is missing from the interpretation of an out-of-context state description.)

The sentence in (1) is a past tense state description:

1. John was sick.

(1) is a perfectly well-formed sentence describing a past state in which John was sick. There is nothing structurally or semantically deviant about this sentence, and yet when read or heard out of context, it is somehow marginal. The intuition of marginality has its nuances. A contextless utterance of (1) seems almost only part of a sentence. One hangs and waits for the speaker to finish the utterance by adding the part that has been left off. What the interpretation lacks is not part of the meaning of the sentence, narrowly construed, for the example is a well-formed sentence and we know exactly what it means. The meaning presented is just not enough. If someone were to approach person A on the street and without preface say to person A that John was sick, assuming the referent of "John" is known to both parties, person A would be puzzled and perhaps inclined to ask "When?" This is the missing information. An interpretation of the utterance is not completed without this information. The information of when the state held is not extra information, it is essential information which is necessary for interpretation.

A contextless utterance in (1) contrasts with a similar utterance of the eventive sentence in (2). This is the second key fact:

2. John broke his arm.

(2) is acceptable in isolation. It is syntactically and semantically well-formed and there is no lingering intuition that the interpretation is less than complete. The event description can stand alone. There may be pragmatic qualms having to do with whether the utterance is relevant to the discourse, but the sentence is quite interpretable. Someone who hears this sentence, and is sympathetic toward John, may respond "oh, that's awful" or ask "how

did it happen?" They may also ask when it happened. But knowledge of when it happened is a luxury, of the same character as knowledge of the causes. It is not necessary knowledge. Sentence (2) is not puzzling without the knowledge of the exact calendar data of the accident. This is how the intuition in (2) differs from the intuition in (1). Information about when the event in (2) happened, like that given by most adverbial modifiers, is information to be added to the already full interpretation of the sentence. On the other hand, a temporal context for the state in (1) is necessary to complete (the process) of interpretation.

What should be read from these examples is that event descriptions are temporally complete while state descriptions are not. State descriptions are not acceptable when taken out of context. They are temporally incomplete. Event descriptions, on the other hand, are not accompanied by intuitions of incompleteness when extracted from the surrounding context.

States descriptions require supplementary temporal information to be fully interpreted. Temporal information can be given by adverbs which modify sentences. Not all temporal information is useful to the temporal interpretation of bare states; adding certain types of temporal modifiers to bare state descriptions does not affect the judgments on the sentences. A state description modified by a frame adverb is unacceptable in the same way as a naked state description. "Frame adverbials" are Bennett and Partee's (73) term for temporal modifiers which refer to periods of time. Pure frame adverbials, which are acceptable with states, are composed of the preposition *for* prefixed to a noun referring to a durational measure of time. Examples include *for an hour*, *for two weeks*, and *for a year*.

Frame adverbs add nothing essential to the interpretation of state descriptions. The example in (3) is no more acceptable when taken out of context than the bare state description given in (1):

3. John was sick for days (weeks) (years).

The frame adverbials tell how long the state of John's sickness lasted. The duration of the state is obviously one of its temporal properties. But, as the intuitions on this sentence show, it is not the right information to fill out the interpretation of the state description. Even when the duration of the state is known, one is still left with a nagging sense that something is missing. We still want to know when the state held for the duration it did.

Other frame adverbs contain more information than the simple ones above. The noun in the modifier *on Tuesday* denotes a duration just like the noun *two weeks*. It represents a duration of one day. It also denotes something more than a pure duration, when it refers to a particular duration of one days length. When the noun *Tuesday* refers to a particular Tuesday, the modifier says when the state held in addition to how long it held. The state lasts for a day and on the day Tuesday. However the noun *Tuesday* does not alone refer to any particular duration, for there are many Tuesdays. Only when the expression is used to refer to a particular Tuesday, such as last Tuesday, does the modifier determine exactly when the state held. This exactitude is necessary to complete the interpretation of the state description. Sentence (4), uttered and interpreted out of context, is marginal like (1) and (3):

4. John was sick on Tuesday.

We need to know which Tuesday is being referred to. If it is implicit that the Tuesday in question is last Tuesday, then the sentence is acceptable. The requirement that the state held on a Tuesday does restrict the range of possible interpretations, though not enough to fully determine the temporal position of the state. A particular duration is needed. Only when some particular Tuesday is denoted is the adverb a sufficient temporal context for the state.

Basic Relations

A sufficient context must specify the time at which the state holds, meaning the context must contribute an event or an interval of time from which the state takes its temporal position. With this context added, (1) becomes acceptable. For instance, the sentence is good if presented with an adverbial *when* clause describing an event:

5. When I came home, John was sick.

The adverb answers the question "When?" that accompanies a contextless utterance of (1). The state of John's sickness holds when the event of my returning home occurs. Thus we say the event described in the adverbial clause acts as temporal context for the state description, insofar as it fills out any lacuna in the interpretation of the sentence. Any temporal adverb can be part of the linguistic context of the state, but an adverb is part of the temporal context only if it determines the state's temporal properties.

Any number of linguistic devices can serve the same purpose. They all determine the state in time by telling when the state held.

In (6) the second sentence forms a temporal context for the first sentence; (we will refer to an expression and the eventuality it describes ambiguously as a "temporal context," when appropriate):

6. John was sick. I took him to the doctor.

In general, the order among clauses describing states and modifiers of those clauses is irrelevant. A phrase can create a temporal context for a state description which precedes or follows it. (Some complications arise when more than two sentences or clauses are involved. In extended discourse, a state will tend to attach to events which are presented before. This reflects a rather superficial interpretive convention, more in the way of a performance habit. A state description is intrinsically incomplete and, in the process of interpreting a discourse, we will attempt to do away with this incompleteness as quickly as possible. If there is a salient event in the context, when the state is interpreted, this event will become the temporal ground for the state. When the context is given in a sentence which follows the state description, the interpretation of the state must be held in its incomplete condition until the context is presented.) The context, whether given before or after, simply says when the state held. The natural interpretation of examples (5) and (6) has the state holding at about the time the events described in other phrases occur: John was sick when I came home, and he was sick when I took him to the doctor.

In her discussion of the semantics of *when* clause adverbial modifiers, Partee(84) requires that the eventuality described in the modifier be an event, or, if it the verb is stative, requires that it have an inchoative interpretation. She does not discuss further the intuitions which motivate this stipulation. However, we can trace the origins of her intuition in the context of this discussion. States require an external temporal context, no matter where they appear. Whether a state is part of a modifier or part of the main clause, it still must be determined in time. In Partee's terminology, a temporal modifier introduces a reference time for the eventuality in main clause. Her difficulty with states in adverbial modifiers is that they cannot create reference times. Here the point to be expressed is that the state in the modifier cannot be an independent temporal context for a state in the main clause, because the state in the modifier itself requires a temporal context, in the form of an event or interval.

This is clear from the example below:

7. When the room was empty, John was asleep.

This sentence is odd in the manner of other underdetermined state descriptions. One is left wondering when it all happened. The adverbial *when* clause does specify when the state in the main clause holds, though only in a way. The sentence tells that the state in the main clause is simultaneous with the state in the adverbial clause. It not known, however, when the state in the adverbial clause held. Introducing a temporal context for a state with another state is simply to pass the need for a context from the first state to the second. Only events and intervals have intrinsic temporal positions. A state in itself has none. Things are different for the

inchoative reading of stative verbs. When a stative verb has an inchoative reading, it describes the event which gives rise to the state (described on the natural reading). (7) is only acceptable if the verb phrase *was empty* is interpreted as an inchoative, meaning *became empty*. Partee's comments about states and their inchoative readings echoes what has been said above. What Partee meant when she said a stative verb can form a linguistic temporal context only when it has its inchoative interpretive is that a stative verb forms such a context only when it describes an event.

The Variety of Temporal Relations

Other linguistic expressions which can create temporal contexts include temporal adverbs specifying a calendar date, indexical adverbs, relative adverbs, adverbial clauses headed by *before* and *after*, and combinations of these. This variety shows that there is latitude in the principle that the context tells when the state holds, for all of these adverbs tell when the eventuality holds but they do not all specify that the eventuality is simultaneous with some interval or event:

8. John was sick on December 23, 1986.
9. Yesterday John was sick.
10. John was sick after he ate the little beetle.
11. John was sick before he finished *Barrierc*
12. John read the *National Review*, and was sick three days later.

All of these sentences are fully interpretable and acceptable. (9) shows an indexical adverb, referring to an interval of time, can be a sufficient temporal context. The adverb *Yesterday* specifies both the duration of the described state and a definite period of time during which the state held. It

gives all of the information presented by a pure frame adverb in its specification of the duration of the state. The indexical adverb goes further in that it gives a particular time at which the state held. This is what is lacking in the interpretation of a pure frame adverb and a non deictic use of the noun *Tuesday*.

A given utterance of (9) means roughly that John was sick during yesterday. It is not really possible to give a precise, core, meaning to the sentence in terms of primitive relations such as temporal inclusion between the interval and the event, because the interpretation of any given instance of the sentence varies so much with context. Some have said the state must span to include the interval, so John would have to be sick throughout yesterday, for (9) to be true. Others have said the state only has to hold sometime during the interval, that the interval must include "part" of the state. Normally contextual effects do not pose serious problems to finding the interpretation of an expression. One can abstract away from the spurious contextual contributions by observing a wide enough range of examples and seeing what is constant in them. However, in this case, it is difficult to find firm evidence which favors either interpretation. For there is not a gradation of judgments, but rather two readings between which the interpretation fluctuates. There are contexts in which one reading is more appropriate than the other, but neither predominates. And there is no context-independent way to choose between the two. At the root of the problem is the adverb *yesterday*, which is often used to refer to an interval related to but not coextensive with yesterday. The contribution of the referent of the adverb sometimes cannot be distinguished from the relation that the state bears to the referent of the adverb. A single

interpretation could be described as the inclusion of the state by the full interval, or the inclusion of a reduced version of the interval by the state. It seems all that can be said about (9) is that John was sick during yesterday, where the interpretation depends on the meaning of *yesterday* and *during*.

The potential ambiguity in (9), between a reading on which the state spans the interval and one on which the state is included within the interval, is important. It suggests what (10)–(12) demonstrate to be true: an event or interval of time can serve as a temporal context for a state of affairs even though the state neither holds throughout the interval nor is temporally coextensive with the event. An utterance of (9) can be true, in context, even if John was sick for only a part of yesterday. The adverbial modifiers in (10)–(12) describe events, and the prepositions place the states in some definite relation to the events. In (10) John is sick after he eats to beetle; in (11) he is sick before finishing barriers; and in (12) he is sick a full three days after reading the *National Review*.

The fact that the obvious and preferred interpretations of (9)–(12) are acceptable shows state does not have to be cotemporaneous with the temporal context. The states above bear a range of relations to the contextual events other than temporal coextension. States have some freedom. But it would be incorrect to suppose that a state is licensed whenever it bears a determinate temporal relation to an event or interval in the context. The real requirement is somewhat stronger.

The preferred interpretation of (10) places the state very near after the event. When (10) is interpreted, the time of John's sickness is very narrowly determined by the event in the subordinate clause. The state must closely follow the event, this is the salient intuition. An interpretation of (10) on which the position of the state is not closely determined, where, for instance, John is sick only sometime after he ate the beetle, would not be vastly more acceptable than a contextless utterance of (1). The intuitions mirror the implicit understanding that John's sickness is somehow caused by his eating the beetle. Due to the latitude in our concept of cause, this does not imply he became sick immediately after he ate the beetle. What it does suggest is that the span of time between the cause and its effect was not great (relative to some scale).

This most natural interpretation of (10) contrasts with certain readings of (13):

13. John was sick after he was born.

If one removes the presupposition that John was sick shortly after his birth, no relation is thought between the event and the subsequent state. (13) might describe a situation in which John was sick yesterday, though born 25 years ago. In such a case, the effect of the adverb is lost. This interpretation of (13) is little or no better than (1). (The state just floats out in the future John's birth, disconnected and unrelated to the event.) We take the marginalness of this interpretation as a sign that the event is not a sufficient temporal context for the state. The position of the state is not sufficiently constrained by its relation to the event. When the relation between the event and the state is only specified as "precedes" or "follows,"

the state does not have a narrowly restricted temporal position; the position of the state in time, its relation to other eventualities, is not determined. To the extent that the judgements are clear, there is no gradation. Either the state is placed right up against the event, the natural reading, and the interpretation is good, or it is arbitrarily removed from the event, and the interpretation is marginal in the familiar way.

These characteristics of the interpretation of sentences (13) and (10) derive from properties of state descriptions, rather than specific knowledge of how the eventualities are customarily related in the world. We have two complimentary intuitions on sentence (10): first that the state of John's sickness follows closely upon the event of his eating the beetle. Second, that eating the beetle caused John to be sick. One might be inclined to see the first as an inference from the second. We know that eating beetles can make people sick, so we assume this in (10). We conclude, on the basis of our concept of causation, that John was sick sometime shortly after he ate the beetle. This is a plausible way to conceive of things. The order of *events* in discourse, it was argued, depend in like manner on empirical knowledge of how the events are connected in the world. But this is not how the position of the states is determined.

It is important to note a contrast between a sentence which describes a state as following an event, and a sentence which describes an event as following another event:

14. John's leg was broken after he hit the ground.
15. John broke his leg after he hit the ground.

The event in the main clause of (15) is the inchoative correlate of the state in the main clause of (14). The content of the two eventualities are very intimately related. The eventualities, having a broken leg and breaking a leg, are related temporally in very similar ways to other eventualities; whenever the state of having a broken leg follows an event, the event of breaking a leg either follows or is simultaneous with that event. Still one has an intuition in (14) that the event of hitting the ground caused the state of John's having a broken leg. No such intuition is present in (15). In (15) it is as if he first hit the ground, and then broke his leg doing something else. Since the two eventualities bear similar temporal relations to other events, and since a causal relation is thought in one case and not the other, it cannot merely be constant conjunction or conventional knowledge of the temporal relations among eventualities which is responsible for the inference in (14) that the state is caused by the fall, for such an inference is equally valid, though lacking, in (15).

It appears that it is the temporal relation between the state and the event which fuels the inference that the event causes the state. The temporal relation is not derived from external knowledge, but follows from properties of state descriptions. We can test this idea by considering an example in which no external knowledge suggests that the state is caused by the event, and observing whether the temporal intuitions are still present and whether there is an inference that the state is caused by the event:

16. John was happy after he ate the beetle.

Very little in most people's experiences leads to a connection between the state of being happy and eating beetles. There are no grounds in the case for saying that empirical knowledge of the eventualities either encourages one to place the eventualities in close temporal proximity or to infer that the event causes the state. But we do have these intuitions. One does not suppose that John was happy sometime arbitrarily after he ate the beetle, but rather that he was happy just after he ate the beetle. Moreover, we assume that the event of his eating the beetle has something to do with his being happy, an inference one would not make if the state description were replaced by an event description. This example does not show that the intuition of a causal relation is derived from the temporal considerations, but the contrast with the eventive cases argues against any inference from the causal relations to the temporal relations.

An event determines the temporal position of a state when the state is temporally contiguous with the event (in some loose sense). This is a new relation to be added to the original relation of simultaneity with the event. This refinement of the definition of "temporally determined" is also required for a proper account of the simple example in (1). Sentence (1) is a past tense state description. What counts as past, the extension of the past tense, if not restricted by other means, is defined with respect to the utterance event. The general past tense is a predicate, expressible as *is prior to this utterance*. It is not quite true to say that a sentence can be uttered wholly out of context, for the utterance itself will always be a very salient event in event in the extra-linguistic context. Any past tense state description therefore bears a definite temporal relation to an event, the utterance event. But as (1) and the examples above show, it is not

sufficient that a state occur arbitrarily before or after an event. The state must be temporally determined by the event, which means that state must either overlap the event or share a common border with the event. If the looser constraint were applicable, and the state were free to stand in any determinate relation to the event, the utterance event itself would be sufficient to license a past tense state description.

A description of a state given in the present perfective contrasts with a similar description in the simple past tense. State descriptions, such as (17), in the present perfective, are completely acceptable.

17. John has been sick.

There is no need for an event from the surrounding context to license the state description, for the utterance event alone is sufficient. Many writers have commented upon the intuition that the past perfect has "present relevance," meaning, for state descriptions, that states described in the past perfect must hold from some time in the past up to the present. Unlike the simple past, the present perfect requires that states continue from the past through to the moment of utterance. (17) means that John was sick for a period which was past and continues up into the present. The utterance event is the least upper bound of the state. The utterance event is temporally contiguous with the state and thus determines the state temporally, on the revised definition. The acceptability state descriptions in the present perfect, in contrast to the simple past, follows from the considerations mentioned above.

Contributions from the Extra-linguistic Context

Events from the extra-linguistic context may also serve as temporal contexts for state descriptions. Extra-linguistic contexts may be created in any number of ways. A temporal context may be created by a photograph. The photograph contributes a particular event, the event of the picture-taking. This event serves as a temporal ground for any state described in the context of the picture. Looking at a picture, someone who says "John sure was fat" means in context that John was fat at the time the picture was taken. A more vivid example consists of someone who has just seen John throw up, and when walking away says "John sure was sick." The utterance means in that context that John was sick when he threw up. (There are some pragmatic complications when the salient event is in the recent past. If the event occurred in the near past, so it is likely the state continues into the present, one will use the present tense. That is if there is reason to believe that John still continues to be sick, one will say "John is sick" or "John has been sick." "John was sick" implies that he was sick for a time that is coextensive with the salient event. It implies that he is sick no longer.) The event of the photographing and the event of John's throwing up are the elements in context which place the state in time. They say when the state held.

A state described in language can bear some range of relations to its extra-linguistic temporal context. The situation mirrors the linguistic case. Suppose person A finds a way to get all of the members of his department into one room. Then knowing that John, a member of the department, is afraid of the dark, person A leaves the room, locks the door and turns off the light. A day later person A runs into person B, who was in the room. Person

B says "It was pitch black and John was terrified," which in context means it was pitch black *just after* person A turned off the lights and John was scared at that time. The states described, John's fear and the darkness, hold after the salient event, the turning off of the light. This is an example where a state described in language is temporally contiguous with an event from the extra-linguistic context.

Disclaimer

One must be very careful when when considering the examples discussed here. Context plays the leading role in interpretation. The manner in which expressions are used is crucial, for referential and descriptive uses of expressions employ context in very different ways. The judgements described above suppose that the stative verbs are used descriptively. The judgments do not hold if one is referring directly to some particular state. In chapter one, we discussed the differences between the referential and descriptive uses of verbs. When a state is referred to directly, its temporal position is already determined. It was argued in chapter one, that the individuation of a state, which is necessary if the state is to be deictically designated, can only come about through a prior, and perhaps implicit, reference to an event. The event to which one refers forms the temporal context for the state. No other event in the context is needed to determine the state. If one is talking about a particular state of John's sickness, the event used to pick out the state is the temporal context for the state. Any extra description, for instance, that the state held after John was born or after he ate a beetle, is superfluous. The state is already determined.

A united theory of reference to states can be described as follows: reference to states can only come about through reference to events. In the case of deictic reference, the position of the state is determined by the position of the event which is the medium through which one refers to the state. When a state is described, there must be an event or interval in the general context. States take their temporal positions from other entities.

Memories of Reference Times Past

The points made in the section are reminiscent of some of Partee's and Hinrichs' ideas. H & P believe that for each narrative, including presumably trivial narratives of one sentence, there must be an initial reference time. This reference time is the temporal starting point, relative to which the first element in the narrative is evaluated. In Hinrichs(86), the idea of a reference time is a crucial concept which does work throughout the theory. No special claims are made about the first sentence in a narrative. The initial sentence has no more need of a reference time than any other expression. A reference time plays a role in the interpretation of the initial sentence because, reference time is part of the overall interpretive framework, and the first sentence is part of the narrative.

Partee, in her discussion, either reads something into Hinrichs' comments on reference times or simply has a different conception of what a reference time is and does. Partee(84) says reference times are salient in the context, something which is neither asserted in nor implied by Hinrichs' discussion of the topic. (Reference time is merely a theory internal concept of Hinrichs' framework, a convenient device, whose sole justification lies in its

contribution role to a correct theory.) Partee comments that "the first sentence of the discourse is not interpretable without some understood past reference time." (The connotation of this remark is out of touch with Hinrichs' notion of reference times, for what Partee says suggests that the need of a reference time is a fact to be explained by a theory, rather than an internal concept from an independent theory designed to account for other phenomena.)

There are a variety of things Partee might mean by the expression "understood reference time." She could have nothing more in mind than what is presented in Hinrich's framework. The description of reference times as "understood" would then be a slightly misleading, interpretation of Hinrichs' theoretical apparatus. In chapter two, we presented arguments which show that Hinrichs' theory of temporal interpretation is not correct. If Partee's comments build on Hinrichs' system, they too are not supported by the data. Given that Hinrich's overall system lacks empirical foundation, the concepts defined and employed within the theory have no justification. Comments to the effect that first sentence of a narrative or any other expression in a narrative have need of a reference time are completely unsupported.

But Partee might mean other things by her comment. If she does not have a theory-specific conception of reference time, she could mean that the first sentence of narrative must be interpreted relative to a salient event or interval. If this is her meaning, then the comment is true in part. State descriptions cannot be interpreted without some type of reference event or interval. The event or interval can be understood, in the sense of being salient and known, whether it derives from the linguistic or extra-

linguistic context. The reference event of the first state of a narrative also acquires some special significance. If a narrative or a section of a narrative consists of a succession of state descriptions, then each description from the second one onward can acquire its temporal determination from the one which precedes it. The first state must, however, look elsewhere to find its temporal position. It cannot receive its position from a prior state. The first state must be determined by an event or interval. It is in this sense that the first state description needs a salient temporal context, or, in Partee's terminology, an understood reference time.

On this reading of her words, what Partee says is not true of eventive sentences. A description of an event does not need a temporal context to be fully and correctly interpreted. Every eventive sentence, from the first to the last, is complete in itself. That the first such sentence does not need a reference time should be clear from a superficial observation of commonplace narrative structures. Novels, in narrative form, do not begin with a specification of a calendar date for the first event of the story. Neither is it necessary to know when the book was written to understand what is said. Most novels simply start in with temporally unmodified sentences, and continue. (Even if a specification, such as *On Tuesday...*, is given, this context does not present enough information to place the subsequent eventuality in time.) Novels which follow this pattern are always fully comprehensible. There are no salient or understood reference times or events in the context. There is almost no context at all. Events described in discourse may be temporally related to other eventualities, but if necessary they can stand on their own. They have no need of special reference times.

There is one more thing which might be meant by "understood reference time." It might mean that a description of an eventuality needs to be presented within some context in order to be relevant to the surrounding discourse. The context for the eventuality would be a temporal context, such as an interval within which it falls or an event with which it is simultaneous. This would be a bare restatement in the temporal domain of Grice's ideas for felicitous understanding in general discourse. The comment would just be a narrow application of Grice's principle of relevance. It would be accurate as far as it goes.

Conclusion

Pre-Conclusion and Fun Analogies

In this chapter, we have isolated a deep property of state descriptions, a property which state descriptions do not share with event descriptions. States require an external temporal entity, an event or interval, to determine the position of the state in time. States are thus dependent upon events. Described states must attach temporally to events, if state descriptions are to be fully interpreted. Simultaneity and temporal contiguity are the two relations that a state must bear to its temporal context. Events, for their part, are temporally complete. They are dependent on no other entities. Events can bear any relation to other eventualities. A sentence describing an event is perfectly interpretable in isolation.

The fact that a state must be attached to an event or interval from the surrounding context, while an event can exist independently, explains the difference between the behavior of stative and eventive sentences in narrative. When pragmatic connections between events are not present, as for instance is the case in incoherent narratives, the structure fragments. The events fall away into temporal disorder. If there is no general reason to connect events in time, the events will not be temporally related. The ability of eventive sentences to stand on their own, without external context, is what makes this complete temporal disorder possible. The temporal structures of events in narrative are able to fall apart because the individual events can subsist independently, and such structures do fall apart if there is nothing to hold them together. It is as if the narrative structure were a wall of bricks none of which are glued together. When the wall is pushed over, the bricks will scatter every which way. The bricks of the demolished wall bear no particular relation to one another. The wall falls apart because there is nothing cementing it together. There is no cement external to the individual elements, the analogue of pragmatic connection, holding the pieces of the structure together. And the individual elements have no intrinsic property of stickiness which binds them together; bricks and events are able to exist alone and unconnected.

When the pragmatic connection between states and other eventualities, described in narrative, is removed, the interpretation still retains some temporal structure. The states bind to the nearest event or interval. They do this event even when there is no independent reason for them to be connected. Incoherent narratives containing states have some temporal structure. The states described in such narratives are related to surrounding

events and intervals, each state holds at about the same time as some event or interval. One might think of states as bricks with their own natural bit of sticky glue. When the brick wall falls over, it will break into pieces. Some of the pieces will be individual events, but others will be larger slabs of wall, consisting of an event glued to and surrounded by states.

It is a natural property of states to bind to surrounding eventualities. So when there is nothing connecting a state to other eventualities, the state will still attach, because state descriptions cannot be interpreted outside of a temporal context. Only events and intervals can create temporal contexts. A state cannot by itself be a temporal context for another state. We might revise our brick-wall analogy somewhat. The bricks with glue analogy suggest that a series of states can bind to each other, forming a slab of wall that can stand alone. But this is not correct. States and groups of states cannot stand alone. Each state must, at some point, be attached to an event. We ought to conceive of states not as bricks, but rather as the paint on the bricks. Paint cannot stand alone. Paint has position and form only when it covers something. Similarly states have temporal position and duration only when they endure throughout events. Paint can cover different sides of a brick. It can cover the front of the brick, just as states can endure throughout an event. Paint may also cover the sides of bricks, as states do for events, when they are not simultaneous with events, but hold just after or just before events. It is inconceivable for paint to float out in the air to the left or the right of a brick. If paint is on the left side of a brick, it must be painted on that side. A state analogously cannot be arbitrarily out in the future or the past of an event, it must be temporally contiguous with the event, it must be attached to one side of the event. And

finally, when brick walls fall over the bricks do not lose their paint, just in the way states cling to events in incoherent narrative.

Real Conclusion

The intuition that states and events have different temporal properties has empirical substance. Sentences describing events have complete interpretations. The events described have duration and temporal position. States are not intrinsically temporal in that they must be attached to events to acquire temporal properties. A state has duration only when it extends over an event or interval. A state has position only when it is connected to an event. The state can span the event or share a boundary with the event. What is important is that it take some determinate temporal position from the event. In this way, a state is licensed by an event.

CHAPTER FOUR

A Theory of Discourse Interpretation

We make the claim that the temporal interpretation of narrative is merely an epiphenomena. The temporal order we impose on a narrative is not determined independently, rather temporal facts are derivative.

Temporal facts are the surface result of the interaction of a number of independent pragmatic considerations. The pragmatic considerations have a number of sources. Aspectual knowledge is one. We described, in the last chapter, some intrinsic properties of state and event descriptions. These properties effect the ways in which events and states are ordered in interpretation. There is also knowledge of eventualities beyond aspect. We have certain extra-linguistic knowledge of eventualities. This knowledge includes information about how a certain eventuality is generally related to others. A third source of guidance are conversation principles. We assume these principles whenever we interpret narrative. For instance, if two events are described, and one is of such a type that it can be part of the other, the principle of relevance will, in most contexts, encourage us to relate the one to the other, as part to whole.

Aside from pragmatic influences which derive from one of these three sources, there are two other general principles of narrative interpretation. The first determines which events are to be related in interpretation. Considering only narratives without temporal adverbs, our initial inclination is to relate an eventuality to the one just previously introduced. The principle is just this: when we hear two eventualities

described in succession we try to determine a relation between the two. This principle is merely a pragmatic convention. It is not a strict rule of the language. Sometimes it is overridden by other considerations. We discuss some examples below. One should think of this principle as the default assumption in a very complex process of interpretation.

The second principle is that an eventuality cannot precede the eventuality to which it related (if the first principle applies, then one eventuality cannot precede the other just previously introduced). This is a much stricter principle than the first. The data show that it is very difficult to override. This, non-precedence condition, is more of a rule of interpretation. Whenever this principle is violated, there is an intuition of ill-formedness about the narrative, as if a mistake had been made. Unlike the first principle, this one seems to be an instance of a more general pragmatic phenomena.

It is impossible to derive these principles from anything deeper. The best we can do is to motivate them by noting the constructive role they play in a correct theory of interpretation.

Principle One

It is easily seen that we must have some principle which stipulates which events are to be related to which others. For suppose that such a principle were lacking, then the temporal order of events would simply be a result of general knowledge, knowledge of aspect, and knowledge of conversational conventions. The idea would be that temporal order of

events is the result of one's empirical knowledge and appreciation of how events ought to be ordered to form a coherent unity. We do have an understanding, the result from general knowledge and conversational conventions, of what it means for a set of events to be relevant and related to one another. On this view, the general understanding alone determines the relations among events. Interpreting a discourse is, held to be, much like putting together a puzzle. One simply looks at the pieces, the eventualities, and decides how they best fit together to form a nice picture or story. One has an intuitions about when a story is coherent just as one has intuitions about when a picture is coherent.

This method of determining temporal interpretation is pleasing in its simplicity, but is obviously incorrect. If temporal interpretation is determined fully by general knowledge, then it should not matter how the sentences of a narrative were presented. One should be able to take a story and jumble the sentences and still end up with the same interpretation. This is clearly nonsense. If the sentences of a story are presented in a different order, then it is possible that another story might develop, but it is most likely that one will end up with no story at all. The order in which sentences are presented plays a critical role in determining what interpretation develops.

Memory limitations make this puzzle-like theory implausible, even in the absence of the obvious empirical arguments against it. For this theory to be psychologically plausible, we must be able to hold in mind all of the eventualities described in preceding parts of a discourse, and then systematically place new entries among the preceding ones. This is

plainly impossible. We simply cannot remember everything we hear with enough precision for it to be possible to arrange eventualities in this way. The corresponding problem does not arise when putting together a puzzle. This pieces of a puzzle lay out on the table, available for constant observation and manipulation. One does not have to memorize the shape of each piece. However, once a sentence is uttered, it is gone. Searching back through the transcript is difficult and often impossible. If we had to remember all of the eventualities described in a narrative in order to form an interpretation, we could never understand any story of more than a few lines length.

An assumption that an eventuality is only directly related to the one just introduced alleviates these problems. Common knowledge and conversational conventions bear less of the interpretive burden. They may only have to determine the relation a described eventuality bears to an event introduced by the immediately preceding sentence. In this way it is unnecessary to place each new event among all that come before, but only to relate it to the immediately preceding one. With this assumption, one accounts for the contribution of the order of sentences in narrative and removes the large scale memory problems. An eventuality must only be related to only its predecessor and thus one only has to remember a single eventuality at each stage in interpretation.

This principle is merely a convention of interpretation. It applies usually, but not always.

Principle Two: The Non-Precedence Condition

Even assuming an eventuality is related only to its predecessor, one still cannot generalize about how eventualities described in narrative are ordered. A given ordering of sentences does not favor any particular ordering of eventualities. Every serial ordering of the events is mathematically possible and compatible with every ordering of sentences. A consistent application of the principle that an eventuality is determined only in its relation to the eventuality describe before generates a set of relations among eventualities. This set of relations is isomorphic to a set of classes of possible linear orderings. Each set of relations determined by the application of Principle One is associated with the class of orderings consistent with that set of relations and satisfying the axioms of a finite discrete partial linear ordering with overlap (or whatever is the correct model of temporal discourse interpretation).

It is the desire for intelligibility which causes us to interpret sentences the way we do. For a given narrative, it must be possible determine whether it is coherent, perhaps interpreting it in such a way as to make it coherent. But it will be very rarely possible to apply the label "coherent" or "incoherent" unambiguously to any single interpretation produced by Principle One in conjunction with general knowledge. Without working out the mathematics, the representations we can derive with Principle One and general knowledge leave too much room for variation, too much undetermined in the interpretation. Each eventuality is related only to the one introduced immediately before. This does not determine an unambiguous order among eventualities. It only determines an incomplete ordering.

We will not know, in most cases, how an eventuality is related to the one introduced two or three stages earlier. If an eventuality e_i is ordered before its predecessor e_j , and the predecessor after all previous entries, then we do not know how e_i is related to the previous entities. It might come before or after any eventuality introduced prior to e_j . Each incomplete ordering generated by Principle One can be associated with a set of complete orderings with which it is consistent. Many incomplete orderings will be consistent with both coherent and incoherent complete orderings, and of the coherent ones some will be true and some will be false. In general, results of temporal interpretation will not be unambiguous. Insofar as each eventuality is only related to the one introduced before and after (if these exist), the ordering of each eventuality with respect to all other eventualities is undetermined. This is unacceptable because a full interpretation which is not specific enough to be called true or false, or coherent or incoherent, is insufficient.

The relations among eventualities determined by Hinrichs' treatment of states is also ambiguous. Unlike events, states, for Hinrichs, overlap the reference time. Unlike events, whose order with respect to all other events is determined, Hinrichs' condition on states leaves open the possibility that they may overlap or not overlap preceding events (though, as we have seen, he requires states to extend beyond events into the future). This ambiguity in the ordering of states does not pose a problem, because only the initial ordering is determined by the aspect of the verb. Outside pragmatic influences are left to enact the final disambiguation. But in our theory in its current state, Principle One, general pragmatic

knowledge, and knowledge of aspect, are all that determines temporal relations, and they leave the order wildly ambiguous.

Hinrichs and others, such as Dowty with his TDIP, and perhaps Partee with her "higher level parameters of discourse structure" seek to capture a very basic intuition. Discourse, on the whole, moves eventualities forward. One can question the empirical adequacy of various proposals which respect this intuition, but the intuition is something true, and it must be preserved. The system of interpretation developed thus far does not respect this fact. We have no reason to assume that a discourse would order events forward rather than backward. An ordering of eventualities opposite to the ordering of sentences is possible, so long as eventualities can be placed before other eventualities in the preceding sentences.

There must be ways to rule out some of the relations admitted. Clearly it would help most to eliminate the possibility of ordering the event in the interpretation of one sentence before the event described by the preceding sentence. This would accord with Hinrichs' and Dowty's observations, while greatly reducing the possibility of ambiguity within the interpretations. If an event must follow one introduced earlier, its position with respect to all earlier entries will be unambiguous, transitivity insures the order will be strictly linear; even a weaker, non-precedence condition will go far toward reducing ambiguity.

Many of the examples narratives we have discussed tell against the stronger claim that an event must follow another described earlier. But I am unaware of any counterexamples to the claim that an eventuality

described by a sentence must not wholly precede, nor precede and overlap, without including, an eventuality described by the preceding sentence (or verb), assuming it is related to this eventuality. The data support such a non-precedence condition. A succeeding sentence should not be directly determined to describe an event as occurring before an event introduced earlier.

Unlike Partee, we are not assuming a higher order parameter which specifies that interpretations satisfy the non-precedence condition. We are not excluding any examples of narrative. The facts, concerning all narratives, are that an eventuality cannot be directly ordered before one previously introduced. (Though an eventuality may come to precede the previous entry, if Principle One does not apply and the eventuality is related to an entry before the last one. In this case, it is not directly ordered before any eventuality.) This is true of the full range of data. We wish to explain or, at least, describe these facts.

How might it be possible to derive this condition from wider pragmatic concepts? The following considerations are suggestive. Language has a general disposition to avoid redundancy. In syntax, research has been very successful when guided by the assumption that principles apply to syntactically disjointed domains. Whenever redundancy has appeared, it has been possible to resolve the conflating principles into simpler and more general principles which are not redundant. Even in the interpretation of sentences, ambiguity is much more widespread than synonymy. When we describe the interpretations of an ambiguous quantifier structure, for example, we often resort to marginal *such that* constructions to express

the individual readings. There are generally no natural constructions in which to paraphrase ambiguous structures. Naively I would guess that redundant or synonymous expressions or certain readings of ambiguous expressions would disappear in the course of language change.

The paragraph above, which may be hopelessly unconvincing, is preface. The argument is that the non-precedence condition follows from the mere fact that there is another construction in the language, the past perfect, whose sole function is to place an event before another in discourse or before an event salient in the non-linguistic context. The simple past tense in narrative respects the non-precedence condition just because the past perfect violates it by nature (Dowty(86) makes a similar point). If someone wishes to misorder an event, he only has to insert *had* before the VP. The inability of the past tense to violate the non-precedence condition derives from pragmatic conventions against redundancy. We might take this as evidence that the extension of the past tense is restricted in narrative to a domain which is disjoint from the domain of the past perfect.

The Process of Temporal Interpretation

We are now in a position to present our pragmatic theory of interpretation. The theory has two principles:

1. Eventualities are (initially) related only to the previous entry.
2. Eventualities cannot precede the the entry to which they are related.

These principles combine to yield the general principle of narrative interpretation:

3. Eventualities cannot precede the the previous entry.

This principle is merely a pragmatic convention. It is not a rule of the language. In addition to Principles One and Two, we have at our disposal knowledge of the aspectual class of the verbs and general knowledge of the described eventualities. By the application of these meager resources, temporal interpretation is determined.

We will consider a few example narratives to demonstrate the process of interpretation. When we interpret a series of past tense sentences, the default assumption is that that they constitute a coherent narrative structure (derived from familiar Gricean conventions). We apply principles (1) and (2):

4. John took off his clothes [e_1], went to the bathroom [e_2], took a shower [e_3], and went to bed [e_4].

In narrative (4), the verb phrase describing e_1 is processed first. Our knowledge of aspect tells us that the event can determine an independent temporal referent. The event is specified as past. Next the second verb phrase is encountered, and event e_2 is related to event e_1 by principle (1). Principle (2) requires that e_2 not precede e_1 . Common knowledge of these events suggests that they cannot go on simultaneously. Our knowledge of aspect determines the the second event does not have to be temporally determined by the second. Common knowledge encourages us to place e_2 wholly after e_1 , and our knowledge of aspect allows us to do this. We

determine that e_2 follows e_1 . The same line of argument leads to placing the remaining events in succession.

The first sentence of (5) is processed in the same way as the initial verb phrase of (4): the event e_1 is placed in the past.

5. Robert walked out on stage [e_1], with a unicycle, three balls, and a harmonica. He rode the unicycle [e_2], and, with his hands, he juggled [e_3], and, in his mouth, he played the harmonica [e_4].

Principle (1) relates the second event e_2 to the first e_1 . Principle (2) determines that e_2 does not precede e_1 . Common knowledge tell us that e_2 cannot be simultaneous with e_1 because one cannot walk and ride a unicycle at the same time. For the same reason, the two event cannot overlap. Since e_2 is an event, it does not need to be temporally attached to e_1 . e_2 is determined to follow e_1 . e_3 is interpreted. Principles (1) and (2) combine to place e_3 in a relation of non-precedence with e_2 . Common knowledge is then invoked. We note that Robert is described as being on stage and assume this information is relevant to interpretation. We note that e_2 is an event of riding a unicycle and e_3 is an event of juggling. The fact that Robert is on stage suggests that he is performing an act. People can juggle and ride unicycle at same time, and these combined actions are impressive enough to be considered an act. We assume that e_3 is simultaneous with e_2 . Similar considerations apply in determining the relation between e_4 and e_3 .

Narrative (6) includes state descriptions. We process the first three events, and on the basis of reasoning similar to that employed in the interpretation of (4), place them in order:

6. Jameson entered the room [e_1], shut the door carefully [e_2], and switched off the light [e_3]. It was pitch dark around him [s_1], because the venetian blinds were closed [s_2].

Next we encounter the state description. Principle (1) relates the state s_1 to the event e_3 , and principle (2) determines that it does not precede e_3 . Knowledge of the identity of e_3 and s_1 , that they are an event of turning off a light and a state of darkness, respectively, when supplemented with common knowledge, determines that the eventualities stand in a relation of causation. This knowledge leads us to place the eventualities in succession. The properties of states require that the state either overlap the event or be temporally contiguous with the event. To satisfy the requirements imposed by the relation of causal connection and the need of the state to be temporally determined, the state is determined to be temporally contiguous with the event. The state s_2 is interpreted after the state s_1 . Principles (1) and (2) require that the second state not precede the first. Properties of states require that the the second state be temporally determined by the first, which is itself temporally determined by preceding event. Common knowledge and knowledge of the meaning of the word *because* and its role in this sentence suggest that the second state temporally includes the first. (The ability of state s_2 to include state s_1 does not violate the non-precedence condition. Non-precedence does not disallow temporal inclusion. It only rules out temporal overlap

into the past without inclusion, when the second eventuality is truly "more" past than the first.)

In incoherent narrative, the process of interpretation breaks down. The described eventualities are not related in a coherent unity. Events described in incoherent narrative may not bear any determinate temporal relations to one another. States may bear temporal relations to surrounding events, but only because of their need to be temporally determined. We can understand these intuitions by considering the process of interpretation applied to example (7):

11. Ada ran to the window [e_1]. Germany invaded France [e_2]. She sat in the cafe and finished the article [e_3]. After she bought three cars [e_4], she woke up [e_5], it occurred to her [e_6]: "3+3=6."

The first step in the interpretation places the event of Ada running to the window in the past. It determines an independent temporal referent. We assume these sentences are part of a narrative structure and apply Principles One and Two to the interpretation of the second event. This event is Germany's invasion of France. Principles One and Two encourage us to place this event in a non-precedence relation with e_1 . Common knowledge is left to determine the exact relation between the two. But common knowledge is confused. What does Germany's invasion of France have to do with a woman running to the window. In each of the examples above, the events are actions of a single individual and are related for this reason. We might assume, out of habit, that the second event follows the

first, and hope that things become clear later. The third event is processed. Ada is now in a Cafe finishing an article. Principle (1) and (2) apply to place e_3 in a non-precedence relation with e_2 . However, the interpretation has begun to degenerate. The events seem to be random. We have no reason to connect them in any way and no reason to believe they ought to be connected. The situation is aggravated when Ada is said to buy cars, wake up, and have an idea.

Once we realize the events in (7) do not form a coherent story, the assumption that they are part of a narrative structure falls away. (7) is just a series of disconnected sentences. Principles One and Two, which are principles of narrative interpretation, are not applied. No event is related to any other. And temporal interpretation does not take place.

(8) is another example of incoherent narrative:

8. There was a party. The car slammed into the wall. John was taking a test. He wore a blue shirt. Dave turned on the light. Germany was invading France.

In the process of interpretation, it rapidly becomes clear that the sentences do not describe a coherent story. The eventualities described in this structure do not have any intuitive connection. The interpretations just as in (7). There significant difference, though. When it is realized that the structure in (7) consists of random sentences, each sentence is interpreted in isolation. This is only possible because (7) contains no state descriptions. The state descriptions in (8) cannot be interpreted alone. They need the surrounding events to determine their temporal position. There is

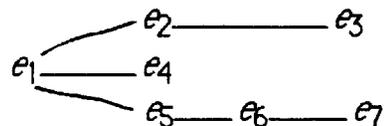
a tension. The incoherence of the structure encourages makes us assume the events are unrelated. We do not wish to place them together. However, we cannot interpret the state descriptions apart from the event. Either we associate the states with the events, and do violence to our general intuition of coherence, or we separate the states, and leave them uninterpreted. This sense of confusion gives rise to the intuitions on this examples.

The natural interpretation of the narrative in (9) violates principle One. This is good example of the circumstances underwhich principle (1) is overridden:

9. The three Princes left the castle early one summer morning [e_1]. Prince Valiant went to Venice [e_2] and married a beautiful woman [e_3]. Prince John rode into the woods [e_4]. Prince Morris travelled to Rome [e_5], discovered a gold mine [e_6], and bought a bank [e_7].

The temporal structure of the interpretation of (9) can be schematically represented as in (10) (time moves forward to the right).

13.



The acts of the individual principles occur in strict linear order, for reasons discussed above. The acts of distinct princes are unrelated. The first event of each prince is related only the mutual departure events. This interpretation violates principle One because it relates the events e_4 and e_5 directly to event e_1 , even though e_1 is not introduced immediately

before either e_4 or e_5 . One can understand why this interpretation arises, without making up a definite line of reasons. The second and third acts are carried out by Prince Valiant. The fourth act involves Prince Morris. The fifth, sixth, and seventh acts involve Prince John. The events are described sequentially as they must be. Still we have no reason to believe that acts of the princes occur in sequence. There is nothing to make us believe that the Prince John and Prince Morris waited until Prince Valiant finished his business, before doing what they did. The subject of the sentences change when we encounter acts of a new prince. The acts of distinct individuals are generally unrelated. When the new subject is encountered, Principle One is discarded. We search back through the discourse to discover an event involving the subject. For each Prince Morris and John, this event is the departure. The acts of Morris and John are related to the departure, rather than the immediately preceding event.

The Notion of Interpretation

The interpretive system includes two principles. An event described by a sentence is interpreted in relation to the previous sentence, and an event may not precede the event described in the previous sentence. Both of these are simple conversational conventions. There are narrative contexts in which an event is to be related to the event described two sentences before it. However these principles are very general, and if there are candidates for rules of narrative interpretation, these are them.

Beyond the two principles nothing else can be said. There are no further rules of interpretation. All there is common knowledge, knowledge of

aspect, and common sense. We use our basic knowledge of the world to decide how to relate the eventualities described in different sentences. We interpret a discourse in the manner which seems most reasonable. If we have good reason to place events in a certain way, then we do so. Gricean conversational principles are partial descriptions of the criterion for reasonableness, relatedness, etc. We assume that a narrative satisfies Grice's conventions, and carry this assumption along when we interpret sentences.

We try to interpret narrative so that it conforms to our knowledge of the world and conversational rules. In a metaphor, interpretations are the solutions to equations whose two variables are what we know of the world and our conversational sensibilities. Someone with very strange beliefs could interpret any of the examples that have been cited in wildly different ways. We, having normal beliefs, interpret narratives in such a way, so that they do not assert bizarre things.

Given that a reading of a narrative is determined by one's beliefs, what does it mean to say that a narrative has a certain interpretation? We have used the term "most natural interpretation," when discussing the preferred interpretations of the examples. But an interpretation is preferred only insofar as the beliefs which lead to that interpretation are preferred. There is probably disagreement about the most natural interpretation of many of the examples we discussed. A change in linguistic and extra-linguistic context can also alter the preferred interpretation. The readings of the narratives are so easily affected that it seems of little sense to speak of "the interpretation" of a given example. Interpretations are as

plentiful as beliefs. Temporal interpretation is an epiphenomenon. It is not a deep concept of the theory, it is just the result of our general reasoning processes.

Section Conclusion

The purpose of this section has been to show that pragmatic considerations are sufficient to determine the temporal interpretation of narrative structures. To prove that common knowledge is sufficient, it necessary to show it to be sufficient in each case, since there are no "pragmatic" structural similarities on which to base a generalized argument. For each case this amounts to developing the line of reasoning that someone follows to arrive at the interpretation of an example. It is clear that this can be done in most cases, probably even by the person doing the interpretation. Some line of reasoning to the desired interpretation-conclusions accompanied most of the examples. But it is not the task of linguistics or semantics to state these pragmatic deductions. If anyone is interested in the issues it would be someone who wished to model general reasoning, perhaps someone interested in artificial intelligence. The facts discussed above have nothing in particular to do with language.

CHAPTER FIVE

Sequence of Tense

The Phenomena

We now consider some effects of the phenomena discussed in the last section. We saw that state descriptions are not interpretable unless they are accompanied by a special context. The context must contribute an event or interval to the interpretation of the state. Events and intervals have intrinsic temporal positions. A described state has no intrinsic position. It takes on the position of its contextual event or interval, or some position closely related to it. This dependence of states on other temporal entities can be observed in a variety of areas. Some particularly interesting structures influenced by this property of states are embedded tense structures. These structures give rise to the well-known phenomena called "sequence of tense." The type of embedded tense structures which demonstrate sequence of tense effects has a matrix verb in the past tense embedding a clause in the past tense.

The Facts

We are specifically concerned with one type of embedded tense structure. The important examples for our purposes are sentences whose matrix verb is in the past tense, and whose subordinate clause is a past tense state description:

1. x **V-past** [y **V-past-stative**]

Examples with the structure in (1) are thought to be ambiguous between two readings. On one reading, known as the "bound" reading, the state described in the embedded clause holds at the same time as the eventuality described in the matrix clause. The embedded state is said to be "bound" to the matrix eventuality primarily because the two are cotemporaneous. For instance, if the matrix verb is *said* in (1), the bound reading reports a past utterance of person X in which X describes a state which held at the time of the utterance. The state described may extend over the utterance into either the past or the future, but this extension is not required. All that is necessary for the truth of (1) is that the state hold at the time of the utterance. On the second reading of the sentence, the "shifted" reading, the subordinate clause describes a state as holding prior to the matrix eventuality. If the matrix verb is *said* in (1), then, on the shifted reading, person X says something and describes a state which holds prior to the time of the utterance. The subordinate state is said to be "shifted" into the past of the matrix eventuality.

Sentence (2a) has the pertinent structure. The two readings of the sentence describe (among others) situations in which, at some past time, Mary utters (2b) and (2c), respectively:

- 2a. Mary said John was sick.
- 2b. John is sick
- 2c. John was sick.

When Mary utters (2b), her utterance is reported by the bound reading of (2a). She says of John that he is sick at the time she speaks. The state she describes holds at the time of her utterance. When Mary utters (2c), her

remark is reported by (2a) with the shifted reading. In such a case, she says of John that he was sick sometime before she comments on his condition. The state she describes is "shifted" into the past of her utterance.

Standard Solutions

Many explanations have been given to account for the ambiguity in (1). Some of the explanations involve abstract morphological "sequence of tense" transformations, from which the structure takes its name. These transformations derive the single surface form (2a) from distinct deep structures. This solution is steeped in the operator analysis of tense. The bound reading is represented at deep structure with the embedded clause in the present tense. This is to signify that the embedded state is cotemporaneous with (present at the time of) the eventuality of the matrix clause. The shifted interpretation of the structure has a past tense in the embedded clause at deep structure; the significance of which is that the embedded state is in the past with respect to the matrix eventuality. More recent proposals, such as Enc(forthcoming) postulate abstract logical forms to represent the different readings. The ambiguity is represented by different structures for the two readings at LF. The relationship between the two eventualities is formalized as syntactic binding of the one tense element by the other.

Problems with the Sequence of Tense Transformations

There are a number of reasons why the old sequence of tense analyses cannot be correct. The essential difficulty lies in the presence of a present

tense at deep structure (See Enc(forthcoming) for an expanded version of these criticisms). A first problem is that deep structure is no longer believed to be the object of semantic interpretation. So an analysis which explains the distinction with ambiguous deep structures and neutralizing transformations has no place in the current framework. However, even supposing the relevant framework were in use, there is still a problem of deriving forms where a present tense occurs in the embedded clause at surface structure. Sentences with a surface present tense embedded under a past tense matrix mean something different from either of the two readings of the embedded past tense structure:

5. Mary said John is sick.

The interpretation of this sentence involves an instance of the extended NOW. Though the specific interpretation is not germane--it is dependent on some very unclear pragmatic influences--the sentence does not mean either that Mary said John was sick when she spoke nor that she said of him that he was sick before she spoke. The bound reading cannot be derived by a transformation which changes an embedded present tense at deep structure to a past tense a surface structure, for this would leave no means of deriving forms where the present tense surfaces, such as (5). (Unless of course the pragmatic influences which determine the interpretation of (5) were represented at deep structure too; so that the bound reading of (2a) and (5) would not have identical deep structures. But this is rapidly becoming foolish.)

Enc's Proposal

Enc(86) develops a much more sophisticated account of the embedded tense phenomena. She makes use of a number of concepts from modern syntactic theory. The ambiguity in the interpretation is represented at the level of logical form. Enc's logical forms are an extremely abstract level of representation. At logical form, the structural representations include abstract elements such as temporal variables. There is binding among the tense elements, and binding relations are given by a system of double indices. LF movement is employed freely to derive structural ambiguities.

Enc's system differs in many important respects from nearly all other accounts which have been proposed. Her theory is much more modern. It is more in keeping with contemporary syntactic theory. However, in one aspect her theory resembles the conventional accounts. Enc represents the relations between the time of the eventualities described in the structures in terms of binding relations. The upper tense in the structure binds the lower tense. When temporal adverbs are present, they may bind other elements in their domains. Any support for Enc's representations, and the binding relations they postulate, will have to come from the explanatory force of her theory. However it must be admitted that the facts are often unclear. If the data she cites along with her explanations were all the support one could find for abstract elements such as temporal variables and bound tense elements, one would wonder whether their existence is really well justified.

Enc often cites work by Partee and Hinrichs as precedents for her ideas. She takes their work as evidence for the existence of temporal anaphora. Temporal anaphora, as she interprets the phenomena, involves the binding of

one tense element by another. This notion is particularly suspect. One very questionable aspect of Enc's system is the distinction she draws between the tense of stative verbs and the tense of eventive verbs. State and event descriptions have different temporal properties, and Enc explains some of these properties in terms of the differing binding conditions which apply to stative and eventive tenses. States and events, the verbs and what they denote, differ in well known ways, as we have noted. It is an undesirable complication to postulate different tense elements on top of the obvious difference among the verbs themselves, as Enc does. The tense elements themselves are clearly unable to explain all, or even most, of the phenomena--how could one derive the fact that if a state holds for a period of time, it holds for every subinterval of the period, from properties of tense? The correct approach seeks an explanation in terms of the nature of the verbs of the things they refer to.

As part of this discussion of sequence of tense, we will not consider in detail Enc's particular proposals. Her system is rather intricate and complex. Rather we will concentrate on her assumption that tense binding exists, an idea on which her proposals are based. It turns out that Hinrichs' and Partee's work provide absolutely no evidence which supports the idea that tenses can be bound. Tense binding does no work in their systems and the concept is vacuous as a result. There has been much confusion on the issue and it has percolated upwards through the years. Once it is seen that the crucial idea of Enc's system has no independent foundation, one can consider her theory on the basis of its own merits.

Tense Binding and Temporal Anaphora

The notion of "temporal anaphora" has been discussed fairly widely in the literature. A number of writers, including Partee and Hinrichs, have described the phenomena discussed in this essay under the title of temporal anaphora. They have noted how the temporal position of eventualities described in one sentence may depend in systematic ways on the position of eventualities described in other sentences. For instance, events described in successive sentences in discourse often follow one another in time. This fact, along with others, has been cited as an example of temporal anaphora; the element describing the subsequent event being anaphorically related to the one describing the first. Phenomena involving states have also been mentioned. States acquire their temporal positions through other temporal entities in the context. Their position is therefore determined by the position of other entities. This is another example of temporal dependence, and it too has been cited as an instance of temporal anaphora.

The name that one gives to any particular phenomenon is surely immaterial to the nature of the phenomenon. The term "temporal anaphora" is as good as any other. But naming a phenomenon must not be confused with explaining it. The term temporal anaphora has connotations. It suggests binding, of a temporal sort. To describe phenomena as examples of temporal anaphora is to imply that the facts are to be explained in terms of some type of binding. The similarities between pronoun binding and the relations eventualities bear to each other are apparent enough. When a pronoun acquires its referent through a relation with another expression in the linguistic context, then the pronoun is said to be bound by the other expression. The other expression is the antecedent of the pronoun. The pronoun *she* may be bound to *Mary* in

sentence (6). *She* comes to refer to Mary as a result of the relation of binding between the two expressions:

6. Mary says she is sick.

When a state is described in the context of an event, the state assumes a position which is directly related to the position of the event. The state thus seems to acquire a positional temporal referent in the same fashion that a pronoun comes to have its referent when it is bound. One might be led to say the state is bound to the event.

Many writers have said this. They have said that the temporal phenomena involve a binding relation between two expressions. Usually it is the tense element which is said to be bound. When two successive sentences describe eventualities, and the second eventuality bears a determinate temporal relation to the first, it has been said that the tense element of the second is bound by the tense element of the first. This is an empirical assertion. A binding relation between two tense elements is an empirical relation. But, in the literature, no evidence is ever given to support this empirical contention. The people who express this view of temporal anaphora fail to keep in mind the distinction between naming a phenomenon and explaining it. If one only intends to assert a relation between a described event and a described state, then it is acceptable to say that the one "binds" the other, meaning no more than that there is a relation. The term "binding" in such usage has no theoretical significance. It is merely a name. But if something of substance is meant by this assertion, then evidence must be given to support it, as it is an empirical point.

Partee(70) was the first modern paper to discuss temporal anaphora within a system of formal semantics. She considered a variety of phenomena. We discussed one of her examples in the first chapter. She argued that certain uses of example (7) involve deictic reference to moments of time:

7. I didn't turn off the stove.

It turns out however that the example does not involve direct reference, but rather simple contextual restriction of the tense predicate. Other examples of contextual restriction of tense are given later in the chapter. This example is crucial for Partee and others who have followed her, because it is the only example ever offered of tense acting as an independently referential expression. Since it demonstrates nothing of the sort, there is no evidence that tense is an independently referential expression.

Later in the same paper, Partee discusses some examples which she believes show tenses can be bound, like pronouns. The examples include ones such as the following:

8. When John failed his test, he was unhappy.

She observes correctly that there is a relation between the time of the event described in the first clause and the time of the state in the second clause. The state holds at roughly the same time as the event. This example, according to her, shows tenses can be bound on analogy with pronouns. The tense in the main clause is thought to be bound to the tense in the subordinate *when* clause. This empirical assertion is made without argument. It is asserted purely on the basis of the temporal relation which

exists between the two eventualities, and the analogy to the pronoun case. Nothing further is made of the statement. Tense never plays a role in the explanation. She neither derives results from the statement that one tense binds the other, nor explains why it is true, nor what it means. The statement is undefined and unsupported. Within the context of the paper it merely expresses the observation that the two eventualities are related. Thus, contrary to appearances, it does no more than reiterate that a relation exists.

What makes one think that the tense element is bound in these examples? A temporal relation exists, this is clear. But what evidence is there to suggest tense is responsible for the relation. The following is a line of reasoning which might lead one to Partee's conclusion: Tense places an eventuality in time. Eventualities described with the past tense happen in the past; eventualities described in the present tense happen in the present; and eventualities described in the future tense happen in the future. So tense is responsible for the relation of a described eventuality to the utterance event. This is true. Now another conclusion which does not follow is drawn: tense is responsible for all temporal relations between eventualities. Since, as everyone would admit, some relation exists between the eventualities described in (7), one concludes that tense is responsible. Since the temporal position of one eventuality is related to, if not identical with, the other, one concludes, on the basis of the analogy with pronouns, that one tense binds the other.

This argument is quite obviously not valid. Rather than go through the details of the fallacy, it is sufficient to point out that no evidence is given

in Partee(70) to support the statement that the tense is bound. Binding is an empirical relation. It has certain properties and characteristics, and it obeys certain conditions. These conditions are never described or defined. No statement is given of the conditions under which tenses can be bound, nor are any structural arguments presented to show that it is tense which is bound. Without structural arguments which pin-point tense, it might as well be some invisible element which is responsible for the phenomenon.

There are a number of things which suggest that the phenomena involve neither tense nor binding. First consider the relation between two eventualities in (8). The state of John's being unhappy bears a temporal relation to the event of his failing the test. But what relation is this? The relation is not necessarily one of simultaneity. It is possible to interpret the sentence as saying that John was unhappy during the time he failed his test, with the state simultaneous with the event, but this is not essential. It is perhaps even more natural to interpret the state as following and being caused by the event. The state comes after the event. Binding relations usually involve coreference, or, at least, inclusion. What sort of binding relation would place the state after the event? Furthermore what sort of binding would allow the state to be either simultaneous with the event or subsequent to it? When both eventualities in the sentence are events, there is even more variation:

9. When John went to Kansas, his mother bought him a car.

The event in the main clause can bear any relation to the event in the subordinate clause. John's mother may buy him a car, before, during, or after he goes to Kansas. The two events can stand in any relation. No particular

relation is determined. Pronoun binding is Partee's model, and pronoun binding determines the referent of the bound pronoun uniquely. The phenomena represented in (8) and (9) do not resemble coreference of any known sort.

Secondly, there is the proposition *when*. This expression connects the main and subordinate clauses. If a relation exists between what is described in the two clauses, it seems this is the element which is responsible. Tense already has a role-- specifying that the eventualities happened in the past. Developing a special role for tense is redundant and theoretically unparsimonious. The obvious question to ask oneself is: if tense determines the relation between the two clauses, what role does *when* play? If tense just expresses pastness, the facts are clear. *When* does not specify any temporal relation between the two eventualities, which is in keeping with the observed phenomena. It simply states that they are conjoined, somehow.

Partee cites some interesting examples. They demonstrate that eventualities described in different clauses bear relations to one another. Sometimes they bear determinate temporal relations. But beyond this, nothing can be said. The evidence does not support the contention that the phenomena involve binding or any attribution of binding to tense.

Hinrichs(86) expands upon Partee's ideas. He considers a full range of examples of temporal relations among eventualities in discourse. He considers examples of past tense narratives consisting of a succession of unmodified sentences. (10) has this form. He also considers examples similar to (9), with *when* clause adverbial modifiers. He examines other

examples with indexical temporal adverbs, as in (11), adverbs specifying a date or date, (12), and cites examples where the adverbial clause is headed by the prepositions *before* and *after*:

10. John came home. He turned on the lights. He sat down.
11. Yesterday John was sick.
12. John finished on the 23rd at 2 p.m.
13. John finished after Dave.
14. John turned in his paper 3 days after Steve.

Hinrichs observes that temporal relations are expressed in these sentences. And following Partee, he describes all of these as instances of temporal anaphora. He remarks that the narratives involve a number of different forms of anaphora. There is tense morpheme - tense morpheme anaphora, tense morpheme - temporal adverb anaphora, temporal adverb - temporal conjunction anaphora, and others. He never really defines any of these notions, and like Partee, makes no use of these attributions. He develops his formal system with no eye toward the role of tense morphemes. Tense morphemes are never referred in the theory, except in the naming of the phenomena. His system does make use of a concept of reference time. What is suggested is that, in (10) for example, the tense of succeeding sentences is bound to the forward moving reference time introduced by the previous sentence. On this meaning of bound, expressions are not bound to each other, but to related entities. As Partee(84) says, drawing an analogy with pronouns, "it would be as if pronouns referred to the *father* of the last mentioned individual!"[p.256] This is a rather bizarre notion of binding and anaphora, and one wonders whether it warrants the name. Anyway Hinrichs never gives evidence to suggest that tense morphemes can be bound, so all analogies with pronouns are gratuitous. We show in chapter 2 that Hinrichs

system is not correct, and with it goes his concept of reference time, and any lingering suggestiveness of analogy to pronominal anaphora.

Thus far the confusion between naming and explaining has had no ill-effects. Partee and Hinrichs have cited phenomena and presented theoretical explanations. Their explanations consist of model theoretic representations of the truth conditions of the data they consider. The phenomena are described with names that suggest certain explanations, explanations which in turn do not exist. But in most cases no harm is done. Only some obscuring of the facts may take place. The misleading description of the phenomena may be what causes one to overlook the obvious nature of some of the facts that Hinrichs considers. Sentences (13) and (14) are good examples:

13. John finished after Dave.

14. John turned in his paper three days after Steve.

(13) says that John finished after Dave, and (14) that John turned in his paper three days after Steve did. The adverbs in these sentences place the events in a determinate relation. In (13) the one is after the other, and in (14) it occurs three days later. These examples do not involve temporal binding. The adverbs place the entities in certain stated relations. The adverbs are responsible for the relations between the eventualities. The sentences are clear instances of the comparative construction. Consider the analogous examples in (15) and (16):

15. John is taller than Dave.

16. John is three feet taller than Steve.

The first sentence (15) places the height of John and Dave in a certain stated relation: John's height is greater than Dave's. (15) mirrors (13),

where the sentence places the two described events in a certain stated relation: the time of the first event is later (greater) than the time of the second event. If we discard the absolute view of space and time, intervals of time become properties of events, and intervals of space become properties of objects. (13) and (15) simply compare two properties of the entities described in the sentences. (14) and (16) are similar. Intervals are related in both sets of examples. Would we say there is positional anaphora in (15) and (16)?

The blanket assumption that some type of temporal anaphora is involved in the phenomena might be what enables Hinrichs to treat some facts as temporal which are obviously not. Hinrichs considers sentences with clausal modifiers in detail. He specifically considers examples in which the modifier is a clause introduced by *when*. Sentence (9) (repeated here) is typical:

9. When John went to Kansas, his mother bought him a car.

Hinrichs observes that the event described in the matrix clause can bear any temporal relation to the event described in the subordinate clause. As we have also noted, His mother can buy John a car before, during, or after the time he goes to Kansas. This is the range of possibilities. Outside of the fact that both events are past, there is no temporal fact involved. The events can stand in any, or no, particular relation. There is nothing of a temporal nature to explain. The only generalization one can make about this example, and the semantics of *when*, is that the events described in two clauses are conjoined, they form a pair.

Partee(84) builds on the work of Kamp(81) and Hinrichs (86) (present in manuscript form). The paper calls attention to the similarities between nominal and temporal anaphora. However, unlike previous treatments, the temporal phenomena are compared to the nominal anaphoric properties of indefinites, rather than pronouns. Partee(84) combines the systems of Kamp(81) and Hinrichs(86) into a new theory of the temporal relations between eventualities described in discourse. The coverage of the theory is expanded over previous treatments. Sentences with adverbs quantifying over events are treated. The data include both counterfactual *if...then...* sentences and sentences headed by frequentive adverbs such as *Whenever*.

Just as Partee(70) was built on the analogies between pronoun binding and temporal relations in discourse, Partee(84) draws a connection between certain quantified expressions describing individuals and other quantified expressions describing eventualities. The data are two classes of data, which are presented in comparable groups. "Typical uses of pronouns as bound variables are illustrated in (17a-b) (her [4a-b]); apparently comparable cases of temporal bound variable cases are given in (18a-d) (her [5a-d])." [p.246]

17a. Every woman believes she is happy.

b. No woman fully appreciates her mother.

18a. Whenever Mary telephoned, Sam was asleep.

b. When Mary telephoned, Sam was always asleep.

c. When Mary wrote a letter, Sam answered it two days later.

d. Whenever John got a letter, he answered it immediately.

The next class of data compare the famous "donkey-sentences" introduced by Geach (examples are taken from Kamp(81)) with possible temporal analogs. The nominal examples are in (19) and the temporal cases in (20):

- 19a. If Pedro owns a donkey, he beats it.
 b. Every Farmer who owns a donkey, beats it.
- 20a. If Mary telephoned on a Friday, it was (always Peter) that answered.
 b. Whenever Mary telephoned on a Friday, Sam was asleep.

Partee acknowledges that all of the similarities in the data above are merely suggestive of a relation, and that any important theoretical connections can be established only by giving a unified treatment of the two phenomena. This she attempts to do in subsequent sections of the paper. She wishes to show that in the temporal cases the binding and anaphora are of the same nature as they are in the nominal cases. She develops an integrated formal system which combines the frameworks developed in Kamp(81) and Hinrichs(84). This system seeks to treat the temporal phenomena in the same way that Kamp(81) handled nominal anaphora. A theoretical connection will be established between the nominal and temporal cases if the frameworks in Partee(84) and Kamp(81) are sufficiently similar. The connection is removed one step backward, from level of the data to the level of the explanation.

I believe the similarities between the two explanations are only apparent. Partee employs a common formalism to describe both the nominal and the temporal facts, but what this formalism describes in the two cases is very different. The main problems lie in Partee's adoption of Hinrichs' theory of temporal interpretation. This theory does not accurately represent the range

of data. In many cases temporal relations do not exist where Hinrichs' system predicts that they ought to, and, in many cases where temporal relations do exist, they do not conform to the predictions of the theory. The alleged anaphoric relation between expressions describing eventualities is one crucial concept in Partee(84). Since this relation does not exist, Partee's framework loses a certain essential empirical validity. The other crucial concept relates to the quantificational nature of descriptions of eventualities. This concept is valid: verbs, which describe eventualities, do demonstrate quantificational characteristics in certain environments. The only real empirical connection between the nominal and temporal examples cited above lies in the fact that some nouns and all verbs are semantically indefinite. We will explore this connection below.

The relevant semantic characteristics of (17)-(20) are fairly simple. They involve two basic operations: quantification and binding. Nominal anaphors demonstrate both quantificational effects and also bind other elements. The thesis of Partee(84) is that quantification and binding are present in the temporal cases as well, and that the temporal phenomena are therefore analagous to the nominal phenomena. What we hope to show here is that while nominal anaphora demonstrates both quantification and binding, the temporal examples only show the effects of quantification. The formalism of Partee's theory is quite intricate. As a result, we will describe the facts in terms which are as non-theoretical as possible. We can present arguments solely on the basis of these descriptions without considering the details of Partee's framework.

The eventualities in the each of the examples above are held to be bound to one another because of the temporal relations they stand in. This is a version of the thesis of Hinrichs(86). To refute this hypothesis, that there are temporal anaphora in the quantified examples, we need only to reapply the arguments used against the unquantified cases to the quantified ones. This involves showing that in many circumstances the eventualities described in quantified examples do not stand in determinate temporal relations, and that when they do stand in such relations, the relations are determined either by common knowledge, temporal adverbs, or the properties of state descriptions.

On the relevant reading of (17a) (repeated here), the quantifier phrase *every woman* binds the pronoun *she* in the subordinate clause:

17a. Every woman_i believes that she_i is happy.

17a'. \mathbf{Ax} [woman(x) \rightarrow x believes x is happy]

(17a) has the logical representation in (17a'). The values of the bound variable range over the domain of women, and so the domain of the variable is determined by the binder. In (18a), the apparent analog of (17a), there is no binding relation:

18a. Whenever Mary telephoned, Sam was asleep.

18b'. \mathbf{AeEs} [Agent(Mary,e) & Telephone(e) & Past(e) \rightarrow Agent(Sam, s) & Sleep(s) & Past(s)]

The logical representation of (18a) is given in a Davidsonian like notation. *Agent(x,y)* means the individual *x* is the agent of the eventuality *y*, *Telephoning(e)* means *e* is an event of telephoning, *Past(e)* means *e* is

past, e represents an event, and s represents a state. (18a') means that for every past event of a telephoning by Mary, there is a past state of John's being asleep.

The eventualities come in pairs in (18a), just as individuals do in (17a). For one can correlate events of Mary's telephoning with states of John's sleeping such as there is one of the former for every one of the latter. This is the meaning of a universal quantifier over events having wide scope over an existential quantifier over states. Similarly in (17a) one can correlate women who hold beliefs and women who are the objects of beliefs. For each woman who believes some woman is happy, there is some woman was believed to be happy. The eventualities in (18a) and the women in (17a) can be grouped into ordered pairs. But something further is true of the women. The same woman constituted both elements in each ordered pair. The matrix subject binds the embedded subject in (17a). There is no binding between the eventualities in (18a). The binding relation, if there were one, would be temporal. It would mean that the time of the state described in the main clause was bound by the time of the event in the subordinate clause. This is not the case.

The example in (18a) is simply a quantified version of the examples we have considered throughout this essay. It might be thought that the state is bound to the event because it holds whenever the event occurs. This is the natural reading of (18a), but many examples have been mentioned in which the state follows the event. Two examples are (21a) and the quantified version in (21b):

- 21a. John turned off the lights. It was pitch-black.
 b. Whenever John turned off the lights, it was pitch-black.

The state of darkness is more naturally placed after the event. This is because the state is caused by the event. The same arguments against the existence of a binding relation in (18a) and (21a) apply to the quantified examples in (18b) and (21b). The state does attach to the event, but not because it is bound to the event. The state attaches to the event because it must have its temporal position determined in some way, and the event is the only salient element in the context.

The really strong evidence which contradicts a binding analysis are sentences where both eventualities are eventive. Partee gives examples where both eventualities are events in (18 c-d). However, in the examples she cites, the temporal relation between the second event and the first event is determined by a temporal adverb. This removes the freedom of the event to occur anywhere in time:

- 18d. Whenever John got a letter, he answered it immediately.

The temporal adverb *immediately* in (18d) states that the event in the main clause occurred just after the event described in the subordinate clause. We have argued that adverbs of this sort are simply comparative adverbs. An example is given in (22):

22. Every player on the Patriots is slightly taller than the opposing player on the Jets.

The comparative adjective *slightly taller* in (22) states that the individuals described in the first clause of (22) are just taller than their

opposite numbers described in the second clause. Examples (18d) and (22) also have identical quantificational properties. For every event of letter receiving by John, there is a unique event of letter-sending by John. And for every Patriots player, there is a unique player on the Jets. The two examples are exactly analagous. There is no anaphora.

The examples in (18c-d) are specially chosen. They contain adverbs which restrict the relations of the described events. The existence and effects of these adverbs do not create a binding relation between the events, they only override and obscure the natural temporal properties of events. Once these adverbs are removed, one sees the events do not stand in any particular temporal relation:

23. Whenever I did the dishes, Susan mopped the floor.

In (23) the events are constantly conjoined but they do not stand in any particular relation. For each past event of me doing the dishes, there is a unique past event of Susan mopping the floor. However, the events can come in any order. Susan could mop the floor before I did the dishes, while I did the dishes, or after I did the dishes. She could mop the floor during a period of time which overlaps the dish-washing or during a time which does not overlap the dishwashing. The times of the events are wholly unrelated. The adverb *whenever* is the quantified correlate of the adverb *when*. Neither determines a relation between the eventualities described in successive clauses. *When* asserts some implicit connection between two described eventualities, but not necessarily a temporal relation. *Whenever* asserts a relation between any number of pairs of eventualities, though again not necessarily a temporal relation.

Similar points can be made about the examples in (19) and (20). The nominal cases involve both binding and constant conjunction. In (19), for every donkey that Pedro owns, there is a donkey which Pedro beats. The existence of an owned donkey and a beaten donkey are constantly conjoined. Furthermore, a donkey owned is also a donkey beaten. The constant conjunction between the existence of a donkey owned and the existence of a donkey beaten is result of the semantic properties of the *IF...THEN* construction. If an individual is described in the *IF* clause, and another is described in the *THEN* clause, then one will always be able to pair the two, even when the noun takes on the quantificational properties of construction, as in (19a). On the other hand, the relation of identity between the individuals described in different clauses is the result of the binding of the indefinite *a donkey* in the subordinate clause by the pronoun *it* in the matrix clause.

In the examples with eventualities, there is only constant conjunction between the eventualities described in the *IF* clause and the ones described in the *THEN* clause. Consider example (20a):

20a. If Mary telephoned on a Friday, it was (always) Peter that answered.

First it should be noted that the temporal adverb *on a friday* is superfluous. The adverb only restricts the time, so that the eventuality in the *IF* clause occurs on a Friday. This restriction makes no difference in the semantics of the sentence. *A Friday* binds nothing in the main clause. One could just as well replace it by *on a sea going vessel* and the essential facts about the sentence would remain the same. Perhaps there is

a suggested analogy between (19a) and (20a) because *a donkey* and *a Friday* both begin with the letter "a," however this is not a significant similarity. Let us drop the adverb *on a Friday* and consider sentence (24).

24. If Mary telephoned, it was (always) that answered.

24'. AeEe' (Agent(Mary,e) & Telephone(e) & Past(e)-> Agent(Peter) & Answer(e) & Past(e'))

The eventualities in the different clauses of (24) are constantly conjoined: for every event of Mary telephoning there is an event of Peter answering. In this particular example, the order in which the events are interpreted is fixed by our empirical knowledge of those events. Peter's answering always comes after Mary's calling, because one can only answer a telephone after it rings. However such a specific relation between the events does not reflect a linguistic fact. In many other cases no particular temporal relation is determined between the described events:

25. If I ate vegetables, then my dog ate meat.

The events described in the antecedent and the consequent may occur in any order (in point of fact, my current dog is a puppy, who eats three times a day: before, during, and after I do). The events are constantly conjoined but they are not related temporally. There is no evidence of temporal binding here.

In the nominal examples there is evidence of both universal association, or constant conjunction, among the described individuals and binding of one nominal element by another. In the temporal examples there is only evidence of constant conjunction among eventualities, there is no evidence of

temporal binding or temporal anaphora. When Partee constructs her theory she assumes the validity of Hinrichs' theory of temporal anaphora. This aspect of her system is responsible for the account of the binding properties of temporal expressions. The elements that she takes from Kamp's theory account for the quantificational properties of the expressions. Even though the the part of the theory that predicts binding is not correct, the quantificational account remains true.

Temporal anaphora does not exist. What do exist, however, are verbs, and verbs are indefinites. When a verb is presented within the context of a universal quantifier, it takes on the properties of that quantifier, just like nominal indefinites. The (a) examples below show verbs that are not in the context of universal quantifiers, while the (b) examples place verbs in such contexts:

26a. John hit Bill, when Bill kicked John.

26b. Whenever John hit Bill, Bill kicked John.

27a. Susan turned off the light and she went to bed.

27b. If Susan turned off the light, then she went to bed.

We assume in (26a) that *when* does not have a universal interpretation. (26a) is true, on this reading, if there exist two events, one in which John hit Bill and another in which Bill kicked John (perhaps they are related somehow). In (26b), the verbs take on the universal properties of the *IF... THEN...* construction. The events are universally quantified. This means that for all events in which John hit Bill, there is an event in which Bill kicked John. In (27), the existential reading of the described events, change

into universal readings when the events are described in an *IF...THEN...* structure.

The indefinite properties of verbs are responsible for the phenomena that have been previously attributed to the quantificational properties of tense. Tense has been described as quantifier meaning *sometime in the past*. In a simple sentence such as (28), the event described is interpreted existentially:

28. John hit Bill

28'. $\exists e[e < \text{Now}] [\text{agent}(\text{John}, e) \ \& \ \text{hitting}(e) \ \& \ \text{patient}(\text{Bill}, e)]$

28'' $\exists e [\text{Agent}(\text{John}, e) \ \& \ \text{hitting}(e) \ \& \ \text{patient}(\text{Bill}, e) \ \& \ \text{past}(e)]$

It has been standard to symbolize (28) in logical notation as (28'). Both the existential quantification and the attribution to the event of the predicate past ($e < \text{Now}$) are attributed to tense. A tenseless sentence is thought, on this view, to have no quantificational properties:

29. John to hit Bill

29'. $[\text{agent}(\text{John}, e) \ \& \ \text{hitting}(e) \ \& \ \text{patient}(\text{Bill}, e)]$

When tense is contributed it carries along the existential quantifier and the predicate pastness. The past tense says of a tenseless sentence, that it was true both *sometime* and *in the past*. Now that we see verbs are indefinites, the quantification comes for free. Indefinites not embedded under universal quantifiers have an existential reading. A tenseless sentence says *there is* an event with such and such properties. The past tense says that one of these properties is the property of holding prior to the moment of utterance. Though nothing empirical turns on the point, (28'') is a superficially more appealing way to represent (28'). Tense is a

predicate. The predicate *past* is on par with other predicates such as *agent* and *patient*.

Partee's Interpretation and Enc's Assumptions

When describing her view of tense in light of the results of Partee(84), Partee writes: "I still believe it is reasonable to characterize tenses as anaphoric, or more broadly as context dependent, but I would no longer suggest that this requires them to be viewed as 'referring' to times as pronouns 'refer' to entities, or to treat them as arguments of predicates." [p. 256] The context dependency of tense plays a large role in the correct explanation of discourse interpretation and sequence of tense phenomena, as we shall see. However, Partee(84) gives no support to this view. Tense is never mentioned within the context of the theory presented in the paper and, therefore, plays no role in the explanation. In the quoted passage, Partee seems to imply that anaphora and context dependence are the same phenomena. This, however, is unlikely to be true. Without belaboring the point, Enc takes the theory presented in Partee(84) as evidence not that tenses are context dependent, but rather that they are capable of referring to times ("reference times") and being syntactically bound. The theory presented in Partee(84) supports none of these conclusions.

The Trivial Solution

The Effect of Stative of Underdetermination

The conventional analyses of sequence of tense and the more recent ones such as Enc(forthcoming) fail to note one important fact. The fact is that the bound reading of the structure is much more widely available than the shifted reading. When we hear a sentence such as (2a) (repeated here) uttered without significant context, we assume the bound reading:

2a. Darlene said Juan was sick.

We assume that Darlene said of Juan that he was sick at the time of her utterance; the described state holds at the same time as the matrix eventuality. The shifted reading is not available when the sentence is interpreted out of context. It is possible only when the linguistic or extra-linguistic context contributes an appropriately timed event. This event serves as a temporal ground for the embedded state description. When the structure has the shifted reading, the embedded state holds at the time of the salient event.

The shifted reading of (30b) is possible, for example, if it is preceded in a dialogue by (30a).

30a. Juan threw up on the subway.
30b. Yea, Darlene said he was sick.

The sentence in (30a) creates a temporal context for the embedded state in (30b). The described event offers a temporal ground for the state of Juan's

sickness. If the event of Juan's throwing up is held to occur before Darlene speaks, it is perfectly natural to take Darlene's statement to mean that Juan is sick before she speaks, at the time he threw up. This interpretation of (30b) is the shifted reading: the embedded clause describes a state which holds prior to Darlene's description of it. It is the salient event, the throwing up, that determines the time at which the embedded state holds.

The salient event may also derive from outside the linguistic context. For example, if person X sees Juan drop out of a race (salient event), and talks to Darlene about it afterward (matrix event), X can report an utterance of Darlene's using (30b), with the meaning that Juan was sick at the time he dropped out. Since Juan drops out before Darlene speaks, the state described holds at some time before the utterance. The report of the utterance has the shifted reading.

It should be clear that embedded past tense state descriptions and matrix past tense state descriptions are very similar. In sequence of tense structures, the shifted reading is only available when some event in the context, occurring before the matrix eventuality, is able to serve as a temporal ground for the state. Similarly, a past tense state description in the matrix clause needs a temporal entity (an event or interval) to serve as its temporal ground. Without these contextual entities, the state descriptions cannot be "shifted" into the past. The difference between the two is in the definition of past. State descriptions embedded under matrix verbs in the past tense, can only describe states which are simultaneous with or earlier than the matrix eventuality. Matrix past tense state descriptions describe states which are prior to the utterance.

Before we go on, it will be useful to consider present tense state descriptions. In a way present tense states are much less interesting than past tense states. A well-formed single clause sentence, in the present tense, describing a state, is always acceptable. One can hear or utter a sentence like (31) at any time, and it will be perfectly comprehensible.

31. Leo is fat.

(31) means, in most contexts, that Leo is fat at the time the sentence is evaluated. Present tense state descriptions are not fundamentally different than past tense state descriptions; both describe states and all states need to be temporally determined by an event. The difference lies in the events which do the determining. The event from which a past state takes its temporal position must be prior to the utterance event. For a present tense description, it is simply the utterance event itself that serves as the temporal context. The present tense predicate restricts any eventuality described by it to hold or occur in the present--"present," in most cases, means *simultaneous with the utterance*. A state description in the present tense is always acceptable because the utterance event is always present in the extra-linguistic context. Unlike past tense descriptions, present descriptions never need to look elsewhere for their temporal contexts.

The nature of the past tense allows the possibility that a temporal context could fail to exist. The past tense predicate requires of an eventuality that it hold or occur in the past-- "the past" being defined as *prior to the utterance event*. Given that the utterance event is the only constant

element in the extra-linguistic context, it is clearly possible that there may not be an event in the context occurring prior to the utterance. The quite obvious difference between the present tense and the past tense in present and past state descriptions is responsible for the difference between the eventualities that ground the described states.

The bound reading of an embedded tense structure is in some ways very similar to a present tense matrix description. The utterance event is a constant element in the extra-linguistic context of any utterance. The matrix eventuality is, in the same way, a constant element in the linguistic context of any embedded state description. On the bound reading, a subordinate state is attached to the matrix eventuality, just as a present tense state description is temporally determined by the utterance event. Present tense descriptions and bound readings of embedded tense structures are both universally acceptable, for this reason.

A Simple Thesis

Any solution to the embedded tense problem must account for two basic facts. It must explain why a past tense state description in the embedded clause of a sequence of tense structure can only describe eventualities restricted to times at or prior to the matrix eventuality. That is, it must explain why the bound and shifted readings are the only possible ones; why the embedded state cannot describe an eventuality which holds after the matrix eventuality. Secondly, it must explain why the bound reading is more widely available, and, generally, more natural than the shifted reading. A trivially simple solution is possible, one which postulates neither

ambiguous deep structures nor ambiguous logical forms nor any other type of structural ambiguity: the embedded clause is just the simple past tense state it appears to be.

We'll assume this simple solution, and approach the problems in reverse order. The same arguments given above for the preference of the bound reading over the shifted reading are valid when the embedded clause is past tense at all levels. The essential detail is the ubiquity of the matrix eventuality. The matrix eventuality is a constant element in the linguistic context of the embedded state. It is always present, always salient and available to serve as a temporal context for the state in the embedded clause. On an analysis where the bound reading is treated as present underlyingly, the matrix eventuality is the constant element to which the present tense state is attached. "Present" for the embedded clause means simultaneous with the matrix eventuality. The matrix eventuality, being in the extension of the present of the subordinate clause, by definition, can serve as a temporal ground for the embedded state on the bound reading.

If we treat an embedded past tense as a standard past tense--and let us do this as a first approximation--then the matrix eventuality is in its domain. The matrix eventuality is in the past. It is an element in the linguistic context of the past description. Furthermore, it is a constant element in that context. The bound reading is always available because the eventuality to which the state attaches is ever present. The bound reading is preferred over the shifted reading--again as a first approximation--because the matrix eventuality is more salient than most anything else in the context.

We would assume, therefore, that if a more salient event makes itself known, the shifted reading would be preferred.

Pronoun Binding and the Lack of Ambiguity

If this is not all very clear, pronoun binding yields a useful and illustrative analogy (though, I do not wish to suggest that the phenomena here involve binding in any meaningful sense). The pronoun *she* in (6) may either be bound by the subject of the matrix clause or take its referent from the external linguistic and non-linguistic contexts. The matrix clause always has a subject. It is a constant element in the linguistic context of the embedded pronoun. As long as the gender and number of the subject are compatible with those of the pronoun, the matrix subject can bind the embedded pronoun in every case:

6. Darlene says she is sick.

The mere mention of the subject makes it a salient discourse referent. When there is no other salient and suitable referent in the context, the pronoun must bind to the subject if it is to acquire a referent. The greater the salience of some external referent, the more likely the pronoun is to acquire a referent from a source other than the subject.

The relation of the pronoun to the matrix subject in (6) is very similar to the relation of the embedded state to the matrix eventuality in (30a). The fact that the matrix element is always present in both cases makes the bound readings universally possible. The salience of the matrix elements also suggests, in part, why the bound reading is usually preferred.

Most illuminating however is the analogy between the two cases as regards whether the structures are ambiguous. The embedded tense structure is ambiguous only in the way that sentence (6) is ambiguous. Neither is structurally ambiguous. They are ambiguous only in that the referent of the pronoun and the temporal referent of the state can be determined by any appropriate entity in the context; and there is often more than one such entity. Seen in this light, the distinction between the bound and shifted readings seems rather arbitrary. In (6), the pronoun may acquire its referent from the linguistic or non-linguistic context. Within the linguistic context, one does not distinguish categorically between binding by the subject of the matrix clause and binding by some other expression. Clearly, therefore, there are no grounds on which to distinguish binding by the subject, on the one hand, from binding by other linguistic elements and reference to extra-linguistic entities, on the other. The distinction between the subject and everything else is unprincipled. But the distinction between the bound and shifted readings is just this division between the matrix element as binder, and all other elements, linguistic and non-linguistic. On the bound reading, the embedded state is attached to the matrix eventuality, and on the shifted reading, it is attached to some other entity. So if we understand the phenomena on analogy with pronoun anaphora, as some recent proposals do, there is no sense to the claim that the structure is ambiguous; there is just more than one thing in the context.

The Nature of Tense and Sequence of Tense

Partee's point that the extension of tense depends on context is the key to understanding the sequence of tense facts. Tenses are not referential expressions and they cannot be bound. They are predicates. The extension of all predicates, however, varies with context. Tenses are no exception. The first and central fact to be explained about sequence of tense structures, why the embedded state (or event) description cannot describe an eventuality which follows the matrix eventuality, is a reflection of the extension of the tense in the subordinate clause. The subordinate tense is not bound, it simply has a restricted extension. The extension covers eventualities which hold or occur at or before the matrix eventuality. This restriction is a pragmatic phenomenon.

Once one realizes there is no evidence to suggest that tenses are referential expressions or quantifiers, that all apparently referential properties of tense are due to pragmatic restriction and all quantificational properties due to the indefiniteness of verbs, the tense system loses all structure. There is neither sufficient structure nor reason on which to base syntactic/structural generalizations about tenses. We should simply think of tenses as the predicates that they are, predicates whose extension changes in certain contexts.

An unembedded and contextless past tense applies to past eventualities, a present tense to present eventualities, and a future tense to future eventualities (philosophical questions aside). These extension change in context. When Partee drives down the highway, the extension of the past tense in (32) is restricted to a subset of the whole past.

32. I didn't turn off the lights.

In an extended discourse, the linguistic context into which expressions are introduced changes constantly. The context for tense changes in a significant way every time a new tensed verb is introduced. The domain of the past tense is defined to be the interval whose upper bound is the moment of utterance and whose lower bound is the time at which the previously introduced event occurred. This interval changes each time a new event is introduced into the discourse.

In chapter two, we discussed the process by which eventualities are ordered in discourse structures. The potential range of temporal relations one eventuality can bear to another is restricted by a number of principles. The principle that states must be temporally determined is one example. We cited a condition against redundancy as the reason why eventualities cannot be ordered prior to eventualities introduced before. The reason is that the past perfective aspect has as its function the placing of one eventuality before another previously introduced. If two sentences are given, both describing events, the first in the past tense, and the second in the past perfect, then the second describes an event which occurs before the event described by the first. In (33) the past perfect places the event described by the second sentence before the event described by the first:

33. I went home. I had done all of my work.

When both sentences are in the simple past, the second event may overlap or follow the first, but it may not precede the first:

34. I went home. I did all my work.

In (34) the second event follows the first. This ordering is a result of the non-precedence condition and the influence of common knowledge of the events described. The non-precedence condition is derived from the condition against redundancy. If the simple past could place an event before the previous entry, it would perform the function of the past perfect. The overlap between the function of the two would result in a certain redundancy, which is to be avoided.

We may conceive of the non-redundancy principle as a condition on the extension of predicates. In the discourse case, the condition applies to the extensions of the past tense and past perfective predicates. The extensions of these predicates are not to overlap. They must describe disjoint domains of eventualities. The past perfect describes eventualities which hold or occur prior to the current "reference event." The simple past describes eventualities which hold or occur at after or at the same time as the "reference event." The extension of both predicates change with the linguistic context. The simple past is continually restricted by new sentences. As discourse events move forward in time, the interval covered by the past tense, the interval between the "reference event" and the current moment, becomes smaller. The complimentary interval described by the past perfect grows, as more and more events become "past."

The restriction on the extension of the embedded past tense should be seen similarly to derive from pragmatic conditions against redundancy. Three tenses occur naturally embedded under a past tense verb: the past, the past perfect, and the modal *would*. The present tense verbs, *is*, and *will*, are only acceptable some of the time. Present tense verbs can only be embedded

under verbs in the past tense if those verbs are eventive. They are not acceptable under stative verbs:

- 35a. Darlene said Juan is happy.
- b. ? Darlene found out Juan is happy.
- c. ?? Yesterday, Darlene believed Juan is happy.
- d. ?? Darlene hoped Juan is happy.
- e. ?? Darlene thought Juan is happy.

(This ill-formedness does not seem to derive from the temporal underdetermination of states, though I am not certain.) The three tenses which are universally acceptable divide the landscape fairly evenly. The future-oriented modal *would* describes eventualities which hold or occur after the matrix eventuality. The past perfect describes eventualities prior to the matrix eventuality. And, on its most natural interpretation, the bound reading, the past tense describes eventualities which hold or occur at the same time as the matrix eventuality.

The guiding principle behind the interpretations of embedded tenses is that the tenses should divide the temporal domain into disjoint sectors, with each tense covering a particular interval. This is not a grammatical principle. It is an instance of the general pragmatic condition against redundancy. It is not a synchronic condition on the well-formedness of expressions. The tense system cannot be derived from a condition on the overlap of tenses, for there are infinitely many unrealized systems which are compatible with that vague notion. There is no rule against two expressions having a common extension. The evolution of language moves forward the ideal of non-redundancy. The results of this idea are easy to observe; the non-coreference rule for pronouns is an instance. If the non-

coreference rule did not exist, the sentences in (36a) and (36b) could be synonymous:

- 36a. Clyde likes him.
 b. Elvis likes himself.

Reflectives would be redundant, because their function could be taken over by pronouns. Other conditions such as *The Avoid Pronoun Principle*, also prevent redundancy. The parasitic gap construction in (37a) is preferred over the example in (37b) with the pronoun:

- 37a. Which articles did you file λ without reading λ .
 37b. Which articles did you file λ without reading them $_i$.

If both examples were acceptable, then the gap and the pronoun would function identically in this context.

The one significant difference between the pronoun phenomena and the embedded tense phenomena is that the non-coreference rule for pronouns is grammaticized, while the temporal conditions are not. Both are forms of restriction in context, both are the diachronic results of anti-redundancy conditions, but only non-coreference has become a syntactic principle. Non-coreference for pronouns is a general condition on syntactic representations. The tense phenomena do not reflect general structural conditions. One could develop a formalism to represent the temporal facts in terms of binding, but there is no general empirical support for such an account. Intuitions on the pronoun facts are clear, concise, and general, like most grammatical intuitions. The intuitions on the temporal facts in discourse are often very very unclear and example specific. The discourse facts reflect non-grammatical pragmatic influences.

A disbeliever might argue that if the restriction of the past tense in the embedded clause is really pragmatic in origin, as explanation in terms of non-redundancy suggests, then it ought to be possible to violate the condition with only an intuition of pragmatic ill-formedness. The disbeliever would note happily that it is not possible to undo the restriction. There is no way of interpreting the embedded past tense clause so that it describes an eventuality which follows the matrix eventuality. The disbeliever is correct about the facts of embedded tense structures, but the conclusion she wishes to draw from these facts belies a confusion. It is the origin of the restriction which is pragmatic, not the restriction itself. The value of the restriction is determined rigidly and precisely by the contextual frame: embedded past tenses describe eventualities which are simultaneous with or prior to the matrix eventuality--this is etched in stone. However, the way this came to be a determinate fact reflects the teleological property of language to avoid redundancy. Attainment of this property is an ideal towards which languages evolve. It is an ideal state to attain from the point of view of language use.

There is an analogy with color words. A set of color words, not containing synonymous examples, will include a subset of elements which tend to describe relatively disjoint regions of the visible spectrum. In the set, there will be general words such as *red*, whose extension includes that of specific words such as *rose*. But at each level, general and specific, the individual expressions will not overlap greatly. There may be overlap, but it will not be sufficient to create confusion. A complete set of color words will cover the visible spectrum. For efficient use of language, it is useful to have color words which do not overlap. Color words which divide the

spectrum into disjoint domains make it easier for us to precisely describe the colors we see. The ideal of precision in linguistic performance is defined in both the temporal and color cases as complete and disjoint coverage of the respective domains. Neither set of predicates has attained this ideal. Colors do not describe rigidly disjoint domains. There is overlap. One sign that tenses have not achieved non-redundancy is the existence of the shifted reading of embedded states. This reading impinges on the domain of the past perfective, even though the two are not perfectly synonymous. Still the marginal status that the shifted reading enjoys is the price it pays for going against linguistic nature.

CHAPTER SIX

The Metaphysical Properties of States and Events

Introduction

The argument in chapters two through six of this essay divides into three parts. In the first section, temporal properties of the interpretation of past tense narrative structures are considered. We suggest that temporal interpretation is the result of the influence of a wide variety of pragmatic principles and considerations. Two main types of influence can be distinguished. On the one hand, there is general knowledge, which is largely derived from experience. On the the other hand, there is the knowledge which accounts for intuitions about verb aspect. It is possible to minimize the influence of general knowledge on the interpretation of some narrative structures. Left are the temporal properties of interpretation which are due to aseptual influences. Events described in a structure are not related temporally if they are not related by general knowledge. States, in contrast, must be temporally related to other entities, even if nothing in experience supports such relations.

In the next section, we investigate the properties of state and event descriptions that influence temporal interpretation of the narrative structures. State descriptions, it appears, are temporally underdetermined. They have need of an independent temporal entity to place them in time. Event descriptions are not so dependent. Their interpretations are self-sufficient, they have complete interpretations. The dependence properties of state descriptions and independence properties of event descriptions are

responsible for the facts of narrative, once higher level pragmatic influences are removed.

These properties of state and event descriptions are not primitive. They result from independent considerations. The facts given by intuitions on certain descriptions of eventualities reflect very basic understandings that we have of the world. The origin of the linguistic facts lies in our knowledge and intuitions about empirical reality. Thus, we might say the facts are not primarily facts about language, but rather facts about the world, which have repercussions in language. But these understandings of the world are not usual. These particular understandings are very deep ones of which we are not necessarily aware. They are not frequently articulated. The tacit conceptions in which the linguistic facts are grounded undergird our basic metaphysical understanding.

As the final section in the argument, this chapter shows how the properties of state and event descriptions are related to deep seated beliefs about certain entities. This result represents the final step in the argument. Chapter four developed a theory of interpretation of narrative structure. The theory refers only to general pragmatic principles and considerations. General knowledge, conversational conventions, and two basic principles of narrative interpretation are countenanced by the theory. The theory also makes crucial reference to the aspectual classes of verbs. If we can show that aspectual class is world oriented, then knowledge of aspect can be grouped with other forms of pragmatic knowledge. The temporal facts of narrative are, in this way, reduced to completely general pragmatic knowledge.

Linguistic vs. Worldly Facts

We want to argue that the facts described in chapter three are in essence facts about our intuitive metaphysical understanding of states and events. (The understanding of states is especially interesting in the way it diverges from the popular conceptions.) At a superficial level, the phenomena to be explained are linguistic. Linguistic intuitions about sentences of the language are the evidence for all of the statements we have made. The point, however, is that the phenomena are not essentially linguistic. They are epiphenomena, that derive from something more basic. The linguistic intuitions are the result of a deeper knowledge of non-linguistic entities.

The distinction between facts about language and facts about the world is a familiar one. (We motivate it here at a somewhat naive level.) Language is a system of representation. Some words of the language are related directly to the world. These words have meanings and in certain circumstances refer to external entities. Through the meanings of words and syntactic-semantic rules which combine words and meanings, larger meaningful constituents are built up. Some of these expressions, like their constituents, are independently meaningful and are related to external entities. These referential expressions have descriptive content. They refer to or describe things in the world. An obvious and intuitive dichotomy is built up and preserved between the system of representation and what the system represents. Each side of the dichotomy has its own properties and structure. Things can be said about each. Facts are true of language and, or, the world.

Though language can be distinguished from what it describes, the two structures are intimately related. It is a fact about the world that a certain state of affairs "exists" (whatever this means). This can be described in language; some sentential expression is related (the key concept in philosophy of language) to the state of affairs. Both the linguistic expression and its referent have certain properties. The linguistic expression, a sentence, has the property of being true if what it describes exists. The truth of a sentence is a fact about that expression, a fact about language. However, it is a fact which depends on a prior fact about the world: a statement is true only if it accurately describes reality.

The existence of a relation between language and what it describes implies that what is true on one side may have implications for what is true on the other side. "Truth" is the main predicate of linguistic expressions, whose extension depends on the conditions of the described reality. Yet, though there are relations, the fact that we distinguish between language and the world suggests that there are facts which are particular to each. Some facts concern only language and are completely independent of what the language describes. Other facts are set primarily in the world. Others perhaps are somewhere in between.

In general it is far easier to conceive of a fact which is purely a fact of language (in its capacity as representor) than one which concerns only the world. Any fact about the world can be described in language. Therefore any fact about the world implies certain facts about the linguistic expressions which describe it. Facts of language do not necessarily imply anything

about what they describe. It is possible for two very different systems of representation to describe the same reality. This means the differences are incidental to what is described. The differences between the systems is at the formal level. That is, the referential-semantic properties of the two systems can be identical, even though the forms of the expressions differ.

One group of facts, which are unadulterated facts of language, concern the pronunciation of words. How words are pronounced is irrelevant to the capacity for description. We refer to the same entities with the expressions "tape" and "cassette," though they are pronounced differently. One can change the pronunciation of a word and then use the word, with the new pronunciation, to refer to the same things. The pronunciation may vary within a language and across languages. The pronunciation of words is an obvious examples of a linguistic fact, which has nothing to do with what is described.

We observe the independence of pronunciation by applying a test. A property is a property intrinsic to language if it can be changed, while the relation between what is described and the describing expression is retained. Pronunciation satisfies this test because a word can be pronounced in any way, while still referring to the same things. The facts of pronunciation (phonology) are therefore independent of the what is described. Another essentially linguistic fact concerns the order between syntactic heads of phrases and their complements. In some languages the head precedes the complement, and, in other languages, it follows the complement. Languages which differ on this count are nevertheless capable of describing identical things. The order of constituents is not related to the referential

properties of expressions, since facts about order vary independently of referential properties. We say that the facts of pronunciation and the order of syntactic elements are facts about language.

The test for whether the explanation of a phenomena is intrinsically linguistic or not has another side. We know that every fact about the world has some repercussions in language, through its effect on the truth values of the sentences which describe it. Therefore, every fact about the world gives rise to derivative facts about language. If we vary the facts of the world, some facts of language change. Certain sentences become true that were not. When the investigation concerns our intuitions on the well-formedness of a senteces, we vary our beliefs. If our intuitions on well-formednesss change as our beliefs are changed, we conclude that the intuitions are rooted in belief. The properties of the expression that are responsible for our intuitions, whatever they may be, are dependent on what the expression describes. Our beliefs concerns worldly objects, and if intuitions vary with these beliefs, then those intuitions are about what beliefs are about. We say, in this case, that the facts are facts about the world.

The following example illustrates the point:

1. John punched obviousness.

This sentence is strange for anyone who knows what it means. The intuition of ill-formedness is an intuition about the sentence. The ill-formedness is, clearly, in a sense, a fact about language, and a fact about sentence (1) in particular. But this is only true at a certain level. We know why the

sentence is odd. It is odd because it asserts something odd. (1) says that John punched obviousness, and we know that obviousness is not a thing that can be punched. Only concrete entities can be punched. Obviousness is abstract. (1) asserts something which is not only impossible, but is impossible in such a way as to make it both inconceivable and confusing.

However, if we alter our beliefs about what the sentence describes, then the situation changes. We might personify abstract entities. We search for happiness, feel oppression, and enjoy the ambience. We might punch obviousness, if we only had the appropriate beliefs. If obviousness were something that one encountered when working on a problem, then one might punch it in an effort to remove its obscuring role. Under these assumptions, or for a person with different beliefs than ours, the sentence is not strange. The ill-formed disappears. This suggests that the fact which is the ill-formedness of (1) is, at a deeper level, a fact about what the sentence talks about it. It is a fact about the world. There are more obvious examples of linguistic facts which reflect and derive from worldly facts, and the same points apply to these cases.

The test for whether something is a fact about language is its ability to vary independently of what is talked about. The corresponding test for something being a fact about the world, represented in language, is its dependence on beliefs. Behind these tests lies the principle of explanation. Facts are ascribed to the domain in which they find their explanation. To say that something is a fact of language means that it is to be explained by reference to linguistic concepts. If a certain fact is free to vary independently of our beliefs about the world, then these facts are not to be

explained in terms of our beliefs. Such facts, which are represented in language, are solely facts about linguistic expressions. On the other hand, if a fact represented in language depends on our beliefs, then this variation can only be explained by reference to beliefs. The fact is a fact about the world, because it is explained by principles which refer to things in the world.

The Nature of Aspectual Facts

The Facts

Our intuitions on the well-formedness of many sentences in the language depend on verb aspect. For instance, intuitions on the sentences below vary with the identity of the main verb.

- 4a. ?? John is believing that Dave left early.
 b. ?? John is noticing Debby.
 c. John is building a house.
 d. John is walking this way.
- 5a. ?? Know that answer!
 b. Win that race!
 c. Building that house!
 d. Walk down the street, real quiet.
- 6a. ?? Wilbert believed Mary in three minutes.
 b. Wilbert finished the race in three minutes.
 c. Wilbert built a house in 3 minutes.
 d. ?? Wilbert played in the pool in 3 minutes.
- 7a. Milo knew Mary for 3 years.
 b. ?? Milo noticed Mary for 3 years.
 c. ?? Milo built a house for 3 days.
 d. John played in the pool for 3 months.

According to the standard classification: the verbs in the (a) sentences are stative; in the (b) sentences, the verbs are achievements; in the (c) sentences, the verbs are accomplishments; and in the (d) sentences, the verbs are activities. The verbs in the examples in (4) are in the progressive aspect. Accomplishments and activities are acceptable in the progressive, while states and achievements are not (though there are exceptions). The sentences in (5) are imperatives. States are usually unacceptable in the imperative, while achievements, accomplishments, and activities are good. The verbs in (6) are modified by the adverb *in 3 minutes*. Stative and activity verb phrases cannot take "in" adverbs. Accomplishments and achievements are perfectly acceptable in this environment. In (7), the verb phrases are modified by *for 3_____*. Only achievements are unacceptable with "for" adverbs, verbs of the other classes take them naturally.

These generalizations apply to the majority of verbs in each class, though there are quite a few exceptions. The verb *win*, for example, is usually classified as an achievement. Unlike most achievements, *win* is acceptable in the progressive:

8. Arnold is winning the race.

Winning is usually thought of as a punctual event, something that happens at the moment a competition is over. In (8) winning appears to mean something different. To say that John is winning the race means that he is on his way to winning, or that he is leading. The generalization that achievements are unacceptable with "for" adverbs also has exceptions:

9. John won for 3 years.

(9) is acceptable only when it has a certain meaning. (9) may say that John won each game he played during an uninterrupted period of three years. Other interpretations are not available. An interpretation on which (9) means that John won at each moment during a three year period is unacceptable. It might be argued that these exception involve non-standard, derivative, uses of the expressions. *Win* in (8) might be thought to have an activity reading. Winning becomes a process leading up to the conclusion of a race, rather than the conclusion itself. This is perhaps why the use of the verb in (8) is roughly equivalent to *is ahead* or *is leading*. The use of *for 3 years* in (9) could be called derivative for similar reasons. The sentence does not mean John won at every moment for three years, but that he won consistently at intervals throughout three years time. Given that *for X amount of time* usually specifies the duration during which a certain something is in progress, the fact that winning only happens at discrete times through the period might be considered an aberration.

Another set of facts which varies with verb aspect is more logical in nature. The validity of some truth conditional implications depend on the identity of the main verb in the sentences:

10. If John was running, then he ran.
11. If John was building a house, then he built a house.

If a sentence, whose main verb is an activity in the past progressive aspect, is true, then the corresponding sentence with the verb in the simple past is true. For instance in (10), if John was running for some amount of time, then it follows that at some point in the past he ran. The implication does not go through with accomplishment verbs. A sentence which describes a past accomplishment as in progress, i.e., using the progressive aspect, does not

imply another sentence which describes the accomplishment as completed. In (11), John could have been building a house for a period of time though left it unfinished. It is possible that John was building a house, but never built one. The facts recur in the present tense:

12. If John is running, then he has run.
13. If John is building a house_i, then he has not built that house_i.

If an activity is on going, such as when a person is running, then the activity must have occurred in the past. If John is running at this moment, this means he has been running for some non-trivial amount of time (he has run for some period of time). But if it is an accomplishment which is in the process of being completed, the opposite conclusion is to be drawn. An accomplishment in the process of being completed has not yet been completed. Thus if John is now building a house, he has not built that house. This difference between the implicational properties of accomplishments and achievements, on the one hand, and activities and states (when they are acceptable in the progressive) on the other, has been described variously as the "perfective paradox" and the "perfective puzzle."

Finally there are the facts that have been discussed throughout this essay. State descriptions need some context if they are to be fully interpreted, while event descriptions can be interpreted out of context:

14. John was sick.
15. John broke his leg.

Forms of Explanation

Lingering under or around every discussion of verb aspect is the question of the nature of aspect: what type of property is aspect. Here we ask: what is the nature of the facts described above? This is the question we want to address in this chapter. In the literature, the discussions of the topic have not been all that clear on the matter. Some times verb aspect is simply described as a semantic property of the verb and nothing more is said. , other times, the labels apply to the entities that the verbs refer to. And in other discussions, the topic is ignored or conflicting sentiments are expressed.

We have been labelling verbs with aspectual properties freely, as if the matter were decided pretheoretically. However, the theoretical status of aspect, and the properties we attribute to each individual verbs, should be determined by the theory which best accounts for the phenomena. The facts mentioned above are fairly disparate. They do not appear to depend on one identifiable characteristic. The account of aspect given at the end of this chapter is only meant to explain the contrast between the intuitions on sentences such as (14) and (15). Similarly Dowty(79) accounts for one set of facts by assuming that linguistic aspect is determined by the entities described by the verb. He uses this orientation to explain why some activity verbs cannot not occur with "for" adverbs. The examples he considers are similar (if not identicle) to the ones below:

16. ?? John found a flea on his dog for 6 weeks.
 17. John found fleas on his dog for 6 weeks.

Dowty assumes *find something* describes is an event of going from a state of not knowing where (or what) a thing is to a state of knowing where

(or what) that thing is. (16) is true if and only if at each moment during six weeks time John went from a state of not knowing where a certain flea was to knowing where that flea was. This interpretation is contradictory, for it implies that, at every moment within the six week span, except the first and last, John both knew where the flea was and at the same time did not know where the flea was. (16) is odd for this reason. (17), in contrast, is good. The difference between the two is that in (17) more than one flea is found. This explanation is characteristic of accounts of aspect. It does not generalize to any other examples. It cannot explain, for instance, why accomplishments are not acceptable with "for" adverbs. The account has appeal only as a description of our intuitive understandings of the sentences.

There are three basic ways to classify aspect. Aspect could be treated as a syntactic property of expressions, a semantic property of expressions, or aspectual predicates could be applied to the entities that the expressions refer to. As far as theoretical utility is concerned only the third option offers any explanatory potential.

The assumption that aspect is a syntactic property of verbs brings all explanation to a halt. The assumption has essentially no content, for aspect represents no non-trivial syntactic property of linguistic expressions. Aspect does not pattern with the selectional properties of verbs: intransitive, transitive, and three-place verbs can have any aspect. Neither do aspectual properties vary with other syntactic characteristics of verbs such as the ability to assign case. If the phenomena to be described are those given in (4)-(7), then a syntactic account offers no explanation. One cannot even make superficial syntactic generalizations about these

examples. Their structures are rather trivial and certainly are not what is responsible for the ill-formedness. If one wishes to steadfastly maintain that aspect is a syntactic property, the verbs can be given syntactic features such as [+acc], [+ach], [+sta], [+act]. But the labels would be vacuous because nothing can be made of them.

The next option is to treat aspect as a semantic property of expressions. This option suffers from a problem not present with the other two. It is not exactly clear what a semantic property of an expression is. There is something of a void between aspect as a characteristic of the expressions and aspect as characteristic of what the expressions describe. One true thing is that these examples in (4)-(7) differ in mood and other vaguely semantic like characteristics. An ever present option is to classify the verbs in terms their ability to occur in these semantic environments:

18.	[Prog]	[Imp]	[__In]	[__For]
States	--	--	--	--
Activities	++	++	--	++
Achievements	--	++	++	++
accomplishments	++	++	++	--

(a ++ means the verb is acceptable in the context, -- means the verb is unacceptable)

Each class of verbs patterns differently in the contexts. The two contexts [Prog] and [__For], the progressive and *for* adverbs, alone distinguish between the four classes. Aspect could be defined in terms of these contextual features. A state would be [-prog, -for], an activity [+prog,+for], an achievement [-prog,+for], and an accomplishment [+prog,-for]. Aspect would just be a collection of semantic features defined by the progressive aspect and durative adverbs. This type of definition in terms of features is

familiar from phonology. It is also the conventional structuralist analysis of the phenomena. However no explanation can be built on this analysis of aspect. The ability to occur in the progressive aspect or with *for* adverbials do not form the basis of any explanation. There is nothing to conclude from the fact that a verb occurs in the progressive. That there are numerous exceptions to the generalizations also helps to make the idea of a features analysis a dubious one.

Short work can be made of any syntactic or semantic features analyses of the facts in (1)-(4). These analyses are perfect straw men. After they are disposed of, the problem of developing a real analysis of the phenomena remains. The conception which views aspect as fundamentally a property of entities, and only secondarily as a property of verbs, is by far the preferred option. The names of the aspectual classes are taken from the names of different types of eventualities. Stative verbs are called so because they describe "states." Activities verbs describe "activities," achievement verbs describe "achievements," and accomplishment verbs describe "accomplishments." Most modern writers on the subject assume this option, implicitly if not explicitly.

The problem does not become any easier to solve once one decides to attribute aspect to objects. The facts in (4)-(7) remain very motley. We are no closer to an explanation. We do not know what property of verbs is affected by the change to the progressive aspect, nor exactly how the property is changed. The imperative construction is similarly opaque. We know what sentences in the imperative mean, and vague things can be said about the imperative representing a command. Yet these intuitions have no

great theoretical utility. The environments give us no structure to consider, no general phenomena in which to search for a generalization. *For* and *in* modifiers have meanings, and contribute to truth conditions, but it is unclear how their properties determine the ill-formedness of the sentences.

The linguistic examples lack structure. A corresponding lacking exists on the other side with the objects to which the verbs refer. The assumption, in model-theoretic semantics, that verbs are classified in terms of the objects they refer to has received little empirical motivation. Almost nothing has been derived from these assumptions. Part of the problem lies in the description of eventualities. The different eventualities tend to be described in general and unrevealing terms. Accomplishments are said to be extended events, and achievements are said to be punctual events. States and activities are usually thought of as homogeneous extended events, that do not have conclusions like accomplishments.

These descriptions are appealing at an intuitive level. But they lead to rather facile explanations of the phenomena. One has the intuition that states may not occur in the progressive because states are not dynamic and the progressive aspect seems to contribute a sense of constant change. Achievements, punctual events, may not occur in the progressive because the progressive makes events "in progress" and momentary events are never in progress, they are over as soon as they begin. States, in general, are bad in the imperative, because the relations described by many states are cognitive and cannot be altered volitionally. Activities are not good with *for* adverbials because *in x time* means some action is completed in that amount of time and activities have no natural conclusion.

These types of explanations are given for aspectual phenomena. They assume aspect is not an essentially linguistic property, by accounting for aspect as a characteristic of objects. As is clear, the explanations do not generalize in any way. And they cannot be stated more precisely, both for the want of structure in the examples and in the eventualities. It appears that no principled explanation can be given of the phenomena in (4)-(7). The facts do not result from syntactic or semantic properties of the verbs. Descriptions in terms of what the sentences describe have their intuitive appeal. Perhaps such accounts are correct as far as they go, but very little follows from them.

The Linguistic Representation of States

The facts in (14) and (15) appear to be empirically vacuous like (4)-(7). The intuitions on (4)-(7) are artifactual. The fact which is the difference between (14) and (15) seems to be equally inexplicable. (14) and (15) are well-formed in all obvious syntactic respects. They are well-formed semantically as regards modification, which they lack, and predicate-argument structure, which they possess. Our intuitions on the sentences also do not seem to vary with our beliefs. The following reasoning is intuitively valid: *was sick* is a stative verb phrase. Assuming that aspect is a property of eventualities, we would say that (14) describes a past state in which John was sick. John, being human, is the type of entity that can be sick. Sickness is a property that one can have in the past. Therefore (14), in asserting that John was sick in the past, describes something that is not unusual. We cannot point to any particular element in the sentence as

the cause of ill-formedness. For this reason, the problem seems to be inexplicable. The contrast with (1) is clear. In (1), the problems clearly revolve around the relation kicking and its object obviousness. (1) is strange because we are unable to conceive of what it would be like to kick obviousness. This might change with a different conception of obviousness, and people with radically different beliefs from ours might not find the sentence confusing in the least bit. We can very easily conceive of what (14) describes, and for this reason, its deviant nature does not seem to be pragmatic.

In point of fact, however, (14) is pragmatically deviant. That is, to say, it is deviant because of what it describes. There are a number of reasons why one might not attribute the problem in the interpretation of (14) to any particular element in the sentence. The considerations mentioned in the paragraph exemplify a misunderstanding of what sentence (14) describes. Sentence (14), contrary to popular wisdom, does not describe a state. The sentence consists of three semantically significant elements. It contains a subject *John* and a verb phrase *is sick*. The subject refers to an individual. The verb phrase refers to a property. The third constituent is tense, the past tense, which expresses a relation of priority to the utterance event. The subject-predicate relation, in (14), attributes the property of sickness to John, and tense specifies that John has this property before the utterance.

No state is described by the sentence. The sentence describes only two entities: the individual John and the property of sickness. In our intuition, a state is something more than an individual with a property. A state has temporal extension. A state of John's happiness is a temporally extended

entity. It is John having the property of happiness for a period of time. Extension in time is lacking in the what (14) describes. Nothing in (14) contributes temporal extension. Only the property and the individual are present in the interpretation.

(14) is odd for exactly the same type of reason that (1) is odd. It is odd because it asserts a relation between two entities that do not naturally stand in such a relation. (1) is deviant because John and obviousness are not both within the extension of the relation kick. The past tense sentence (14) is deviant because it tries to place an individual with a property in a temporal relation to the utterance event. Individuals and properties are not temporal entities, and, for this reason, they do not stand in temporal relations. Only eventualities, states and events, bear temporal relations. The confused belief that (14) describes a state conceals the true character of the example.

The example in (15) differs critically from (14). (15) describes an event. It describes an event of John breaking his arm. The sentence (15), like (14), consists of three semantically significant elements: the subject noun *John*, the verb phrase *break his arm*, and the past tense element. *John* refers to the individual John as usual. The verb phrase *break his arm* describes an event, and the past tense specifies that this event occurred before the utterance event. (15) is acceptable because tense relates two temporal entities, the described event and the utterance. It places the two events in the relation of temporal precedence. The difference between (14) and (15) is in the reference of the verb phrase. The verb phrase in (15) describes a real temporal entity, an event. In (14), it describes a non-temporal property.

Events are temporal. All events, breaking an arm included, have extension and position. Even if breaking an arm is conceived to occur at a moment, and thus, to have an essentially trivial duration, it is still a durational entity. Zero duration is a duration. It is not that properties have no duration. The notion of duration is undefined for properties.

An individual with a property is a state only when it is temporal. An individual-with-property becomes temporal only when it acquires a temporal position. Temporal positions are determined by intervals and events. If an individual-with-property endures throughout the span of an event, then there is a state, which is the temporally extended individual-with-property complex. The state is a complex construct created when an individual-with-property is placed, and perhaps, stretched out, in time.

For example in the sentences below, (1) describes an individual with the property of sickness and (19) describes a state of the individual being sick.

1. John was sick.

19. When John took his test, He was very sick.

In isolation, the main clause of (19) describes only an individual with a property. However, when it is interpreted relative to the event described by the subordinate clause, the individual-with-property becomes temporal. The individual-with-property complex is extended across the event. The state, which is John's sickness at the time of the test, is this temporally extended individual-with-property.

The event described in the subordinate clause is a primitive temporal entity. It is extended and has a temporal position. What this means is that the event

can overlap and stand in relations of precedence with other eventualities. The state is the individual-with-property given the temporal characteristics of the event. The position and extension of the state are those of the event. The state is simultaneous with the event by definition.

In chapter three we discussed states and noted their need to be temporally determined by an independent event. A state description needs an event from the context to license it. A described state is licensed only when it bears a very restricted range of temporal relations to the event. The state can be simultaneous with the event or it may stand in a relation of temporal contiguity with the event. We now see how these expressions and this way of talking about the phenomenon are somewhat inaccurate. What we described as state descriptions are only descriptions of individual-property complexes. It was said that a state must be temporally determined by an independent event. This phrasing suggests that states are independent entities, which exist apart from events, though acquire their temporal properties through events. This is an expression of the intuition of states as self-subsisting non-temporal things. A more appropriate way to express the relation between states and events is as follows: rather than saying states must be temporally determined by events, we say states are determined by the temporal properties of events. Temporal characteristics are one constituent of states. Apart from events, states do not exist.

Most of the comments about states in previous chapters apply instead to individual-with-property complexes. By themselves, individual-with-property complexes are complete entities. They have certain characteristics and a range of properties can be attributed to them. They are not, however,

temporal entities. They do not stand in temporal relations with eventualities. When we say that individual-property complexes need to be temporally determined, what is meant is that they need to acquire temporal properties in order to stand in temporal relations with eventualities. An individual-property complex must become a state if it is to stand in temporal relations with eventualities, for temporal relations are only defined on the domain of eventualities.

The point can be summarized as follows. Below are two sentences:

- 14. John was sick
- 20. John built a house.

The first sentence attributes the property of sickness to John. The past tense places the described individual in a relation of precedence to the utterance event. The sentence is deviant, because individuals are not related to temporal relations. The example in (20) is different. The verb phrase in (20) describes an event, the agent of which is the subject John. (20) says there exists an event of building a house of which John is the agent. The referent of the verb phrase, being an event, is temporal. The event is naturally placed in the past of the utterance event. The sentence is acceptable, because events are in the extensions of temporal relations. The crucial difference is that the verb describes a property, an object, in (14), and an eventuality in (20).

Importantly one should not say that (20) attributes the property of building a house to John. (20) does not describe a property. It is the sentence (21),

the progressive form of (20), which attributes the property of building a house to John:

21. John was building a house.

This sentence is deviant in the same way as (14). Our language of describing eventualities encourages a confusion between that attribution of a property and the participation in an event. An event is described as an event of building a house. The corresponding property is the property of building a house. The two are not equivalent. As the examples in (11) demonstrate, one can have the property of building a house and yet never be the agent of an event of building a house. The function of the progressive aspect is to convert an event description to a description of a property.

The deviant status of (14) does not seem to vary with our conscious beliefs. No alteration in the beliefs we hold about John or our beliefs about the property of sickness will bring about change in our intuitions on the example. Knowledge of aspect is therefore independent of general beliefs about the world. We can of course change the aspect of the verb from stative to eventive, so that (14) describes a past event. But this amounts to changing the descriptive character of (14). We can change our beliefs about a certain object, so that the new beliefs are still beliefs about the very same object. However, if the aspect of the verb is changed in (14), then the sentence describes a different thing.

When the deviation of an example results from a clash of superficial beliefs, as in (1), the explanation of the phenomena is usually very superficial. In (1) the explanation amounts the statement that obviousness is not kickable,

under normal assumptions. The explanation is theoretically uninteresting, for it merely reiterates the intuition. The explanation of the phenomena manifested in (14), if correct, is much deeper. It ascribes some ontological structure to individual, properties, states, and events, where other theories do not. The intuition of ill-formedness is accounted for in terms which are not simply restatements of the salient intuition. Because the deviant quality of (14) does not depend on superficial beliefs, the explanation is not an expression of superficial beliefs.

The explanation has its intuitive appeal. It is theoretically interesting in the way it makes a variety of statements about the ontological relations between abstract objects. However, one might question whether the facts support such an account. There are two facts in this chapter that we have accounted for: the oddity of (14) and the acceptability of (15). The discussion of the relation between events and states, in chapter three, contributes a few other examples. Yet the explanation is still far more abstract than the few bits of data it is meant to explain.

There are a few other general facts that might be added and accounted for. A state is only determined to follow an event, which licenses it, if the event causes the state. This is one fact. Another is the familiar subinterval property of states, that states are infinitely divisible. These two pieces of data add little to the empirical basis of any theory. It is clear that the value of the explanation lies not in the variety of empirical results which follow from it. Its main value lies rather in its richness as a descriptive account of our intuitive metaphysics. The oddity in (1) and its explanation tell something about our beliefs, at a superficial level. The account of (14) is deep, though similarly concerned with our metaphysical intuition.

The Origins and Basis of the Explanation

We explain our intuitions on the sentences in (14) and (15) by referring to our beliefs, perhaps tacit, about the entities which these sentences describe. It is claimed that our understanding of (14) and (15) reflect a deep understanding of the temporal nature of events, states, properties, and individuals. The explanation presented above is not occasioned merely by the aspectual facts in language. The approach to the aspectual facts is suggested by certain similarities between these facts and the results of philosophical constructions carried out by philosophers

Wiener, Russell, Whitehead, and Kamp all develop constructivist representations of time. For these philosophers, time is a derivative concept. Time is an abstraction from a more basic substratum of events. Temporal entities, such as moments and intervals, are abstract constructions from events. These entities are defined in terms of set theoretic event constructions. Temporal relations among moments and intervals are similarly defined in terms of temporal relations among events. General statements about moments and intervals are given logically equivalent translations in the language of events.

The details of the particular constructions are not relevant to the present discussion. The motivating intuitions make the systems interesting. I am not familiar with Wiener's particular construction. However, Russell, Whitehead, and Kamp were each motivated by different philosophical programs. The impetus of Russell's construction was a desire for ontological purity. He believed the only firm basis of a knowledge of the

external world lay in perceptual sense data. Everything we know of objects and minds, according to Russell, is derived from sense data. All knowledge of non-sensory objects he attributes to a process of ontological construction on a ground of sense data. The particular construction of temporal concepts from events represents Russells attempt to give content to his epistemological views. Russell believed that events were relatively unproblematic entities. We could perhaps have direct sensory intuition of events. However, it is impossible to perceive individual moments or intervals of time. Therefore, if any knowledge is to be had of time, then temporal concepts must be constructions from something more basic. Events, he argues, are the meduim through which we understand time.

Russells' construction defined moments and intervals of time as classes of overlapping events. Kamp's exposition is a formal rendering of Russells' intuitive construction. Kamp defines intervals as maximal sets of overlapping events. Temporal relations between moments are defined in terms of relations between sets of events. Kamp is not motivated by any particular philosophical agenda. His interests lie in developing a model for temporal discourse in natural langauage. The use of event structures in Hinrich(86) and Partee(84) originate with Kamps' work.

From a philosophical perspective, the most interesting construction belongs to Whitehead. Whitehead was motivated by ontological concerns similar to Russell's. Whitehead did not embrace Russells' empiricist empistemology. He did, however, believe that there was an ontological order to the universe. Whitehead placed events an the base of the ontology. He believed that the only things with which we were directly aquainted were certain entities,

which he chooses to call "durations." For our purposes, we might consider durations simply to be events. We perceive events directly. Events possess an intrinsic property of temporal extension. When we grasp events, we grasp them in their full temporal extension. (In Whitehead's system, there are complications involving the specious present, which we will ignore). It is not as if each event of finite duration is a complex of smaller events of infinitesimal duration. Finite durations are given as undivided wholes.

Temporal relations are defined on the domain of events. Events stand in relations of temporal precedence and overlap. Other relations, such as temporal inclusion, can be defined in terms of these two. Some principles are stipulated to hold of this intuitive structure of events. For instance, whenever two events overlap, there is always a third event which is temporally included within both. Our intuition of temporal passage, argues Whitehead, is nothing other than our experience of the course of events. Events bear temporal relations to each other, and we view these events from a perspective which is our "here" and "now." As the course of events progresses, our perspective relative to the events changes. We perceive different events, meet new ones and lose touch with old ones. The successive experience of events is temporal passage.

The ontology begins, for Whitehead, at the level of events. All other entities are abstractions from events. Intervals of time are the extensions of events. Moments of time are abstract sets of events. Individuals and properties are regularities across events. Whitehead conceives of an individual as that type of an entity which is present throughout the course of one event and across different events. I, for example, am the constant element in the

succession of events, which are the events of my life. Properties, such as *blue*, are also constant elements in events. Blue is a constant element (property) in the set of events, which are the life of my pants. This is, to say, blue is present in every event, which can be described as an event involving my pants.

One should not be misled by the language. Just because we describe events in terms of their constituents does not imply that the event is constructed from its constituents. For Whitehead, the relationship is exactly opposite. The "constituents" of events are not independently existing entities, they are mental abstractions from the primitive events. Events do not divide into individuals and properties. Individuals and properties are factored out of events.

Whitehead's metaphysics may not appeal to many contemporary philosophers. His wholistic view of nature seems rather forced, and, for this reason, unnatural. It is one goal of the system developed in The Concept Of Nature to derive the results of the theory of the relativity of space and time. Whitehead develops a very interesting though implausible interpretation of Einstein. He reconceives the relativity of inertial reference frames in special relativity as a relativity in the cognitive-metaphysical perspective from which we view the world. The line of reasoning he develops to derive the results of relativity are as unconvincing and ad-hoc as the interpretations they are meant to justify.

Whiteheads' concept of nature does give rise to an interesting understanding of the temporal nature of individuals and properties. Temporal relations are

defined only on events. This means that individuals and properties and other elements abstracted from events are not intrinsically temporal. Temporal relations can be defined for individuals and properties only derivatively through the events in which they are found. The ability for an individual to be extended in time, therefore, depends essentially on the individuals' participation in events. The concept of extension in time is meaningless for individuals outside of events. Similar properties are extended only in the sense that they are constant elements in extended events. Alone individuals and properties are not temporal things.

This metaphysics of individuals and properties is directly implied by Whiteheads' characterization of nature. The similarities between Whiteheads' concept of individuals and properties and the comments in the section above about individual-property complexes should be clear. Whiteheads metaphysics and the linguistic facts fit together almost as two pieces of a puzzle. What have been called states in the literature are temporally extended individuals-with-properties (or simply temporally extended pure "0-place" properties--*is raining*). The data suggest that attributions of properties to individuals in language (conventionally, "state descriptions") cannot be interpreted in a temporal relation, as determined by the past tense, unless that individual-with-property acquires a temporal position from an event. The unmarked case is one in which the individual-with-property stretches across an event, and takes on the extension and position of the event. For Whitehead, individuals and properties necessarily extended across events. This is how they are defined. States, then, only exist where there are events. States are ontologically dependent on events as is everything else. Extension in time is a property an entity may acquire

only through events, and so it makes no sense to think of states floating out in the void away from events (like a raft in the sea away from an island) for there is no time outside of events.

Whitehead's philosophical system is not merely a play of ideas. When he develops the account, Whitehead presents it as a philosophical interpretation and justification of relativity theory. He wants his "natural philosophy" to be an explanatory, "scientific," philosophical theory. Though he highlights the deduction of relativity, it is perhaps the weakest aspect of his program. Whitehead, and the other constructivists, are most impressive in the way they give philosophical expression to our intuitions about time and change. The idea that the perception of time and the perception of change are intimately related is a valid one. The constructivists presuppose that we do not perceive time unless there is change. Their individual programs can be seen as expositions and developments of this basic intuition.

Whitehead's system provides a foundation for the explanation of the temporal facts described above. Whether Whitehead's system is correct or not is another question. Whether he is true to our intuitions is still another. Both are beyond the scope of this essay. But in presenting our argument that our intuitions about temporal descriptions derive from deeper intuitions, we can do nothing more than note similarities between basic linguistic intuitions and the metaphysical intuitions, perhaps as expressed in a certain philosophical interpretation. A strict scientific or logical deduction of the linguistic intuitions from the philosophical intuitions is impossible because of the lack of evidence and structure. By relating the linguistic intuitions to a philosophical construction it might be possible to invest our metaphysical

intuitions with more structure to attain greater clarity. It is somewhat exciting that the linguistic facts fit so well with a philosophical system that was designed with other goals in mind.

Whitehead's system accords with the intuition that states are temporally determined when they overlap with events. However, states are also determined when they stand in a relation of temporal contiguity with events. Whiteheads' system cannot make sense of this relation. For Whitehead, all non-event entities are abstractions from events, and are therefore essentially simultaneous and coextensive with events. An individual-with-property cannot simply hang on to the edge of an event, as it would if it were temporally contiguous with the event.

Whitehead's conception of the temporal dependency relation between events and other entities is skewed by the types of events he considers. Whitehead does not consider binary changes of state. An event which is a change in a property of individuals presupposes the existence of a succession of states. Whitehead does not discuss changes. It would be very difficult for him to reconcile changes of state with his view of events as the measure of things. In the case of changes, the event is dependent upon the succession of states. Furthermore the states which follow in succession do not hold during the course of the event, as Whitehead would require, rather at least one of the states must precede or follow the change.

Let us try to follow our intuitions through regarding changes to see how they relate to the linguistic facts. We begin with a changeless universe. Russell and Kamp would tell us that in such a universe, time would not

exist. Whitehead would perhaps go further and deny that such a universe could exist. In his metaphysical system, all entities are ontologically dependent upon events. Since there are no changes, there are no events, and consequently no entities at all. Yet this does not seem to be correct. We can perfectly well-conceive of an unchanging universe. Standard non-temporal logics are models of changeless universes.

What would this universe be like? It might contain objects of any sort, just so long as there are no changes. Let us suppose that the universe contains two rubber balls, one red and one blue. In this universe there are at least four things: two individual balls, the property of blue possessed by one ball, and the property of red possessed by the other. These four entities might be conflated into two individual-with-property complexes. There may be other things in the universe, if things such as magnitudes and relations between the balls are admitted. Still, however, there are no changes. Time does not pass. There are no temporal durations nor relations. For this reason, we cannot even say that there is the state of one ball being red.

Let us introduce change into this universe and see where, if at all, states appear. The blue ball changes its color from blue to yellow. This introduces an event into the universe. The event is characterized as a change from blue to yellow. The event does not necessarily introduce duration, or the relation of temporal overlap, into the structure, but it does bring succession. The ball-with-yellow-property complex succeeds upon the ball-with-blue-property complex. There is a change of state.

Once the individual-with-property complexes enter into temporal relations they satisfy our intuitive concept of temporal states. The change is a change in the ball from a state of being blue to a state of being yellow. This occasions another suggestive analogy to the linguistic facts. The temporal relations that the states bear to the change are very interesting. We do not have an absolute temporal background in which to place the event. Therefore it is usual to represent the relation between eventualities in terms of bare temporal precedence. The state of blueness precedes the event and the state of yellowness follows the event. But this is not all. The states are densely ordered. It is inconceivable that another state, say, a state of greenness intervene between the pure, simple, change from blueness to yellowness. There are no gaps between the two states. (This brings up the question, of course, of how the states are related to the event. If the states do not overlap the event, then there is a duration, at which the ball is neither blue nor yellow. Though it is an interesting question, and very difficult to solve, we will not consider it here.)

Aside from question of whether the states overlap the event, it is clear that they must not be temporally separated from the change. The change gives rise to the state of yellowness. The state follows the event. Now recall the linguistic facts in (22):

22. I turned off the light. It was pitch-black.

We noted in chapter three that a described state only naturally follows its eventive context, when the event causes the state. In such cases, the state does not arbitrarily precede or follow the event. The state is temporally contiguous with its eventive cause. In our little "one-change" universe the event, the change, gives rise to or causes the state. The state furthermore

is not merely in the future of the event, it is temporally contiguous with the event. The linguistic intuitions match the metaphysical intuitions exactly.

It is still possible not to be impressed by the correspondence between our thought experiment and the linguistic intuitions, because in both cases the intuitions that an effect must follow its causes is rather very clear. However, it becomes more interesting when one notes the uniqueness of the phenomena. Whitehead only discusses only general extended events. The existence of binary changes implies succession. Generic extended events do not. A Succession of states is present if and only if there is binary change. Furthermore the change can be said to cause the subsequent state. Similarly, the only time a state described in language is allowed to follow an event which forms its context, is when the event causes the state, and in such a case the state is required to follow the event. In both the metaphysical constructs and the linguistic intuitions a state follows an event if and only if that event is causally connected to the state.

The great similarities between the linguistic intuitions and the metaphysical intuitions seem too strong to be coincidental. The metaphysical intuitions result from the assumption that only events are given as the temporal ground. There is no background landscape of absolute moments of time in which events occur and states hold. That states must overlap or be contiguous with events follow as logical properties of the construction. The fact that states follow in the construction when and only when states follow in the linguistic intuition is also a very powerful correlation. These considerations do not prove that our linguistic intuitions are derived from the metaphysics, but they do suggest it.

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