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The Interaction of Tense and Temporal Adverbs in English

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Résumé *

Dans cet article, nous étudions la relation entre le temps du verbe et les adverbess temporels du type indexicals tels que "yesterday" et "tomorrow", lorsque le temps et l'adverbe semblent fournir des informations contradictoires. Nous basons notre étude sur la théorie compositionnelle du temps proposée dans Cowper (1991). L'analyse des adverbess en tant que connecteurs temporels qui se réfèrent directement au moment de parler, des principes de composition temporelle assez simples, et deux conditions de bonne formation, permettent de rendre compte de cette relation étroite.

* Résumé fourni par l'auteure et révisé par les responsables de la publication des Cahiers de linguistique

0. Introduction

In this paper, I will explore the interaction of indexical temporal adverbs like yesterday and tomorrow with tense in English. In particular, I am interested in sentences like those in (1), where the adverb and the tense do not match.

- (1) a. Kate is washing her hair tomorrow.
- b. The children play baseball tomorrow.
- c. Judith was planting the tulips tomorrow. (but now it looks like she won't)

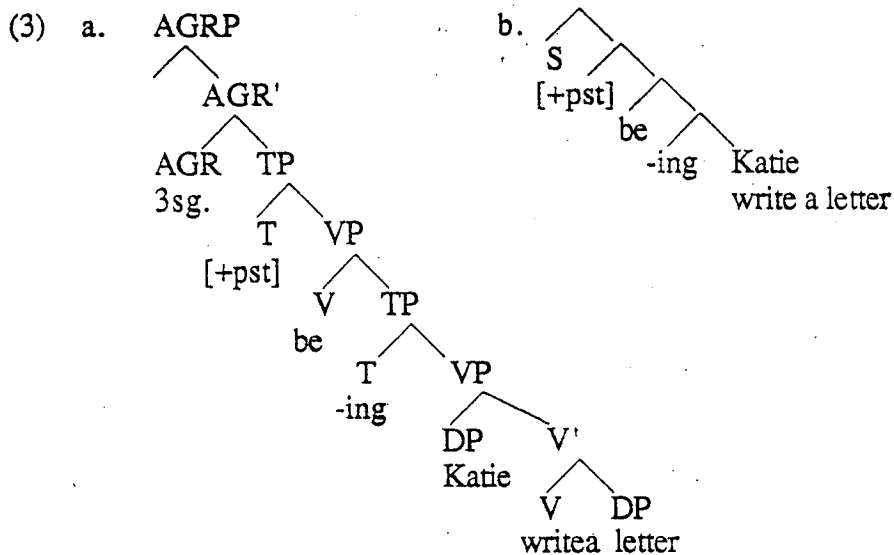
I will provide an analysis which accounts for the grammaticality of the sentences in (1), while ruling out the ungrammatical sentences in (2).

- (2) a. *Kate washed her hair tomorrow. (but now she won't)
- b. *The children play baseball yesterday.
- c. *Judith will plant the tulips yesterday.
- d. *Ruth will be baking cookies last week.

I assume the compositional semantics of tense in English developed in Cowper (1991). I will first present a brief sketch of that analysis, and then go on to propose lexical-temporal representations for the adverbs yesterday, now, and tomorrow, and show how they fit into the analysis. This fit will involve some refinement of the theory, in the form of well-formedness conditions on temporal structure, and rules to repair ill-formed temporal structures, as well as an assumption about the temporal nature of assertions. These will be discussed as they come up.

1. Tense in English

For the sake of clarity, I will be making use of a type of structure I call a temporal projection. This is essentially a syntactic D-structure, with all non-temporal information removed, and augmented by a node referring to the moment of speech. An example is given in (3). (3a) gives the syntactic structure, and (3b) the temporal projection. In the syntactic structure, some specifier positions have been omitted to save space.



Assuming that the point in time corresponding to the moment of speech is a universally available element, the temporal projection contains no information that is not in the D-structure. It is thus not an independent level of representation, but rather a visually simplified D-structure.

The morphemes involved in the English tense system are listed in (4).

- (4) [-past] [+past] -en -ing have be

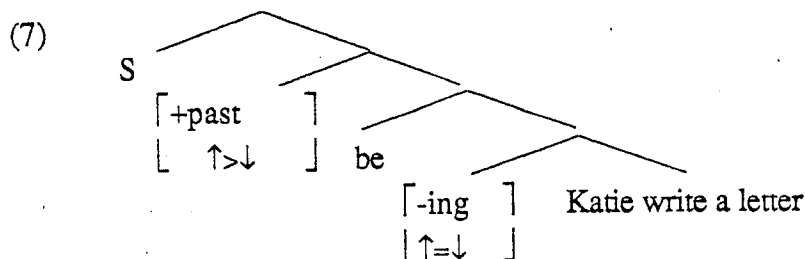
These morphemes can be divided into two classes, according to their temporal properties. While verbs, (be and have) are associated with temporal structure, expressed in terms of points and regions in time, the affixes are associated with temporal relations of precedence and coincidence. I shall refer to this latter type of element as a temporal connector. For example, the present tense morpheme, in a simple main clause, places the verb it is attached to at the same time as the moment of speech, while the past tense morpheme places its verb at a point earlier than the moment of speech. I will express these relations by the notations in (5).

- (5) $\uparrow=\downarrow$ The nearest c-commanding (i.e. higher) temporal structure coincides with the nearest c-commanded (i.e. lower) temporal structure
 $\uparrow>\downarrow$ The nearest c-commanding temporal structure follows the nearest c-commanded temporal structure

The present tense morpheme and the present participial suffix -ing are specified $\uparrow=\downarrow$, while the past tense morpheme and the past participial suffix -en are specified $\uparrow>\downarrow$, as listed in (6).

- (6)
- | | | | |
|-----------|-----------|----------|---------|
| [-past] | [+past] | [-ing] | [-en] |
| [↑=↓] | [↑>↓] | [↑=↓] | [↑>↓] |

The meaning of this notation is clearest in the context of a temporal projection such as the one illustrated in (1). (7) shows the same temporal projection, this time including the temporal representations of the temporal connectors.



Evidence for the participial suffixes having the temporal specifications in (4) comes from sentences like those in (8). Bouchard (1984) argues that in French, the equivalent of the English -en suffix is essentially a past tense marker, in that it backshifts the temporal reference of the event.

- (8)
- a Les enfants partis, on s'est mis au travail.
 - b The broken glass lay on the floor.
 - c The children being tired, we decided to stay home.
 - d The sound of glass breaking interrupted our conversation.

In (8) we see that with -en, the event described by the participle precedes the main event, while with -ing, the event or state described by the participle is simultaneous with the main event.

-Ing has one other property, which it does not share with the finite present tense morpheme. In addition to specifying simultaneity, -ing imposes a selectional restriction on its VP complement. It requires that the temporal structure of the VP be a region of time, rather than a point. This is what is meant by the horizontal line below the down arrow in (6).

This selectional restriction accounts for the difference between the two sentences in (9).

- (9)
- a I saw Alan eat the apple.
 - b I saw Alan eating the apple.

In (9a), I saw the entire event of Alan eating the apple, and there is no sense in which the eating must have taken place over a period

of time. Alan could have swallowed the apple whole. In (9b), on the other hand, I observed part but not necessarily all of the process of Alan eating the apple. Since the only difference between these sentences is the presence or absence of the -ing suffix, it is plausible to attribute this meaning difference to a selectional property of -ing.

Let us now turn to have and be. Have and be are verbs, and as such are temporal structures, not temporal connectors. The temporal structure associated with these verbs happens to be fully underspecified. I will not argue for this here, due to lack of space. In any case, this proposal is in line with work by Mireille Tremblay, who claims that these verbs are thematically null.

The set of primitive temporal structures is given in (10).

- (10) Point in time •
 Region in time -----

These two elements can be combined in various ways so as to express more complex temporal structures. This view of temporal structure draws on work by Jackendoff (1987,1990), and differs from standard treatments of tense in one important way. Reichenbach (1947), and most work on tense since then, analyzes the various tenses in terms of three elements. These are S, the moment of speech, E, the moment or period of the event described by the sentence, and R, a reference point. The different tenses are described by arranging these three elements in various ways along the time line. Although I retain S, the moment of speech, I dispense with E and R as elements of temporal representation. I believe that, like the syntactic elements subject and object, E and R are relational, not structural, concepts. E is a point (or region) of time that happens to be linked with an event. R is a point which happens to figure in the temporal structure, and with respect to which the event can be located. Just as the notions of subject and object do not figure as primitives in syntactic representations, E and R ought not to figure as primitives in temporal representations. In any case, E and R will not figure in the representations to be proposed here, and I shall have no more to say about them. Returning then to points and regions, I assume, following Jackendoff, that any point in time can be viewed microscopically, as a bounded region, and any bounded region can be viewed macroscopically, as a point. Thus a punctual event can be viewed as a process with a well-defined beginning and end, and any bounded process can be viewed as a punctual event. This has a consequence for the selectional requirement -ing imposes on its complement. Rather than rule out certain (i.e. punctual) verb

phrases as complements of -ing, the selectional restriction simply forces such verb phrases to be viewed microscopically.

Elements in temporal representations thus belong to one of two categories: temporal connectors, such as the tense morphemes, -en, and -ing; and temporal structures. Temporal connectors are functions, taking temporal structures as their arguments, and serving in turn as the arguments of higher temporal structures. Temporal structures are associated with lexical items, and are combined in various ways to form larger temporal structures. I will not be concerned with how to derive the temporal structures associated with verb phrases such as 'Katie write a letter' in (1), but I assume that this is done by composition of the verb with its arguments. Nor will I go into much detail about how all the various tense forms are derived. In this paper, I am concerned with the contribution of indexical temporal adverbs to the temporal representation of the sentence.

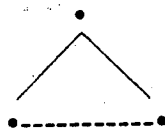
For the sake of eliminating irrelevant complications, I will limit the verb phrases in the data to one aspectual type: accomplishments. The temporal structure associated with accomplishments is shown in (11).

(11) Sue wrote the paper

.....

(11) shows a region of time, bounded at each end by a point. Given that bounded regions can also be viewed as points, this gives the structure in (12) for a VP expressing an accomplishment. (12) simply states that a given constituent can be taken as occupying either a bounded region or a point in time.

(12)



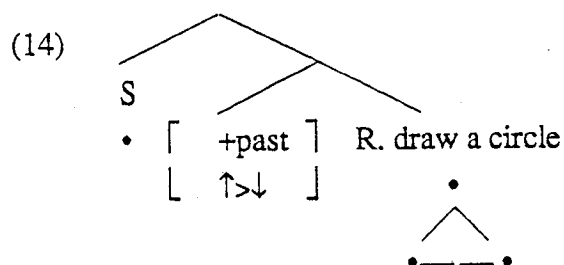
We have now established temporal representations for all the parts of the English tense system, and are ready to look at how the temporal representation of the whole is to be derived.

The temporal interpretation of the full inventory of finite clauses in English is given in the appendix. We will look only at a few examples to show how these representations are derived.

Let us first consider a simple past tense, such as (13).

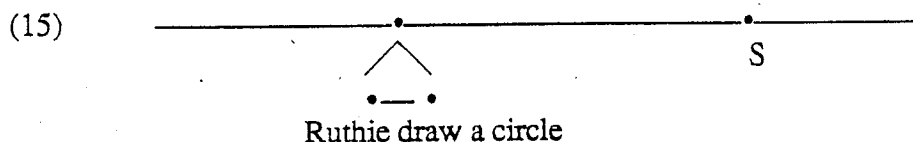
(13) Ruthie drew a circle.

The temporal projection of (13) is given in (14).

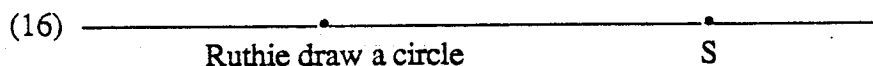


The composition of the temporal structure of (14) is best illustrated with a graphic representation of the time line. It should be noted, however, that all the information in the time line pictures is present in the temporal projection, and hence in the D-structure. Like the temporal projection, therefore, there is no reason to assume that the time line picture constitutes a separate level of representation. Let us now look at how the time line picture is built up from the temporal projection.

The past tense morpheme tells us that the temporal structure associated with the VP Ruthie draw a circle precedes the moment of speech. This places it on the time line, to the left of the point representing the moment of speech, giving (15).

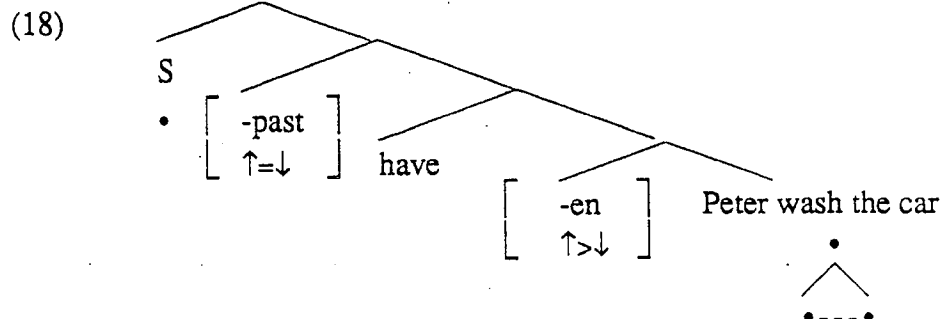


This representation is in an expanded form, to show more clearly how it was put together. The conflated picture in (16) is a better representation.

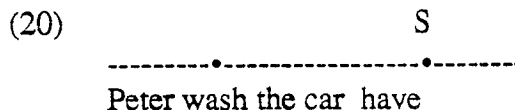
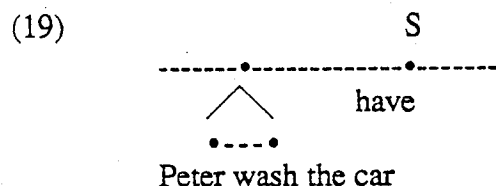


Turning to a slightly more complicated example, consider the present perfect construction in (17), whose temporal projection is given in (18).

(17) Peter has washed the car.

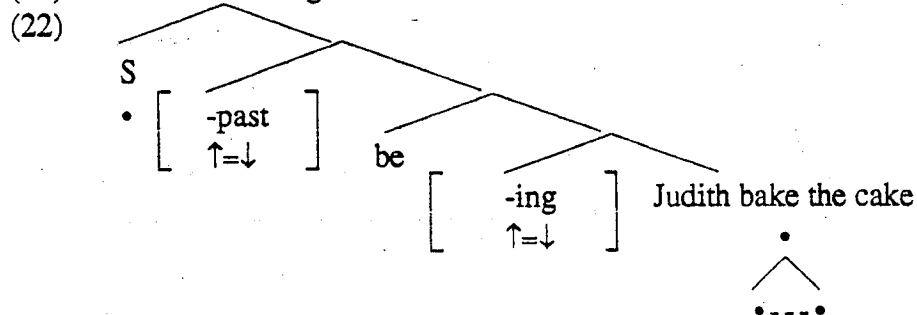


The time line picture is assembled as follows. The -en morpheme states that the temporal structure of Peter wash the car precedes the (null) temporal structure of have. The present tense morpheme tells us that have coincides with the moment of speech. Assuming that have takes on the temporal structure of the element governing it, this gives the expanded time line picture in (19) and the conflation in (20)



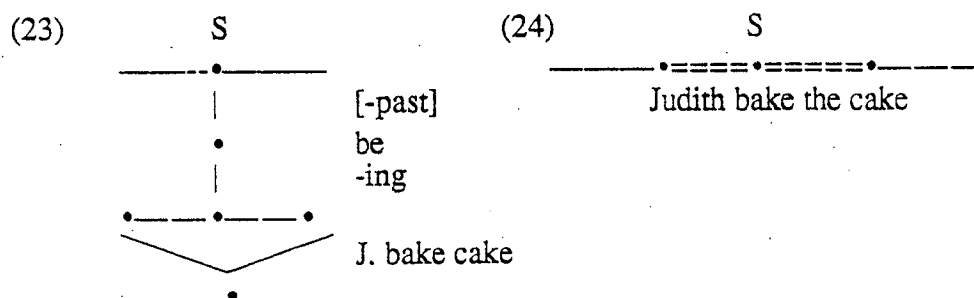
Finally, let us look at the progressive construction exemplified in (21), whose temporal projection is given in (22).

(21) Judith is baking the cake.



Here, the interpretation is slightly less obvious. Again there are two temporal relations, but this time they both express coincidence. The problem is that the three temporal structures which must coincide are not of the same type. The moment of speech is a point, be is null, and the VP, due to the selectional properties of ing, must

be taken as a bounded region rather than as a point. No matter whether be ends up being specified as a region or as a point, we are faced with a relation of coincidence holding a point and a region. The only possible interpretation of this coincidence is that the point is contained within the region. Assuming that be is specified as a point, this gives the expanded time line picture in (23), and the conflation in (24).



This correctly shows that the event of Judith baking the cake takes place during a bounded interval of time containing the moment of speech.

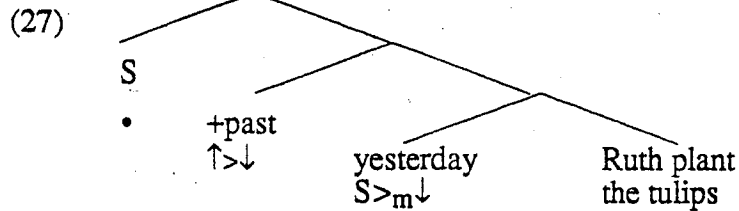
2. Temporal Adverbs

First, consider the temporal representation of adverbs like tomorrow and yesterday. Notice that they relate some event, not to any c-commanding temporal structure, but rather directly to the moment of speech. In this they differ from adverbial phrases like the following day or two days earlier. This means that their lexical-temporal representations must contain a direct reference to the moment of speech. Second, the adverbs yesterday and tomorrow do not express simple precedence, as does the past tense morpheme. They specify that some event precedes or follows the moment of speech by a measured amount of time. I will not be concerned here with the details of that measurement, but simply note that it is there. Suppose that yesterday and tomorrow have the lexical temporal representations given in (25).

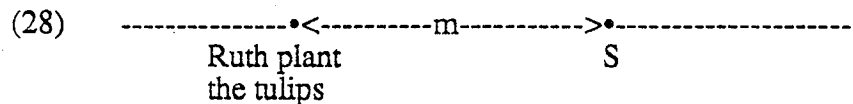
(25) yesterday: $S >_m \downarrow$ tomorrow: $S <_m \downarrow$

These are to be read: The moment of speech follows/precedes, by a measured amount of time, the nearest c-commanded temporal structure. If we make the reasonable assumption that these adverbs occur adjoined to a thematically complete VP, this gives the representation in (27) for the sentence in (26).

(26) Ruth planted the tulips yesterday.

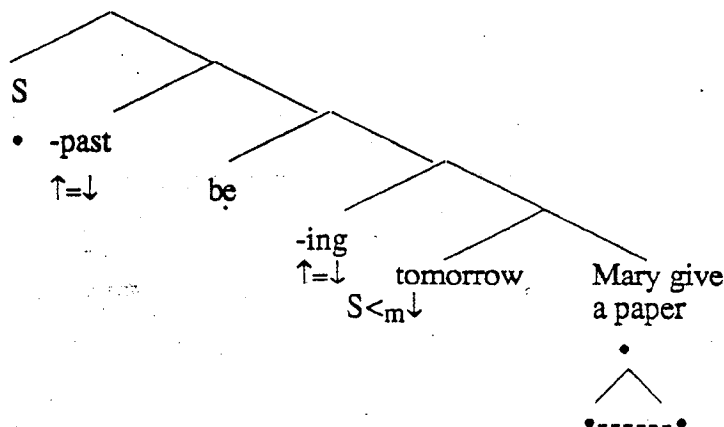


How is this representation to be interpreted? So far, temporal projections have contained an alternating series of temporal connectors and temporal structures. Here, there are two temporal connectors in a row. In this case, the interpretation is quite straightforward, since the two temporal connectors are non-distinct. The past tense morpheme tells us that the event of Ruth planting the tulips precedes the moment of speech. The adverb yesterday also tells us that the event of Ruth planting the tulips precedes the moment of speech, and in addition specifies the amount of time between the two points. In such a case, with two adjacent non-distinct temporal connectors, the temporal connectors fuse, giving a time line picture as in (28).



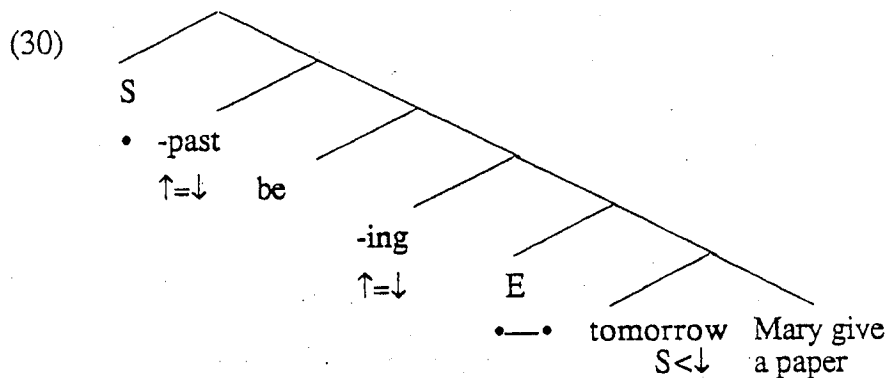
Let us now consider what happens when there are two adjacent temporal connectors which are distinct, and as such cannot fuse. This is the situation in (29).

(29) Mary is giving a paper tomorrow.

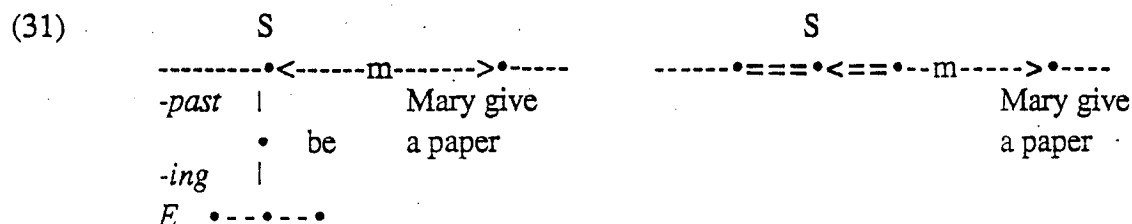


Here, there is a potential contradiction. Disregarding tomorrow, we have the event of Mary giving a paper taking place during a bounded interval of time including the moment of speech. Tomorrow, however, requires that the giving of the paper take place after the moment of speech. There is no way the two adjacent temporal connectors can fuse. I would like to propose that this contradiction is repaired by a process similar to epenthesis in phonology. A temporal structure is inserted between the two distinct temporal connectors -ing and yesterday. This might be seen as a well-formedness condition on temporal representations similar to the Obligatory Contour Principle, requiring that temporal connectors and temporal structures alternate. When two like elements are adjacent, they must fuse if they can. If they cannot fuse, they are separated by epenthesis. This repair strategy is also essentially like what happens in phonology. When epenthesis applies, as in phonology, an unmarked element (in this case a point) is introduced, and is realized according to whatever conditions apply in the context. The selectional properties of -ing force the epenthetic point to be realized as a region, rather than as a point. If no selectional restrictions apply, then the least marked element, a point, will appear.

Epenthesis gives the structure in (30). While the epenthetic temporal structure is marked with an E, it should be noted that this is only for purposes of clarity. I assume that this element has only temporal properties, and no other features or properties at all.



This gives the time line picture in (31).

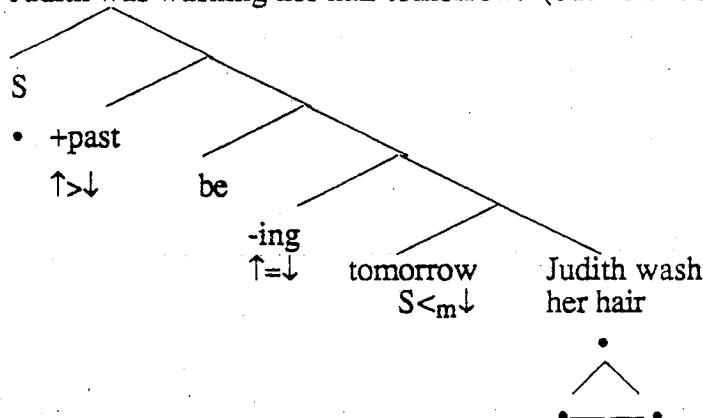


This is an appropriate representation for the sentence, provided we make some assumptions about when the truth values of sentences are to be evaluated. What this sentence means is that as of now, there is a plan, or a schedule, which, if it is carried out, will have Mary giving a paper tomorrow. In other words, the truth of this sentence does not depend on Mary's actually giving the paper tomorrow. It is true at the moment of speech if the plan, at the moment of speech, is for her to give the paper tomorrow.

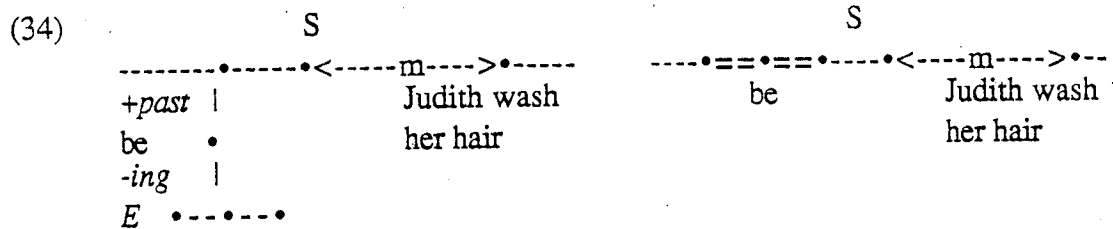
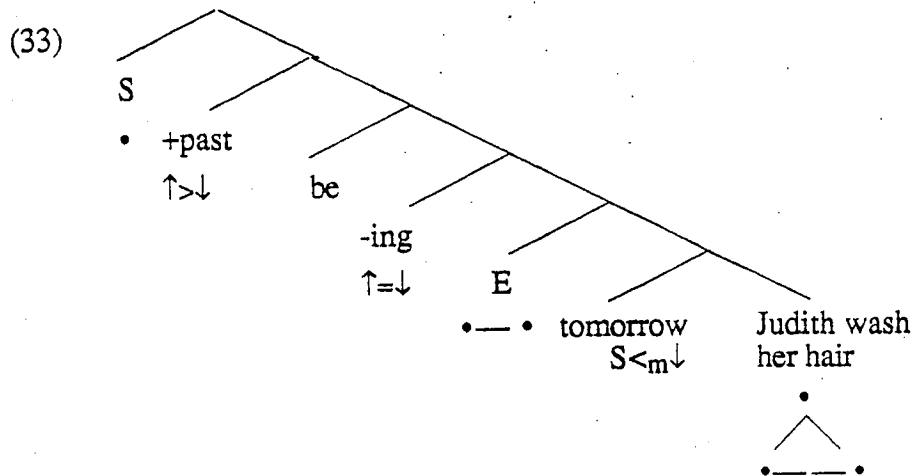
Under the present analysis, this can be implemented by saying that the truth of a sentence is to be evaluated over the time associated with the highest temporal structure in the sentence (in this case the verb be). Since temporal structures are built up by composition, this temporal structure will include any temporal structures which are connected with it by connectors. In the sentence under consideration, this includes the epenthetic region, but crucially not the event of Mary giving the paper. That event is not connected with be at all, but is rather connected directly with the moment of speech via the adverb tomorrow.

Now let us look at (32).

(32) Judith was washing her hair tomorrow. (but now it seems that she won't)



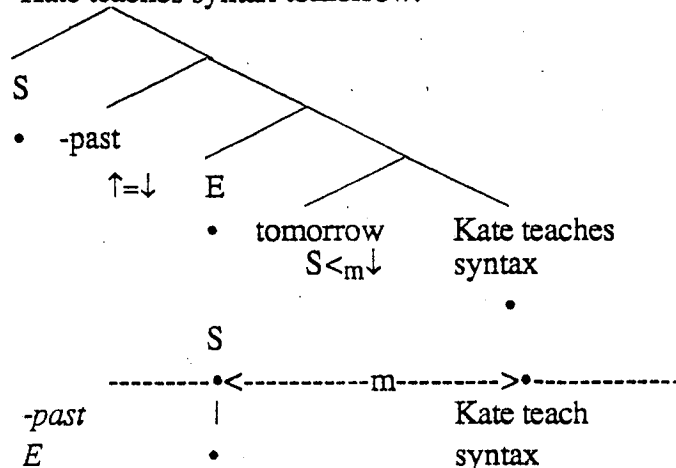
Again, there are two adjacent temporal connectors, and again they are distinct, so fusion cannot apply. Epenthesis thus applies, giving (33), which produces the time line picture in (34).



Assuming that the truth value of the sentence is to be evaluated over the time associated with the highest temporal structure, this sentence is true if at some point in the past, there was a plan for Judith to wash her hair the day after the (current) moment of speech. The sentence says nothing explicit about whether the plan still exists at the moment of speech. However, Gricean principles predict that it does not. Thus we get the strong impression from a sentence like (32) that the plan which once existed has fallen through.

The representation for (35), given in (36), shows that the epenthetic temporal structure plays an important role in the interpretation of the sentence.

(35) Kate teaches syntax tomorrow.

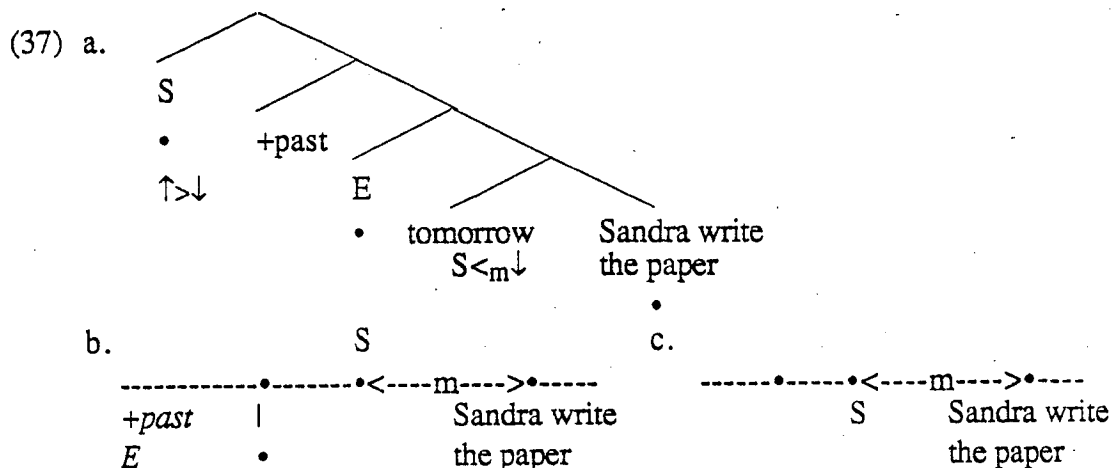


Here, the epenthetic point is the highest temporal structure in the sentence. The VP Kate teach syntax is not part of the highest temporal structure, since it is linked directly to the moment of speech by the adverb. Thus this sentence can be true if, at the moment of speech, there is a plan for Kate to teach syntax tomorrow. Notice that without the epenthetic point, the VP Kate teach syntax would be the highest temporal structure in the sentence. The sentence would then only be true if the teaching actually ended up happening.

I will now consider two kinds of ill-formed tense-adverb mismatches. Of the dozens of possible combinations of indexical temporal adverbs and tense forms, all of the ungrammatical ones fall into these two types. The sentence in (36) exemplifies the first type.

(36) *Sandra wrote the paper tomorrow.

This sentence is intriguing because its progressive counterpart is perfectly grammatical, expressing an unfulfilled plan. Why can this sentence not express an unfulfilled plan? There is nothing inherently impossible about the combination of a past tense morpheme and the adverb tomorrow, as we have seen. However, consider the representation in (37).



What distinguishes this representation from the grammatical ones is that the epenthetic point is not linked to any lexical item, as it was in the progressive constructions, nor is it linked to the moment of speech, as it was in the simple present sentence 'Kate teaches syntax tomorrow'. I believe that what is going on here is some kind of visibility requirement on temporal representations, which can be stated roughly as in (38).

- (38) Every specified point in a temporal representation must be simultaneously linked either with a lexical-temporal structure, or with the moment of speech.

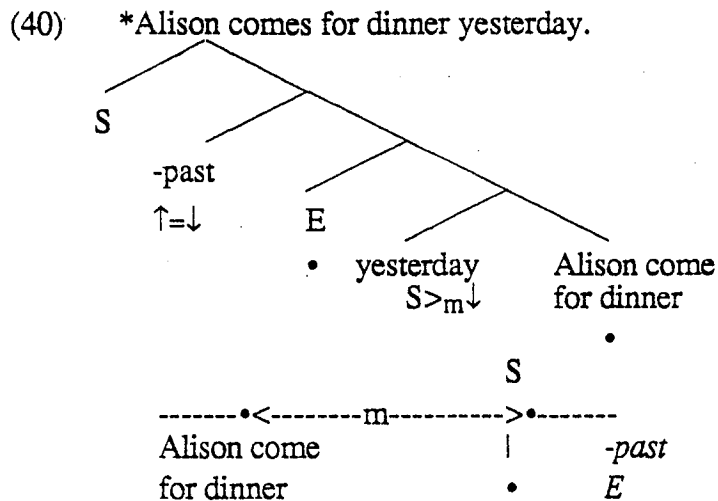
It is clear that this condition ought to follow from something like the principle of full interpretation, but technical details remain to be worked out. The well-formedness condition in (38) holds generally; it does not need to refer specifically to epenthetic points.

Thus, epenthetic points are well-formed to the extent that they are temporally identified with other elements in the sentence. They cannot stand alone, as does the one in (37).

The sentences listed in (39) are some of those that can be ruled out by the condition in (38).

- (39)
- *John washed the car now.
 - *Now John was washing the car.
 - *Tomorrow John was washing the car.
 - *John has washed the car tomorrow.
 - *Yesterday John has washed the car.
 - *John had washed the car now.
 - *John had washed the car tomorrow
 - *John has tomorrow been washing the car.

The sentence in (40) illustrates the second type of tense-adverb mismatch.



This representation looks well-formed. Every specified point in the representation is linked, either to lexical material or to the moment of speech. There are no obvious contradictions, thanks to the epenthetic point. The problem here has to do with when the truth of a sentence is to be evaluated, and the difference between facts (things that have happened) and plans (things which are supposed to happen in the future). Given our definitions, the truth of this sentence is to be evaluated at the moment of speech, since the epenthetic point is the highest temporal structure in the sentence. The time over which the truth of the sentence is to be evaluated crucially does not include the time when Alison supposedly comes/came for dinner. The odd result is that the truth of sentence holds independently of whether Alison actually came for dinner yesterday. This seems not to be possible for events whose temporal location is prior to when the sentence is evaluated, although it seems perfectly reasonable for plans. A number of ungrammatical sentences, some of which are listed in (41), have this property.

- (41)
- *John is washing the car yesterday.
 - *Yesterday John has washed the car.
 - *Yesterday John has been washing the car.
 - *John will wash the car yesterday.
 - *John will be washing the car yesterday.

I propose the condition in (42) as a statement of the generalization just outlined.

- (42) If the truth of a sentence is not evaluated (does not hold) at the time of the event described by the sentence, it cannot be evaluated at any later point.

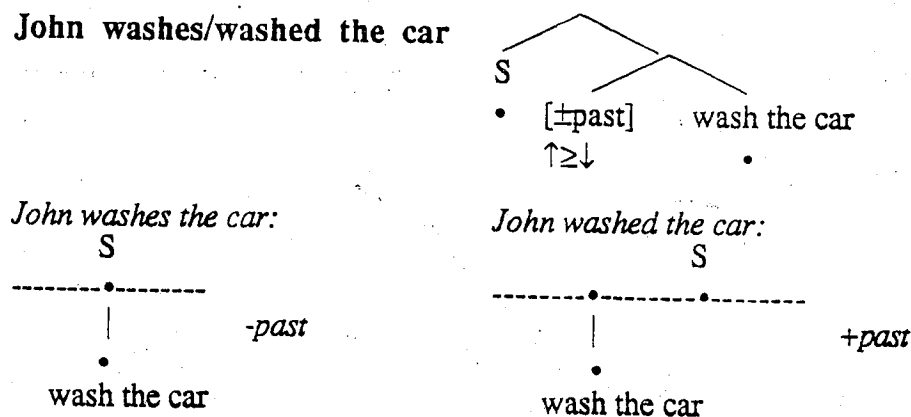
Since space does not permit a discussion of the 86 combinations of temporal indexicals, tense forms, and adverb scope, I will simply say that the analysis just proposed, consisting of the (temporal) OCP, fusion, epenthesis, and the two well-formedness conditions, accounts for all of them with no further stipulations. The temporal OCP can be shown to follow from the fact that connectors are functions taking temporal structures as their arguments. The repair strategies are the least marked way of satisfying the argument-taking requirements of temporal connectors. The first well-formedness condition should follow from the principle of full interpretation, while the second, I suspect, derives from the nature of assertion as it interacts with the difference between things that have already happened and things which are merely expected. Thus it is fair to say that the semantics of temporal indexical adverbs can be accounted for compositionally, without any of the construction-specific stipulations typical of the standard literature on the subject.

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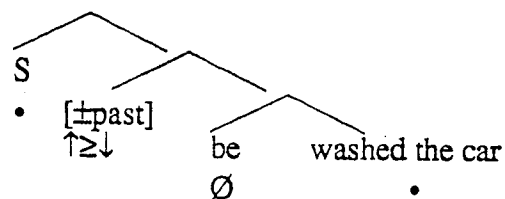
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APPENDIX

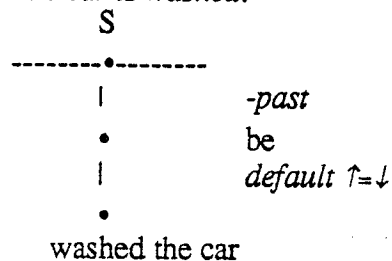
1. John washes/washed the car



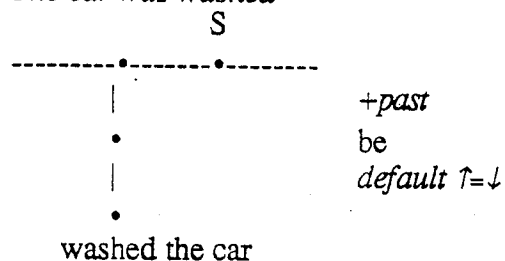
2. The car is/was washed.



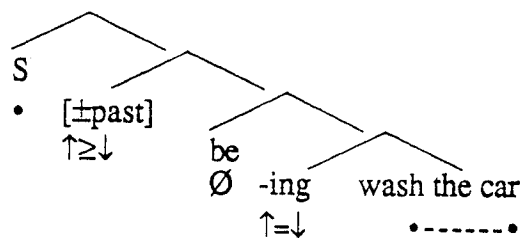
The car is washed:



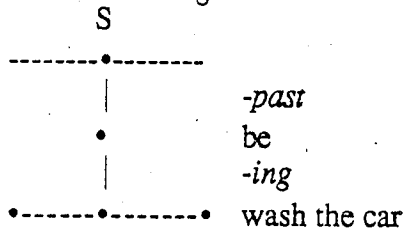
The car was washed



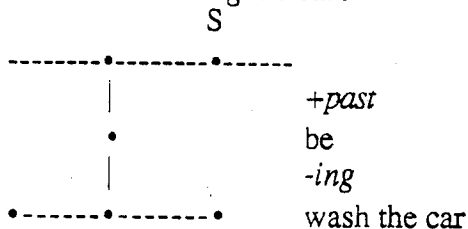
3. John is/was washing the car



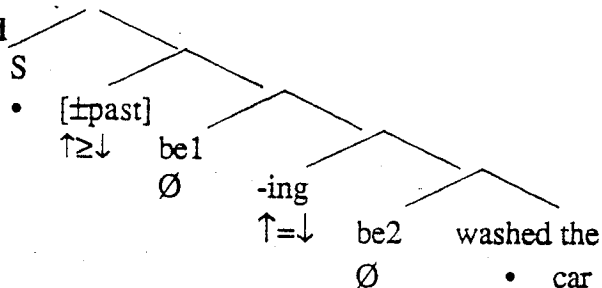
John is washing the car:



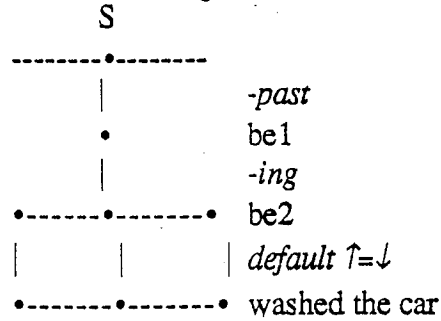
John was washing the car:



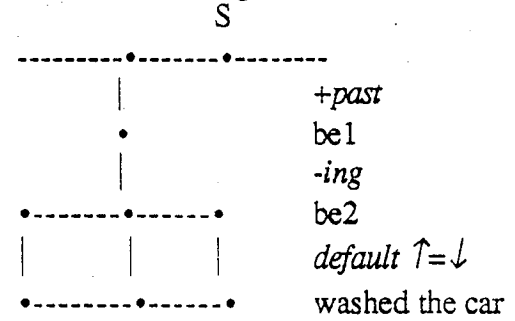
4. The car is/was being washed



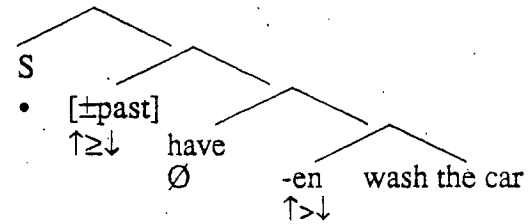
The car is being washed:



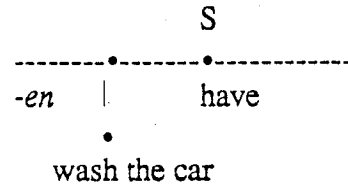
The car was being washed:



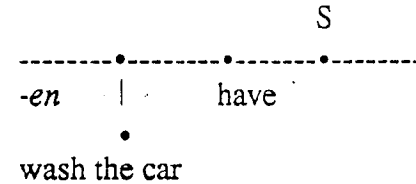
5. John has/had washed the car



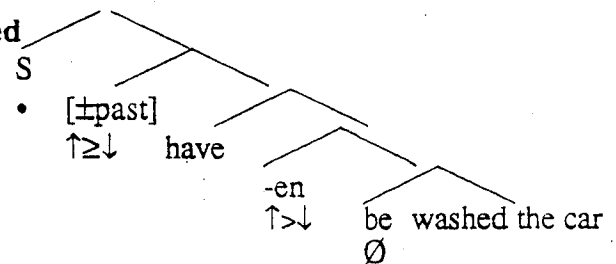
John has washed the car:



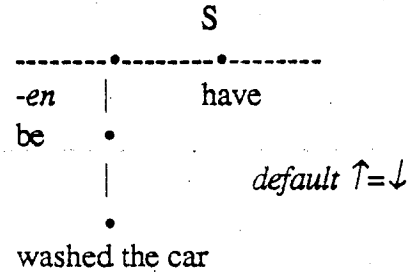
John had washed the car:



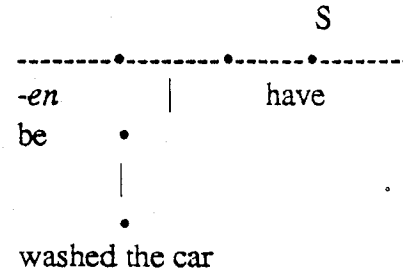
6. The car has/had been washed



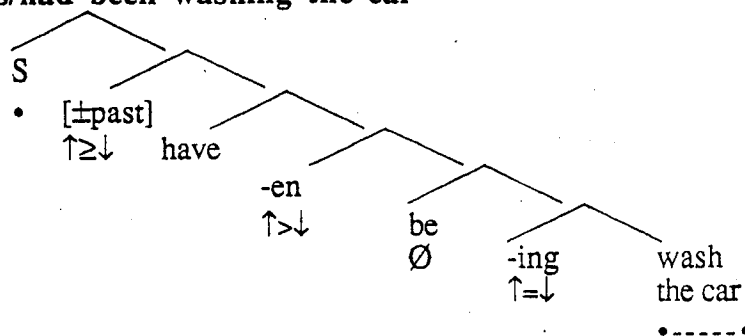
The car has been washed:



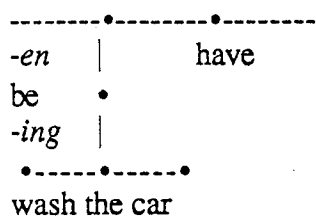
The car had been washed:



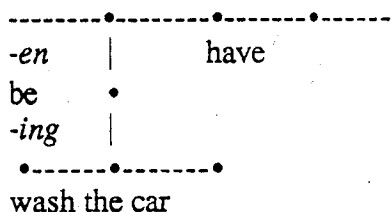
7. John has/had been washing the car

*John has been washing the car:*

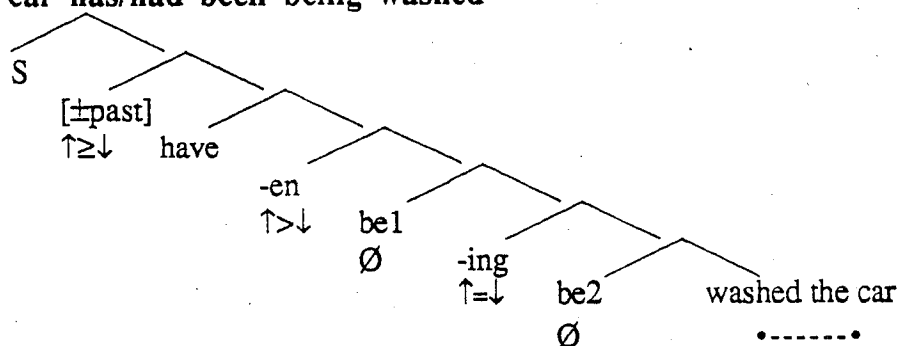
S

*John had been washing the car:*

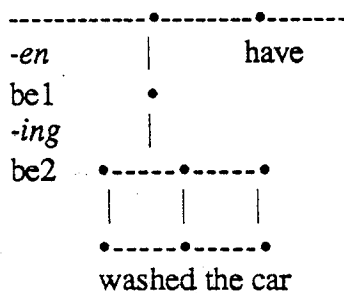
S



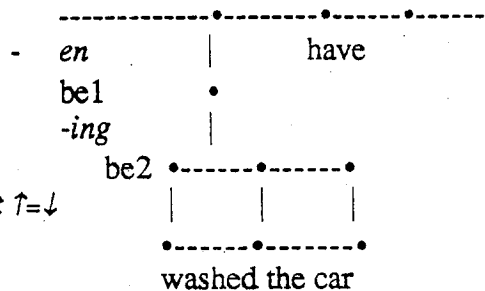
8. The car has/had been being washed

*The car has been being washed*

S

*The car had been being washed:*

S

default $\uparrow = \downarrow$