THE EMPTINESS OF THE PRESENT: FRONTING CONSTRUCTIONS AS A WINDOW TO THE SEMANTICS OF TENSE

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THE EMPTINESS OF THE PRESENT: FRONTING CONSTRUCTIONS AS A WINDOW TO THE SEMANTICS OF TENSE

A Dissertation Presented

by

PETR KUSLIY

Submitted to the Graduate School of the University of Massachusetts Amherst in partial fulfillment of the requirements for the degree of

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Linguistics
The Emptiness of the Present: Fronting Constructions as a Window to the Semantics of Tense

A Dissertation Presented

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PETR KUSLIY

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ABSTRACT

THE EMPTINESS OF THE PRESENT: FRONTING CONSTRUCTIONS AS A
WINDOW TO THE SEMANTICS OF TENSE

SEPTEMBER 2020

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This dissertation is devoted to the temporal interpretation of fronting constructions in English and the phenomenon of the Sequence of Tense. It provides and analyzes previously unobserved data from verb phrase fronting constructions in which the simultaneous interpretation of a present tense embedded under a matrix past tense is available. These data are theoretically unexpected and challenging because most theories of English tense disallow this interpretation for Present-under-Past configurations.

An account that captures the new data is proposed. It establishes a connection between the simultaneous interpretation of Present-under-Past and the mode of semantic composition between a verb and its complement. It is proposed that the simultaneous Present-under-Past is licensed in a VP-fronting configurations when the direct object of a
transitive verb or a CP-complement of an attitude verb compose with their verbs by the rule known as Restrict (Chung & Ladusaw 2004). According to this rule, a verb’s complement acts semantically as a modifier and does not saturate the verb’s internal argument position.

In the process of formulating this proposal, a number of other results are obtained. A version of a theory of temporal de re (Abusch 1994) is stated in terms of temporal concept generators (building on Percus & Sauerland 2003). A case is made for the existence of the simultaneous de re Present-under-Past, which is captured in terms of the proposed concept generator-based analysis. I also propose a novel theory of how tense features are transmitted in Sequence of Tense phenomena.

Finally, several consequences of the proposed approach to tense are investigated. Among them are the temporal interpretation of CP- and DP-fronting constructions, the predictions for Past-under-Past fronting configurations and the predictive potential of temporal de re attitude reports in comparison with temporal de se reports.
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1.1. An asymmetry in the interpretation of the embedded present tense in English

Over the decades of research on the semantics of tense in English, a great deal of effort has been put in explaining the asymmetries that arise in the interpretation of embedded Present tense. These asymmetries have to do with the availability of the so-called simultaneous interpretation of embedded Present that is available in (1):

(1) John will think that Mary is hungry.

Under the simultaneous interpretation, (1) can be understood to describe a situation in the future of the utterance time (UT) in which John thinks to himself, “Mary is hungry”. Mary is thus believed by John to be hungry at the time of his thinking. Crucially, in order for (1) to be true under the simultaneous interpretation it is not required that the state of being hungry that John ascribes to Mary overlap the utterance time.

The sentence in (2) however does not allow for the simultaneous interpretation:

(2) John thought that Mary is hungry.

The only interpretation that is available for (2) is the so-called double-access interpretation: at a time in the past John thought, “Mary is hungry” and, according to the
speaker, this thought extends in time to include the utterance time. In other words, the truth conditions of this sentence, unlike those of (1), require that the state of being hungry ascribed to Mary by John overlap the utterance time. There are other requirements that apply to the truth conditions of (2) and I will discuss them in due course. What is important at this stage is the asymmetry between (1) and (2) with respect to the availability of the simultaneous interpretation.

Assuming that the temporal location of an eventuality described by a clause is determined by the main tense of the clause, the temporal interpretation of an embedded clause is determined by the interpretation of the embedded tense. If so, then the semantics of embedded Present can be understood to determine the availability of the simultaneous interpretation in (1) and its unavailability in (2). The interpretation that the present tense has in (2) is known as the *indexical* interpretation. It requires an overlap with the UT.

The temporal location of the eventuality described in the matrix clause is also a relevant factor. In (1), the matrix eventuality is understood to be in the future of the UT. Reference to the future is reflected by the presence of the auxiliary *will*. Under a matrix Future, two interpretations are available for an embedded Present. The first one is the simultaneous interpretation, which is the most salient. The second interpretation is the indexical interpretation, which was mentioned in relation to (2). (In a sentence like (1), the indexical interpretation of Present-under-Future becomes more salient if an adverb like *now* occurs in the embedded clause: *John will think that Mary is hungry now*. It describes a future situation in which John thinks, “Mary was hungry” and the speaker identifies the time of this alleged state of being hungry as the UT.)
In (2), the matrix tense is Past. Since the simultaneous interpretation of Present-under-Past is unavailable, it is thus natural to reason that this unavailability results from some kind of incompatibility of an embedded Present with a matrix Past. The presence of a matrix Past can be viewed as blocking the simultaneous interpretation that can otherwise be available for an embedded Present.

There are languages in which this does not happen and the Present-under-Past equivalents of (2) allow for the simultaneous interpretation. These languages include Japanese, Russian, and Hebrew. English is not one of them. In English, pure simultaneity under Past is expressed by a Past-under-Past configuration illustrated in (3):

(3) John thought that Mary was hungry.

Under the simultaneous interpretation, (3) is true if and only if at a time in the past John thought, “Mary is hungry”. In other words, he thought that Mary was hungry at the time when he was thinking about it.

Of course, the simultaneous interpretation in (3) does not arise because an embedded Past can always deliver a simultaneous interpretation. This interpretation does not exist in (4):

(4) a. John will think that Mary was hungry.
    b. John thinks that Mary was hungry.
Both sentences only yield the so-called \textit{back-shifted} interpretation, according to which John ascribes Mary a state of being hungry that is perceived as being in the past of the time when he is thinking about it. The sentence in (3) can also have a back-shifted interpretation. What is important here is that the availability of the simultaneous interpretation in (3), just like its unavailability in (2), can also be viewed as arising from the interaction between the matrix and the embedded tenses (the simultaneous interpretation is possible when the matrix tense is Past and the embedded tense is also Past, but it is not possible if the matrix tense is Past and the embedded tense is Present).

These examples of tense in complement CPs show that the observed asymmetries between Present-under-Past and Present-under-Future cannot be explained in terms of a simplistic theory the relies only on one component like the semantics of Present and Past without reference to other factors that influence the interpretation.

Relative clauses seem to reveal a similar behavior as far as the availability of the simultaneous interpretation of the present tense is concerned. This interpretation is available when the matrix clause refers to the future or to the present:

\begin{itemize}
  \item[(5)] \begin{itemize}
    \item a. John will meet a girl who is hungry.
    \item b. John is meeting a girl who is hungry.
  \end{itemize}
\end{itemize}

The simultaneous interpretation is again unavailable when the matrix tense is Past:

\begin{itemize}
  \item[(6)] John met a girl who is hungry.
\end{itemize}
Simultaneity under Past is licenced only for a Past-under-Past configuration:

(7) John met a girl who was hungry.

In order to capture these asymmetries and provide a semantic account of the present (and past) tense, researchers have developed complex theories based on various assumptions about multiple factors that are relevant for the temporal interpretation of embedded clauses. The interaction of those factors deliver the asymmetrical readings with respect to the availability of the simultaneous embedded Present that we observed above. One of the crucial data points has to do with the unavailability of the simultaneous Present-under-Past: the semantics of Present has to be such that it would always yield only the indexical interpretation in those contexts.

1.2. Novel data: embedded Present tense in fronting constructions

Interestingly, the temporal readings that obtain in fronting configurations have not received much attention in the literature. The interpretation of tense in fronting constructions are the main object of this study. I provide data that reveal theoretically unexpected interpretations that an embedded Present-under-Past can receive. The first portion of data comes from VP-fronting:

*New data:* the simultaneous Present-under-Past in VP-fronting constructions
When Mary arrived, John had no idea what her emotional state was like, but...

Think that Mary is hungry, John did. (✓ simultaneous)

Native speakers report that the simultaneous interpretation in (8) is available: the sentence can be true if John ascribed Mary the state of being hungry at the time when he was thinking about her and that state need not be understood to overlap the UT. This sentence can thus share a reading with the Past-under-Past report in (3) discussed above and here as (9):

(9) John thought that Mary was hungry.

This is particularly surprising given that fronted predicates are believed to undergo obligatory reconstruction at LF (Takano (1995), Heycock (1995), Adger et al. (2017)). At first sight, this suggests that at LF (8) should be no different from the Present-under-Past report in (2), repeated as (10), which as we saw does not allow for a simultaneous interpretation.

(10) John thought that Mary is hungry.

Of course, the present tense in (8) can also have the double-access interpretation and thus share a reading with (10). What is important is that (8) has an interpretation that its version without fronting does not have, namely, the simultaneous interpretation.
Present-under-Past in relative clauses that occur inside fronted VPs can also allow for the simultaneous interpretation. *New data:*

(11)  *John tried hard to meet a hungry person at the refugee center and finally...*  
Meet a girl who is hungry, John did. (✓ simultaneous)

Native speakers report that a simultaneous interpretation that does not require anyone to be hungry at UT is available in (11). The sentence in (11) shares this interpretation with its Past-under-Past non-fronting version in (7), repeated in (12). The embedded Present-under-Past in (11) can also share a reading with its non-fronted equivalent from (6), repeated in (13), despite the fact that (12) and (13) cannot be synonymous.

(12)  John met a girl who was hungry.  
(13)  John met a girl who is hungry.

The availability of the simultaneous Present-under-Past in VP-fronting configurations like the ones shown above is puzzling especially in light of the their contrast with the non-fronting versions. This is is one puzzle that is explored in this dissertation.

Fronting alone, however, is not the only reason why the simultaneous Present-under-Past is available in sentences like (8) and (11), because not all kinds of fronting license the simultaneous Present-under-Past. This becomes clear from examples that involve CP and DP-fronting:
Native speakers report that they cannot get the simultaneous interpretation in either (14) or (15). The embedded Present in these sentences must indicate a time that overlaps the UT. Even inside fronted VPs the simultaneous Present-under-Past is not always available:

(16) Meet the girl who is hungry, John did. (*simultaneous)

Observe that (16) is minimally different from (11): their only difference is the determiner. In (11), the direct object of the fronted verb is indefinite, whereas in (16) it is definite. Yet this is enough for the simultaneous Present-under-Past to become unavailable in (16).

In Chapter 4, I provide and explore more data, but I hope that even the examples given here show that the interpretation that Present-under-Past can get inside fronted constituents is influenced by various factors. One challenge that these data bring for a number of current theories of tense has to do with the fact that a number of popular theories assume that Present-under-Past can only have an indexical interpretation indicating a time that necessarily overlaps the UT. This assumption is central to many of them and various aspects of those theories hinge on it. If Present-under-Past can after all have the simultaneous interpretation, then a serious revision of our understanding of the semantics
of Present is in order. The contrasts that Present-under-Past reveals in different fronting constructions raise questions about the factors that license its simultaneous interpretation.

1.3. Outline of the proposal

In order to provide an answer to the questions raised by the new data and solve the new puzzles, I revisit a number of important assumptions about tense that have been made in the literature. In my analysis, many of those assumptions ultimately become reconfirmed, but some are substituted with alternatives or put aside altogether.

The gist of my proposal is that fronting, on the one hand, and the mode of semantic composition of a fronted verb with its complement, on the other, are responsible for licensing the simultaneous Present-under-Past.

I adopt the common assumption about the existence of the so-called simultaneous tense in English (also known as zero tense) that normally borrows its morphology from a c-commanding tense.

I further assume that in fronting configurations where the embedded simultaneous tense is not c-commanded by any tense at surface structure, it can appear with default present tense morphology (as is the case with VP fronting).

Inside a fronted VP, the simultaneous interpretation of a Present-under-Past arises when the embedded clause contains the simultaneous tense and the mode of composition between the verb and its complement allows the embedded tense to anchor to the temporal argument of the matrix verb.
In such a configuration, an embedded simultaneous tense surfaces with default present tense morphology while being anchored to the temporal argument of the main verb. Since the eventuality described by the matrix verb is in the past, the simultaneous tense outputs a time that is identical to that past time.

1.3.1. Capturing the temporal readings of relative clauses

Recall the contrast between (17) and (18) below.

(17) Meet a girl who is hungry, John did. (✓ simultaneous)
(18) Meet the girl who is hungry, John did. (*simultaneous)

I observe that this contrast arises not only between indefinite and definite objects to fronted verbs, but more broadly between “weak” and “strong” DP objects in the sense of Milsark (1974, 1977). For example, we see in (19)-(20) below that other “weak” DP objects in fronted VPs license the simultaneous Present-under-Past reading.

(19) Meet some guys who like Mary, John did. (✓ simultaneous)
(20) Meet guys who like Mary, John did. (✓ simultaneous)

However, “strong” DP objects generally disallow the simultaneous Present-under-Past reading.
Meet every guy who likes Mary, John did. \(^\star\) (\(\ast\) simultaneous)

Meet most guys who like Mary, John did. \(^\star\) (\(\ast\) simultaneous)

Building on the work of McNally & Van Geenhoven (1998), who propose that “weak” DPs can have a predicative interpretation in object position, I propose that when a “weak” DP object like the one in (17) contains the simultaneous (zero) tense, it has an interpretation equivalent to the one in (23). The verb \textit{meet} has its familiar lexical entry given in (24):

\begin{align*}
(23) &\quad \llbracket \text{a girl who is hungry} \rrbracket = [\lambda x . \lambda t . x \text{ is a girl at } t \land x \text{ is hungry at } t] \\
(24) &\quad \llbracket \text{meet} \rrbracket = [\lambda y . \lambda x . \lambda t . x \text{ meets } y \text{ at } t]
\end{align*}

The semantic composition of the predicative indefinite with the verb proceeds by a version of Restrict (Chung & Ladusaw 2004) that identifies the temporal and the individual argument of the DP with those of the verb yielding the complex predicate in (25):

\begin{equation}
\llbracket \text{meet a girl who is hungry} \rrbracket = [\lambda y . \lambda x . \lambda t . x \text{ meets } y \text{ at } t \land y \text{ is a girl at } t \land y \text{ is hungry at } t]
\end{equation}

The unsaturated internal argument position of the predicate in (25) is closed by an application of Existential Closure in the next step of the derivation to yield (26):

\begin{equation}
\llbracket [\text{VP } \exists [\text{meet a girl who is hungry}]] \rrbracket = [\lambda x . \lambda t . \exists y(x \text{ meets } y \text{ at } t \land y \text{ is a}]
\end{equation}
I propose that whenever zero tense is not c-commanded by any temporal operator at surface structure, it surfaces with default present tense morphology. Sentence (17) is a VP-fronting configuration, and the embedded zero tense is not c-commanded by any other tense at surface structure. Therefore, it bears default present tense morphology. A simultaneous configuration is thus created.

Since in the described configuration the temporal interpretation of the relative clause depends on the temporal argument of the matrix verb, which is saturated by the time provided by the matrix past tense, the result is the simultaneous Present-under-Past.

In a sentence like (18), the strong definite DP is not predicted to have a predicative interpretation. It cannot compose with the matrix verb by Restrict leading to a dependent interterpretation of the embedded Present. The definite DP is referential and composes with the verb by Function Application.

Building on Enç (1986), I assume that strong DPs contain a temporal operator that saturates the temporal argument of their restrictor NP, thus making the temporal interpretation of that NP independent from that of the main predicate. I show that dependence on the temporal operator inside a strong DP does not allow the present tense morphology in a sentence like (18) to yield the simultaneous interperation.

This accounts for the contrast between (17) and (18).

The Past-under-Past configuration in (7), repeated here as (27), can also be an instance of a dependent simultaneous tense.
(27) John met a girl who was hungry.

However, since this is a non-fronting configuration, the embedded simultaneous tense is c-commanded by the matrix past at surface structure and, therefore, appears with the past tense morphology that it borrows from the matrix tense.

The simultaneous interpretation is not available in the Present-under-Past construction in (13), repeated as (28), because it is incompatible with a dependent zero tense configuration.

(28) John met a girl who is hungry.

If the embedded clause in (28) contained the simultaneous (zero) tense anchored to the temporal argument of the matrix verb, zero tense would have to surface with the past tense morphology because it is c-commanded by a matrix past tense at surface structure. Since it appears with the present tense morphology, it cannot be a locally anchored zero tense and, therefore, must be an instance of the indexical present tense.

Finally, the unavailability of the simultaneous interpretation in a DP fronting configuration like (15) is accounted for in a similar way.

(29) A girl who is hungry, John met. (*indexical, *simultaneous)
I propose that if a DP is fronted, it is strong. Some DPs are always strong. Other DPs like indefinites can be weak or strong, but when they move outside their base position, they are always strong (cf. Diesing 1992).

As strong DPs, fronted objects pattern with strong objects discussed above. They contain an independent temporal operator and cannot allow for the simultaneous Present-under-Past.

1.3.2. Capturing the temporal readings of complement CPs

The most technically complex part of this dissertation is the extension of the proposed account to complement CPs because their interpretation involves intensionality.

Recall the main contrasts with respect to the availability of the simultaneous embedded Present in sentences (8), (2) and (3), repeated below:

(30) Think that Mary is hungry, John did. (✓ simultaneous, ✓ double-access)
(31) John thought that Mary is hungry. (* simultaneous, ✓ double-access)
(32) John thought that Mary was hungry. (✓ simultaneous, ✓ back-shifted)

To capture these cases, I apply the same reasoning that was applied to Present-under-Past in relative clauses.

I adopt Kratzer’s (2006) perspective on CP complementation. According to this perspective, attitude verbs take an internal argument of type e (the so-called content individual argument). Complement CPs are predicates of content individuals. The semantic
composition of an attitude verb with its CP complement proceeds by Restrict: the content argument of the CP is identified with the content argument of the verb. Existential Closure applies as a next step in the semantic derivation.

I propose that, just like “weak” DP objects, complement CPs can contain a temporal argument that functions as the anchor of the embedded tense. The simultaneous interpretation arises in a fronted VP construction that contains a simultaneous tense anchored to the temporal argument of the attitude verb. Example (30) is one such case. It contains an embedded zero tense that is anchored to the temporal argument of the attitude verb (a case of a locally anchored de re tense). This gives rise to the simultaneous interpretation. Since this locally anchored simultaneous tense is not c-commanded by any other tense at surface structure, it bears default present tense morphology.

I discuss in detail how the abovementioned locally anchored de re interpretation of the simultaneous tense inside a complement CP becomes possible. I motivate the simultaneous temporal de re analysis showing that the more familiar simultaneous temporal de se analysis is not satisfactory. As part of this discussion, I introduce a new perspective on de re interpretation of tenses by extending Percus & Sauerland’s (2003) theory of concept generators to the temporal domain.

The simultaneous Past-under-Past configuration in (32) can be an instance of the same construction as (30) under the simultaneous interpretation, but since the embedded simultaneous (zero) tense is c-commanded by the matrix Past at surface structure, it surfaces with the past tense morphology.

The embedded Present in (31) can only be an instance of an indexical Present, i.e. a tense that denotes a time that overlaps the UT, leading to the double-access interpretation.
The embedded tense in (31) cannot be locally anchored because in that case it would not surface with the present tense morphology. Being c-commanded at surface structure by the matrix past tense, it would have to surface with the past tense morphology.

The inability for fronted CPs to receive the simultaneous Present-under-Past interpretation (33) can also be captured under this account. With an independently justified assumption that fronted CPs move inside a DP layer that contains a covert definite determiner (Takahashi (2010)), it is also explained why fronted CPs do not license the simultaneous Present-under-Past in examples like (14), repeated in (33):

(33) That Mary is hungry, John thought. (* simultaneous, ✓ double-access)

Takahashi (2010) proposes that a CP fronts inside a DP layer headed by a silent definite determiner. Schematically, the LF of (33) looks as shown in (34):

(34) \[DP \text{THE } [CP \text{ that Mary is hungry}]] \lambda t_1 \text{John thought } t_1\]

With the assumption that the silent determiner in (34) is strong, I predict the unavailability of the simultaneous interpretation in (33) for the same reason why it is not available in all other clauses embedded inside strong objects.

As a result, I propose a unified account of the semantics of embedded tense and its interaction with matrix tense in relative clauses and complement CPs.
I also explore several predictions that the proposed system makes. In particular, I show how it can be extended to account for the simultaneous interpretation of Present-under-Past that arises in weak definite objects to fronted verbs and inside strong DPs that contain a pronoun bound by a matrix quantifier. However, a discussion of those cases goes beyond the limits of the present introduction and I refer the reader to the main text.

1.3.3. Order of argumentation

My discussion of the abovementioned topics proceeds in the following order. In Chapter 2, I introduce the basic issues in the tense semantics of English and explore the fundamental theoretical background provided by some influential literature on tense. In Chapter 3, I explore the mechanism of temporal de re in more detail. I introduce a theory of temporal concept generators, which is an extension of Percus & Sauerland (2003) to the temporal domain, as a theoretically and empirically motivated alternative to the so-called res-movement account. In Chapter 4, I reintroduce and discuss in more detail the novel data mentioned in this Introduction. In Chapter 5, I present my account of the simultaneous and indexical Present-under-Past in relative clauses (fronted and non-fronted). In Chapter 6, I discuss the temporal readings that Present-under-Past receives in complement CPs in fronting constructions. In Chapter 7, I explore the more complicated cases with “weak” definite objects to fronted verbs, which also license the simultaneous Present-under-Past. Chapter 8 discusses cases that involve binding into “strong” DP objects or fronted CPs. These environments also license the simultaneous Present-under-Past and I show how the account developed in chapters 5 and 6 can be extended to capture the temporal
interpretations of those environments. In Chapter 9, I explore some further predictions that the proposed account makes as well as some important criticisms in recent literature. In particular, I explore some issues that are relevant for our understanding of the mechanism of Feature Transmission that is central to understanding the Sequence of Tense (subsection 9.1). Next, I discuss the consequences of the proposed analysis for the mechanism of temporal *de se* arguing that it is required only in the analysis of non-finite clausal complements in English (subsection 9.2). Finally, in subsection 9.3 I explore some critical arguments against Abusch’s Upper Limit Constraint in order to reveal their limitations.
2.1. The basics of tense semantics

2.1.1. Tense in matrix clauses

Ever since at least Reichenbach (1947), tense semanticists have been aware that even in a matrix sentence the temporal location of an eventuality may not be encoded directly via tense. In a sentence like (1), the time provided by the past tense is arguably 3 p.m.

(1) At 3 p.m., John had left the store.

However, under the most salient interpretation of (1), the time of John’s leaving the store is understood to be earlier than 3 p.m.

To capture such readings, Reichenbach distinguishes Event time and Speech time from what he called Reference time. In a sentence like (1), 3 p.m. is the Reference time and the time of John’s leaving the store is the Event time. They both precede Speech time. However, the Event time is also understood to precede the Reference time. Therefore, the interpretation of (1) can be viewed as involving two temporal displacements.
Another relevant example, which is explored in Klein (1994), contains a temporal displacement from the utterance time into the past in a matrix sentence, but the event time can still overlap the utterance time:

(2) a. There was a book on the table. b. It was in Russian.

Even though (2)b contains Past tense, it is not understood to mean that the book in question is not in Russian at the utterance time. Thus the eventuality described in (2)b is not fully displaced from the utterance time despite the presence of the past tense.

As is well-known, Klein’s treatment of such cases involves a cooperation of tense and viewpoint aspect. Similar to Reichenbach (1947), Klein (1994) introduces a tripartite schema consisting of the utterance time (UT), the event time (ET) and what he calls the topic time (TT). Tense establishes the relation between the UT and TT, whereas viewpoint aspect establishes the relation between the TT and ET.

According to Klein (1994), a sentence like (2)b contains imperfective viewpoint aspect, which puts the TT inside the ET described by the predicate be in Russian. Thus, the ET must include the TT, but can extend beyond the limits of the TT into the future as well as into the past. Since tense establishes the relation between the UT and TT, the past tense requires the TT to precede the UT. We can thus correctly capture the intuitive meaning of (2)b. It is understood to assert that the state of being in Russian includes a past time indicated by the past tense, but can extend up until and including the UT.
This approach also captures the meaning of (1), if viewpoint aspect (here, the perfect) is understood to put the ET into the past of the TT. In (1), the TT is 3 p.m. and is provided by the past tense. The ET precedes the TT and, therefore, is earlier than 3 p.m.

The Kleinian approach combines well with the neo-Davidsonian view according to which verbs are predicates of events, i.e. expressions of type \(<e,t>\) (see Davidson (1967), Parsons (1990), Paslawska & von Stechow (2003)). Viewpoint aspect is a function that applies to predicates of events and maps them to expressions that can compose with tense (i.e. predicates of times). This way, viewpoint aspect relates the time of the event and the time provided by tense.

A simplex sentence like (3) can be viewed as having the LF in (4):

(3) John misses Kate.

(4) \[
\begin{array}{c}
\text{TP}_i^0 \\
\text{DP}_e \quad \text{TP}_{\langle e,t \rangle}^0 \\
\text{John} \quad 2 \quad \text{TP}_i^1 \\
\end{array}
\]
In (4), each syntactic node is accompanied by its semantic type indicated in the
subscript. I assume that proper names are referential expressions that refer to entities and
have the semantic type \( e \). This is why \( \text{DP}^1 \) and \( \text{DP}^2 \) have \( e \) as their subscript. Verbs are
predicates of events, so the second argument of \( V^0 \) is of type \( e \), which I take to be the basic
type for events. The transitive verb \( \text{miss} \) is of type \( <e, e, t> \). The external argument is
severed from it (Kratzer (1996)). The verb is thus understood to take an entity argument
(the internal argument) and an event argument. Its lexical entry is given in (5):

\[
(5) \quad [\text{miss}] = [\lambda x . \lambda e . \text{miss}(x)(e)]
\]

After the verb \( \text{misses} \) applies to its internal argument, it becomes an expression of
type \( <e, t> \). \( v \) denotes a relation between events and entities (i.e. an element of type
\( <e, e, t> \)). \( v \) combines with VP by Event Identification (Kratzer (1996)), an operation
that identifies the event arguments on \( v \) and on VP and creates one constituent \( v' \) of type
\( <e, e, t> \). In accordance with Kratzer (1996), \( \text{John} \), the external argument of \( \text{misses} \) and
the subject of the sentence, is introduced in the specifier of \( v' \). From there, \( \text{John} \) moves to
a position above tense for case reasons. In accordance with Heim \& Kratzer (1998), the
moved DP \( \text{John} \) adjoins TP\(^1\) and creates a lambda-abstract (here, 2) that binds the trace in
its base position (here, \( t_2 \)). So, after \( v' \) has applied to the (trace of the) external argument,
\( vP \) is created. It is a predicate of events.

Next, \( vP \) combines with the viewpoint aspect. As was said above, the viewpoint
aspect introduces the temporal domain into a verbal projection. I assume that the viewpoint
aspect denotes a function that maps sets of events to sets of times with a lexical entry like the one in (6) for the imperfective aspect (taken from Paslawska & Von Stechow (2003)).

\[
\text{(6) } \quad \boxed{\text{Impf}} = [\lambda P_{\leq t} \cdot \lambda t_i. \exists e(t \subseteq \tau(e) \& P(e) = 1)]
\]

According to this definition, the imperfective aspect (Impf) introduces existential quantification over events and saturates the event argument of vP. It also introduces an argument slot for a time that is to be provided by tense. The imperfective aspect puts the introduced time argument inside the time of the event (“⊆” stands for “includes”). The result of the interaction between Asp\(^0\) and vP is a constituent of type \(<i,t>\) (a predicate of times), where \(i\) is a basic semantic type for times. This constituent is Asp’ (and, consequently, AspP).

Tenses are understood to be pronouns over times. This treatment of tenses goes back to (Partee (1973)). In accordance with Heim & Kratzer’s (1998) treatment of pronouns, tenses come with indices that are mapped to times by the relevant assignment function (see more on this below). Thus, a tense indicates (or denotes) a time. There are two tenses in English: the present tense (Present) and the past tense (Past). Tenses are expressions of type \(i\). A tense and an AspP compose by \textit{Function Application} to produce a constituent of type \(t\) (in (3), that constituent is T’ and, consequently, TP\(^1\)).

Finally, the subject DP, which moves from its vP-internal position to its surface position, creates a lambda-abstract that binds the DP’s trace and makes its sister a function from entities to truth values (Heim & Kratzer (1998)). For this reason, TP\(^2\) is of type \(<e,t>\) and TP\(^3\) is again of type \(t\).
Having described this popular perspective on the interaction between tense and aspect in determining the temporal location of an eventuality, I would like to discuss one issue with this approach that will require a minimal revision in the overall picture.

In (1), we saw a case in which the temporal adverbial *at 3 p.m.* is modifying the TT. However, temporal adverbials can also modify the ET. Hornstein (1993: 25) provides the following examples:

(7)  

a. Tomorrow, John will leave in a week.

b. Yesterday, John left a week ago.

In both sentences in (7) the pre-sentential adverbials are understood to modify the TT (as was the case in (1)) and the temporal adverbials *in a week* and *a week ago* are modifying the ET. In (7)a, it is in a week from tomorrow (i.e. in eight days from the UT) that John is understood to be leaving. Similarly, it is one week before yesterday (i.e. eight days before the UT) when John is understood to have left in (7)b\(^1\).

Assuming that temporal adverbials are predicates of times, i.e. expressions of type \(<i,t>\) (von Stechow (2009)), the adverbials *yesterday* and *a week ago* can be given the following interpretation:

(8)  

a. \([\text{yesterday}] = [\lambda t . t \text{ is on day before the utterance time}]\)

b. \([\text{a week ago}]^g = [\lambda t . t \text{ is one week before } g(I)]\)

\(^1\) Some authors reported that *ago* adverbials always back-shift from the UT (e.g. Schlenker (1999, 2003)).
In (8)b, I assume for simplicity that a week ago denotes the set of times that are one week before a contextually salient time \( g(1) \).

As we saw, temporal adverbials must be able to modify event times. However, it is not immediately clear how they could do that, if verbs are predicates of events or relations between events and entities that do not take a time argument. In other words, a VP of type \( <e,t> \) cannot compose with a modifier of type \( <i,t> \).

One way to solve this problem is to allow verbs to take a temporal argument in addition to event and individual arguments. Instead of having the lexical entry in (9)a, the verb leave could have the lexical entry in (9)b, where \( \tau(e) \) stand for ET as in (6) above:

\[
(9) \quad \begin{align*}
\text{a. } & [\text{leave}] = [\lambda e . \text{leave}(e)] \\
\text{b. } & [\text{leave}] = [\lambda t . \lambda e . \text{leave}(e) \& t = \tau(e)]
\end{align*}
\]

Interpreted as (9)b, the verb leave (type \( <i,<e,t>> \)) can be modified by a week ago, which is of type \( (<i,t>) \). The resulting predicate leave a week ago would have the interpretation provided in (10):

\[
(10) \quad [\text{leave a week ago}] = [\lambda t . \lambda e . \text{leave}(e) \& t = \tau(e) \& t \text{ is one week before } g(1)]
\]

The rule of semantic composition that allows (8)b to combine with (9)b to yield (10) is known as Restrict (Chung & Ladusaw (2004)). A version of this rule employed here can be defined as shown in (11):
(11) If $\alpha$ has two daughters $\beta$ and $\gamma$, such that $[\beta] \in D_{\text{<i,}\varepsilon t}$ and $[\gamma] \in D_{\text{<i,}\text{t}}$, then $[\alpha] \in D_{\text{<i,}\varepsilon t}$ and $[\alpha] = [\lambda t . \lambda \varepsilon . [\beta](t)(\varepsilon) & [\gamma](t)].$

In what follows, I will use Restrict extensively defining its versions that will apply to other cases.

Having allowed a temporal argument into the lexical entry of a verb, we must also revise the semantics of a number of other components. The tree in (4) now looks as (12):

(12) 

```
TP\text{\textsc{i}}
   \downarrow
   TP\text{\textsc{1}}
      \downarrow
      TP\text{\textsc{2}}_{\text{<i,}\varepsilon t}
         \downarrow
         TP\text{\textsc{2}}_{\text{<i,}\text{t}}
            \downarrow
            DP\text{\textsc{2}}_{\text{<i,}\varepsilon t}
               \downarrow
               John
               \downarrow
               T_0
                  \downarrow
                  AspP_{\text{<i,}\varepsilon t}
                     \downarrow
                     \text{Pres}
                     \downarrow
                     Asp'_{\text{<i,}\varepsilon t}
                        \downarrow
                        \text{Impf}
                           \downarrow
                           \text{vP}_{\text{<i,}\varepsilon t}
                              \downarrow
                              t_{\varepsilon}
                                 \downarrow
                                 \text{v'\text{<i,}\varepsilon t}
                                    \downarrow
                                    \text{v}_{\text{<i,}\varepsilon t}
                                       \downarrow
                                       \text{vp}_{\text{<i,}\varepsilon t}
                                          \downarrow
                                          \text{VP}_{\text{<i,}\varepsilon t}
                                             \downarrow
                                             \text{V'}_{\text{<i,}\varepsilon t}
                                                \downarrow
                                                \text{V}_{\text{<i,}\varepsilon t}
                                                   \downarrow
                                                   \text{DP}_{\text{<i,}\varepsilon t}
                                                      \downarrow
                                                      \text{misses}
```

```
\text{Kate}
```
We revise our understanding of $\nu'$ and viewpoint aspect. $\nu$, which was of type $<e, \varepsilon t>$ in (4), must now be able to compose with VP of type $<i, \varepsilon t>$ in a way that and identifies the event arguments on both expressions. The result of this composition should be an expression of type $<e, <i, \varepsilon t>>$.

Since VPs are now relations between events and times and not predicates of events, I propose that $\nu$ maps individuals to relations of events and times. It is of type $<e, <i, \varepsilon t>>$ and composes with VP which is of type $<i, \varepsilon t>$. The mode of composition is a version of Kratzer’s (1996) Event Identification. From two constituents of type $<e, <i, \varepsilon t>>$ and $<i, \varepsilon t>$, it creates one constituent of type $<e, <i, \varepsilon t>>$ by identifying the time and event arguments on the two initial ones. This rule can be defined as follows:

(13) Time and Event Identification

If $\alpha$ is a binary branching node and $\beta, \gamma$ are its daughters such that $\llbracket \beta \rrbracket \in D_{<e, <i, \varepsilon t>>}$ and $\llbracket \gamma \rrbracket \in D_{<i, \varepsilon t>}$, then $\llbracket \alpha \rrbracket \in D_{<e, <i, \varepsilon t>>}$ and $\llbracket \alpha \rrbracket = \lambda x_e . \lambda t_i . \lambda z_\varepsilon . \llbracket \beta \rrbracket (x)(t)(z) \& \llbracket \gamma \rrbracket (t)(z)$.

In (6), the imperfective aspect was defined as a function that maps predicates of events to predicates of times. Now, it must be a function that applies to relations between times and events and maps them to predicates of times (i.e. an expression of type $<<i, \varepsilon t>, <i, t>>$). As an illustration, I provide a revised lexical entry for Impf in (14):

(14) $\llbracket \text{Impf} \rrbracket = [\lambda P_{<i, \varepsilon t>} . \lambda t_i . \exists t' \exists e (t \subseteq t' \& P(t')(e) = 1)]$
After viewpoint aspect applies to a VP, the result is an expression of type $<i,t>$, i.e. a predicate of times, which can compose with tense.

The tree in (12) represents my basic structural and semantic assumptions for a finite clause. I provided a discussion showing that a temporal argument is present in the semantics of a verb before it composes with viewpoint aspect because this assumption will be important for the argument that I will develop below. However, having shown this, I would now like to simplify my exposition by suppressing viewpoint aspect and pretending that tenses saturate the time arguments of VPs directly. For simplicity, I also assume that verbs take their external arguments and that subjects do not move to Spec,TP. I believe that everything that I will say in this dissertation in terms of the simplified approach will be in principle convertible into the more complex treatment described above.

Consider again sentence (3), repeated here as (15):

(15) John misses Kate.

The verb *miss* gets the lexical entry in (16) and the LF predicted for (15) is given in (17):

(16) $[[\text{miss}]] = [\lambda y . \lambda x . \lambda t . x \text{ misses } y \text{ at } t]$

(17) \[
\begin{array}{c}
\text{TP}_1 \\
\text{Pres} \\
\text{VP}_{(i,t)}^2 \\
\text{John}_e \\
\text{VP}_{(e,ti)}^1 \\
\text{V}_{(e,\{e,\text{it}\})} \\
\text{misses} \\
\end{array}
\]
Having said that, I now turn to some relevant terminology. An utterance of (15) can convey something true at one time and false at another. For this reason, it is important to take into account the time at which (15) is evaluated. Following the literature, I call this time the *evaluation time* (EvalT) of a sentence. The time indicated by tense (i.e. the time that a tense contributes to the truth conditions of the clause it occurs in) I call *topic time* (TT). The distinction between TT and ET will not play an important role in my discussion and I will assume that tense provides ET.

Since (15) is a simplex sentence, its evaluation time is identical to *context time* (c(time)), which must overlap the *utterance time* (UT). In order to evaluate the truth conditions of (15), i.e. establish whether the eventuality described by VP² in (17) obtains at the time indicated by the present tense, we must know the denotation of Present.

Intuitively, we understand that (15) is true if John misses Kate at the time of the utterance. But as far as the semantics of Present (the main and only tense in (15)) is concerned, we can ask ourselves the following question: does Present tense denote the evaluation time, whatever that is, or does Present tense denote the utterance time, c(time)²?

---

² Not all simplex sentences that contain Present describe eventualities that occur at c(time). When eventive verbs like *walk, smile*, etc. are used in a simplex sentence with the present tense morphology, they only yield a so-called *habitual* interpretation. In order for “John smiles” to be true at c(time), John need not be smiling at c(time); it is enough for him to have a tendency to smile. (It can be said that the habit described by the VP must occur at c(time)). Present Progressive must be used in order to express an overlap between an actual eventuality and c(time): “John is smiling”. 
As far as an extensional sentence like (15) is concerned, both options output equivalent results. However, we can already see that these two approaches to Present are equivalent only in those cases where EvalT = c(time). In cases where this identity does not hold and EvalT is identical to some $t'$, such that $t' \neq c(time)$, these approaches will predict different denotations for one and the same present tense morpheme: $t'$, under the former approach, and c(time), under the latter.

Like many other researchers, I refer to the former approach to the semantics of Present as its \textit{relative treatment}. According to the relative approach, Present \textit{anchors} to EvalT and contributes a time that is \textit{simultaneous} with EvalT (the anchor). I call the second approach \textit{deictic} or \textit{indexical}: Present always denotes c(time) and its denotation is not relativized to EvalT. The difference between the relative and indexical approaches becomes important in embedded environments. However, before we look at embedded cases, a couple of other preliminary considerations are in order. One of them is the semantics of Past.

Consider (18) and its LF in (19):

\begin{center}
\textbf{Consider (18) and its LF in (19):}
\end{center}

\begin{center}
\begin{tabular}{l}
\hline
Unlike eventive predicates, stative predicates in English do not have this peculiarity: when they combine with Present, they can describe an ongoing eventuality as well as a habitual one. For this reason, I used a stative predicate \textit{miss} in (3). In most of my examples, I use stative predicates.
\hline
\end{tabular}
\end{center}
In order for (18) to be true, it must be the case that John missed Kate at some point in time that precedes c(time), namely the time when he was away. Here again, we can think of Past as interpreted *relatively* (as shifting back from EvalT) or *indexically* (i.e. shifting back from c(time) no matter what EvalT happens to be).

If we wanted to provide a *deictic* (indexical) semantics for Present and Past, we could use the definitions in (20) and (21):

(20) \([\text{Pres}]^e = c(\text{time})\)

(21) \([\text{Past}]^{c,g} = g(i), \text{ defined iff } g(i) < c(\text{time})\)

In (21), “<” stands for “precedes”. This condition has the status of a presupposition, analogous to the gender presuppositions of pronouns. “Past” denotes a particular contextually salient time. The assignment function \(g\) is assumed to be context sensitive and accessible to speaker and hearer, as in a common treatment of deictic uses of personal
pronouns. Also observe that under the deictic approach, we do not even need to introduce an index for “Pres” because it necessarily denotes c(time)\(^3\).

If we want to provide a relative semantics for Present and Past, we need a way to encode the idea that tenses are interpreted relatively to an anchor (EvalT). One popular way to do this is to relativize the interpretation function \([\cdot]\) to a temporal parameter and treat this parameter as the anchor (EvalT) of every tense that the interpretation function applies to (see Heim (1994)). The lexical entries that Present and Past receive under this perspective are given in (22) and (23):

\[
\begin{align*}
\text{(22)} & \quad \mathbb{[}\text{Pres}\mathbb{]}^{g,tc} = g(i), \text{ defined iff } g(i) \otimes t \\
\text{(23)} & \quad \mathbb{[}\text{Past}\mathbb{]}^{g,tc} = g(i), \text{ defined iff } g(i) < t
\end{align*}
\]

In (22) and (23), “\(\otimes\)” stands for “overlaps” and “\(<\)” stands for “precedes”, respectively. In a matrix clause the temporal parameter is equivalent to the UT. However, in an embedded clause the temporal parameter of interpretation \(t\) can change its value even if the context parameter remains unchanged.

Under the relative approach to tense, the LFs predicted for matrix sentences like (15) and (18) are just like the ones given in (17) and (19) with the only difference that the present tense bears an index. The predicted truth conditions are given in (24) and (25):

\[
\begin{align*}
\text{(24)} & \quad \mathbb{[}\text{Present}\mathbb{]}^{g,tc} = g(i), \text{ defined iff } g(i) \otimes c(t) \\
\text{(25)} & \quad \mathbb{[}\text{Past}\mathbb{]}^{g,tc} = g(i), \text{ defined iff } g(i) < c(t)
\end{align*}
\]

\(^3\) For uniformity, we could provide Present with an index \(i\), have it denote \(g(i)\) and be defined only if \(g(i)\) overlaps \(c(t)\).
(24) \[ (15)_{g,t,c} = 1 \text{ iff } \text{John misses Kate at } g(1), \text{ defined iff } g(1) \oplus t \]

(25) \[ (18)_{g,t,c} = 1 \text{ iff } \text{John misses Kate at } g(1), \text{ defined iff } g(1) < t \]

The last thing that I want to present before moving to embedded contexts is the semantics of Future and its standard account (building on Ogihara (1989), Abusch (1994), Heim (1994)). Consider (26):

(26) \text{John will miss Kate.}

Ever since Chomsky (1957), Future has not been treated as a real tense. The approach I adopt here assumes that the future auxiliary \textit{will} is the result of a combination of Present and the tenseless verb stem \textit{woll}. The auxiliary \textit{would} (in the sense of Future-in-the-Past) is made from Past and \textit{woll}. The lexical entry for \textit{woll} is given in (27). The LF for (26) is given in (28). (The index on Present is taken into parentheses to mark that it is used only for the relative construal of the present tense.)

(27) \[ [\textit{woll}] = [\lambda P_{<i,t_i>}. \lambda t_i'. \exists t''(t'' > t' \& P(t''))] \quad \text{(to be revised in (47))} \]

(28) 
```
  TP_t
     Pres  VP^2
        woll VP^1
           John_v VP^2
               miss Kate
```
What we have so far is a number of some basic syntactic and semantic assumptions about clausal structure, the semantics for Future, and two approaches to the semantics of Present and Past. We can now proceed to embedded environments.

2.1.2. Tense in embedded clauses: empirical and conceptual puzzles

As was already mentioned above, embedded clauses are environments where the temporal anchor of an embedded tense can be different from the evaluation time of the whole sentence. For this reason, the temporal interpretations that embedded clauses get can serve as evidence for or against the relative and the indexical (deictic) approach to the semantics of tense. The embedded environments that are discussed most often in the literature are relative clauses (RCs) and CP complements of attitude verbs. In this section, I discuss several central problems that they present for a unified theory of the present and past tense in English. I begin with tense in RCs.

Embeddedness under a matrix Present does not help us decide between the relative and the matrix approach to tense. Consider (29), which represents an example of a Present-under-Present and a Past-under-Present:

(29)  
a. Mary is meeting a guy who misses Kate.  
b. Mary is meeting a guy who missed Kate (when he was on vacation).
In either of the two cases in (29), we can allow the embedded CP to have a temporal anchor in its left periphery, understand it to be contemporaneous with the time provided by the matrix tense (i.e. the meeting time) and evaluate the embedded tense with respect to that anchor, or we can treat the embedded tense as deictic (indexical). The readings we get are equivalent.

Things become more complicated only when we move to embeddings under Future and under Past. Let us take a look at embeddings under Future first.

(30) a. Mary will meet a guy who misses Kate.
    b. Mary will meet a guy who missed Kate.

In (30)a, the simultaneous interpretation is available for the embedded Present. In order for (30)a to be true, no one needs to miss Kate at the utterance time. The sentence describes a future situation in which Mary meets a person who misses Kate in that situation. The availability of the simultaneous interpretation (30)a requires that the simultaneous (non-indexical) interpretation of embedded Present be available.

The sentence in (30)b can describe a future situation in which Mary meets a guy who missed Kate at a time that precedes the meeting but is still in the future of the UT. This reading is known as the later-than-matrix (LTM) reading. In order for this reading to become possible, the embedded Past must be able to shift-back from a future time. This time is the time of the meeting. The LTM interpretation would be impossible if the embedded Past were interpreted with respect to the utterance time (UT).
Despite the described two readings that can only be captured in terms of the relative treatment of embedded tense, the sentences in (30) do not exclude the possibility of the indexical (deictic) interpretation. The sentence in (30)a has a reading that directly requires the indexical interpretation of the embedded Present. This is the reading according to which Mary will meet one of the guys who miss Kate at the UT. They need not be missing her at the time of the meeting. A relative interpretation of the embedded Present is incompatible with this reading. The indexical interpretation of the embedded Past in (30)b makes the sentence true in a situation when missing Kate precedes the UT. This reading, however, is also predicted under the relative interpretation of the embedded Past where it anchors to the future time of the meeting.

We thus see that Present-under-Future requires the indexical, as well as the relative approach. Past-under-Future requires the relative interpretation and is compatible with its indexical interpretation in those cases when the embedded eventuality is understood to precede the UT. Let us now see what happens when Present and Past are embedded under a matrix Past. Consider a case with Past-under-Past first:

(31) Mary met a guy who missed Kate.

Native speakers easily get the so-called *back-shifted* interpretation of Past-under-Past in (31), according to which the eventuality of missing Kate precedes the meeting. The *simultaneous* interpretation, according to which the time of missing Kate overlaps the time of meeting Mary, is also easily available here. Other examples in which simultaneous Past-under-Past is more salient are given in (32):
(32)  a. Mary met a guy who was sick.
     b. Mary met a guy who had a brown bag in his hand.

Finally, the so-called forward-shifted interpretation is also available in (31): the state of missing Kate is still in the past with respect to c(time), but it is in the future of the time of meeting Mary. This interpretation can also be disambiguated with the help of temporal adverbials:

(33) Five days ago in Amherst, Mary met a guy who was in London yesterday.

Obviously, if the meeting took place in Amherst, then the embedded Past, which temporally locates the time of being in London yesterday, cannot also overlap the meeting time (assuming that no one can be in London and in Amherst at the same time).

The simultaneous and the forward-shifted interpretation of Past-under-Past can only be generated under the indexical (deictic) approach to Past, whereas the back-shifted interpretation is compatible with both the relative and the indexical approach. We thus see that Past-under-Past in relative clauses seems to make the availability of the deictic interpretation of an embedded Past necessary.

Examples of Present-under-Past in a relative clause are provided in (34):

(34)  a. Mary met a guy who misses Kate.
     b. Sally met a guy who is sick.
The only interpretation that the embedded Present is known to have in these sentences is the indexical (deictic) interpretation: missing Kate happens at c(time), whereas meeting Mary is in the past. Crucially, unlike Present-under-Future in (30), Present-under-Past does not allow for a purely simultaneous interpretation, according to which missing Kate or being sick only overlaps the time of the meeting but does not overlap the UT.

English embedded Present thus reveals an important asymmetry in its interpretation: it can be relative under a matrix Future, but not under a matrix Past. This asymmetry clearly shows that a simple-minded theory of tense according to which tense is either always relative or always indexical will not be satisfactory. More factors must be taken into consideration in order to explain the semantics of embedded tense already at the level of relative clauses. Things get only more complicated when we look at tense in complement CPs.

Attitude reports add an attitude holder’s perspective as a factor affecting the temporal interpretation of embedded clauses and reveal new challenges for a theory of tense. The importance of the perspective of an attitude holder is best illustrated by the contrast between the readings that are available for Past-under-Past inside a relative clause (discussed above in relation to (31)-(33)) and those that are available for it inside a complement CP. Consider (35):

(35) Mary thought that John missed Kate.
Sentence (35) disallows the forward-shifted interpretation. This is because (35) does not have a meaning according to which Mary is future-oriented with respect to the situation in which John misses Kate. In other words, (35) cannot truly describe a situation in which Mary perceives the situation in which John misses Kate as being in the future for her. Notice that this way of looking at attitude reports suggests that the local EvalT for an embedded tense is the time that the attitude holder perceives as her “now” (the so-called subjective “now” of the attitude holder). In order to describe such a thought about an eventuality that the attitude holder believes to be in the future, the embedded clause must contain *would*.

(36) Mary thought that John would miss Kate.

The future-oriented perspective of an attitude holder thus cannot be described by a Past-under-Past attitude report. This is one example in which the attitude holder’s temporal perspective becomes a factor that restricts the interpretations that are available for a Past-under-Past in an attitude report. An asymmetry between Past-under-Past in complement CPs and Past-under-Past in RCs thus arises.

Since a forward-shifted interpretation of Past-under-Past can arise only if the embedded Past anchors to the UT (and back-shifts to a time that is in the future of the time denoted by the matrix Past), the unavailability of this reading suggests that an embedded Past in a Past-under-Past attitude report might not be able to anchor to the UT.

At the same time, sentence (35) also has the simultaneous interpretation according to which Mary thought to herself something like “John misses Kate”. In other words, under
this reading the attitude holder is understood to be present-oriented to the eventuality described by the embedded clause. This reading cannot be derived by a relative interpretation of Past-under-Past. The relative interpretation of Past-under-Past can derive a back-shifted interpretation (which is also possible in (35)), but not the simultaneous one.

Present-under-Past in complement CPs also differs from Present-under-Past in RCs. Consider (37):

(37) Mary thought that John misses Kate.

Just like Present-under-Past in a RC, the present tense in (37) does not seem to allow for a purely relative interpretation. The embedded Present in (37) must overlap c(time) and, thus, be indexical, just like Present-under-Past in relative clauses in (34) above. The crucial difference, however, comes from the requirement on the interpretation of (37) known as *double-access* (Smith (1978), Ogihara (1989, 1995, 1996), Abusch (1994), Heim (1994), Gennari (1999), Bary & Altshuler (2015), Bar-Lev (2015)). Even though missing Kate (according to Mary’s thoughts) must overlap c(time), it cannot be in the future from the standpoint of Mary. In other words, the attitude holder must perceive the time of John’s missing Kate as something that overlaps her subjective “now” (and is not in the future). And since, as we said, Mary’s subjective “now” is treated as the local EvalT, Present-under-Past in a complement CP must not only overlap the UT, but also its local EvalT. Hence, the name *double-access*. No such requirement exists for Present inside the relative clause in (34): missing Kate or being sick need not overlap the meeting time.
Thus, just like Past-under-Past before, Present-under-Past also reveals an asymmetry between RCs and complement CPs.

Embeddings under Future do not reveal noticeable asymmetries. Consider (38):

(38)    a. Mary will think that John misses Kate.
          b. Mary will think that John missed Kate (when he was on vacation).

According to one reading that (38)a has, in Mary’s future thoughts, John misses Kate at Mary’s subjective “now”. This illustrates a purely relative interpretation of embedded Present. Embedded Past in (38)b can also have a purely relative (LTM) reading. According to this reading, at a time in the future Mary perceives the situation where John misses Kate as being in the past, but this time is not taken by the speaker to overlap or precede the UT.

The deictic (indexical) interpretation of the embedded Present in (38)a is also possible for many speakers, as reported in Ogihara & Sharvit (2012) (also see a relevant discussion in Gennari (1999)). Adding now makes it easier to grasp this interpretation:

(39)    Mary will think that John misses Kate now.

In a situation that makes this sentence true, Mary entertains at some future time the thought that John misses Kate at c(time). At the time of thinking, Mary must be past-oriented with respect to the time when John misses Kate (she should be thinking something like “John missed Kate”).
Finally, the indexical interpretation is also available for the Past tense in (38)b. The embedded Past in (38)b can also be understood to have the indexical interpretation under which both the speaker and the attitude holder are past-oriented w.r.t. to the eventuality described by the embedded clause (i.e. the state of missing Kate that Mary will ascribe to John at some time in the future).

Complement CPs were also the environment in which theorists observed another important effect associated with embedded tense. Above, I said that the Past-under-Past in (35), repeated in (40), did not have a forward-shifted interpretation, but could get the simultaneous and the back-shifted interpretation.

(40) Mary thought that John missed Kate.

The lack of the forward-shifted interpretation could be treated as suggesting that an embedded Past in a complement CP could not anchor to the matrix time. But the availability of the simultaneous reading for Past-under-Past would then look like a mystery because, as I said, that reading could not arise from a relative interpretation of the embedded Past in (35).

It turned out that the simultaneous interpretation could be licensed by the so-called vacuous interpretation that the embedded Past can have in (35). Arguing against Enç (1987), who proposed that Past tense always back-shifts, Abusch (1994) provided cases that clearly showed that a Past-under-Past can have an interpretation that does not assume any back-shifting at all:
A week ago, John decided that in ten days at breakfast he would tell his mother that they were having their last meal together.

Observe that, under the most salient reading of (41), the time of telling and the time of having breakfast overlap. If the most embedded Past necessarily back-shifted, it would be a mystery what anchor it back-shifts from: the sentence does not seem to provide any anchor that would be in the future of the time of telling so that the most embedded Past could back-shift from it and end up overlapping the time of telling.

Such examples were also discussed in Kamp & Rohrer (1984) and are sometimes called “Kamp-Abusch” sentences. I will refer to this example as the Breakfast example. Such sentences have been considered to provide evidence that Past-under-Past in English can have a “vacuous” interpretation in which the embedded Past tense morphology indicates simultaneity. This analysis extended to other cases like the ones illustrated in (32). However, the example in (41) is believed to provide crucial evidence for the “vacuous” reading also known as SOT (Sequence of Tense; e.g. see Comrie (1985)).

Thus, Past-under-Past not only reveals an important asymmetry between relative clauses and complement CPs with respect to the availability of a forward-shifted interpretation, but also provides evidence for the “vacuous” interpretation that a past tense can have if it is embedded under a matrix Past (but not under a matrix Present or Future, where it must back-shift). The existence of the “vacuous” Past-under-Past can now be used to generate the simultaneous interpretation we observed in (35) without generating the forward-shifted one that is not available in that sentence.
Interim summary. The data we have looked at first suggested that Present and Past could either have an indexical or a relative interpretation because, for each tense, the two interpretations were indistinguishable. Then we saw some cases from embeddings under Future that suggested that embedded Present and Past required the relative and the indexical interpretation. After that, we saw examples from Present and Past under a matrix Past in which these tenses could not have a relative interpretation and had to be interpreted indexically. The variation also seemed to be linked to the kinds of embedded clauses a given tense occurred in (complement or adjunct CPs) as well as to the kind of tense that occurred in the matrix clause. The data became even more complicated because of such factors as the double-access interpretation of Present-under-Past in complement CPs, the “vacuous” interpretation and the lack of the forward-shifted interpretation.

The challenge associated with the data we looked at has to do with the impossibility of adopting one perspective on Present or Past throughout all contexts. Allowing tense to be relative to predict some cases immediately overgenerates in the others. Disallowing tense to be relative inevitably undergenerates.

The semantic perspective on English tense that emerged from the contributions made in the 1980’s and 1990’s by such theorists as Dorit Abusch, Toshiyuki Ogihara, Arnim von Stechow, Irene Heim, Angelika Kratzer, Hans Kamp, Barbara Partee, Philippe Schlenker, Mürvet Enç, Bernard Comrie and others sheds light on the processes involved in the temporal interpretation of clauses. This perspective captures all of the above data with all of their abovementioned complications. It derives them in an elegant way from a limited number of natural and well-motivated assumptions.
In the next section, I discuss one version of the current widespread perspective on tense and the set of theoretical tools it uses to capture the data.

2.1.3. The indexicality of Present, the relativity of Past, zero tense, and the tenseless verb stem *woll*

Under the most popular approaches to the semantics of tense in English, Present is understood to be inherently indexical (deictic), whereas Past is believed to allow for a relative, as well as indexical interpretation. Present always denotes \( c(\text{time}) \), which necessarily overlaps the utterance time (UT). Past can be computed relative to the temporal parameter of interpretation (a parameter that relativizes the interpretation function that maps a past tense morpheme to its denotation). In a matrix clause, the temporal parameter is the time of utterance. In an embedded clause, the temporal parameter can be a different time.

This perspective can be captured with the following definitions for Present and Past, repeated from (20) and (23), respectively:

\[
\begin{align*}
\langle \text{Pres} \rangle^{g,c} &= c(\text{time}) \\
\langle \text{Past} \rangle^{g,t,c} &= g(i), \text{ defined iff } g(i) < t
\end{align*}
\]
In addition to Present and Past, there is also a tense called zero or null tense\(^4\). This is a special tense that is introduced in addition to Present and Past. Its two main properties are that it functions just like a relative Present tense and that it lacks its own morphology (borrowing it from a c-commanding tense via a special mechanism of transmission of temporal features).

The first of these properties is captured in the lexical entry given in (44), which must be taken together with the syntactic assumption that, at LF, zero tense is always bound locally (i.e. by the closest c-commanding anchor).

\[(44) \quad [\emptyset]^{g} = g(i)\]

Zero tense is thus licensed only in embedded environments because, in a matrix sentence, it is not c-commanded by any tense, cannot borrow morphology from anywhere and is, therefore, ruled out.

A trickier task is to explain how zero tense can borrow its morphology (i.e. temporal features) from a c-commanding tense. The basic assumptions associated with this idea are as follows:

\[(45) \quad \begin{array}{l}
a. \quad \text{The transmission of temporal features (FT) onto a zero tense from a} \\
\end{array}\]

\(^4\) In my exposition of this idea, I build on the proposal in Kratzer (1998, 2008) and its discussion in Cable (2015).
c-commanding tense occurs at a level of syntactic representation that feeds PF (I will call it “PF” for short).

b. FT is not seen at LF, because, in that case, the transmitted temporal morphology would be interpreted and the “vacuous” interpretation will be lost.

The mechanism by which FT in English is realized can be viewed as proceeding according to the following rules:

(46)  

a. *Tense Lowering*: in a finite clause, tense features are lowered from a tense onto the main verb.

b. *Predication*: if a verb’s sister immediately dominates a λ-operator over times, then tense features are transmitted from the verb onto the operator.

c. *Feature Transmission Under Binding (FTUB)*: if a temporal operator bears temporal features and binds a tense, the features are transmitted from the operator onto the tense.
The mechanism of feature transmission at PF predicts a number of readings that we couldn’t predict without it. We’ll see how it works shortly. However, before I proceed to a demonstration, I would like to describe a popular view on Future.

The basic approach to Future is similar as the one I already mentioned and defined in (27). Future is not a tense, but a combination of a tense and the tenseless verb stem woll. The verb stem, however, is modal and like all modal or intensional verbs is understood to have the ability to introduce a temporal binder or, rather, compose with a complement that has a temporal binder in its specifier (see Von Stechow (1995)). This temporal binder can serve as a local anchor (EvalT) for zero tense inside the complement of woll. The lexical entry for woll from (27), which I call woll₁, is thus supplemented with an optional version in (47)b, which I call woll₂.

\[
(47) \quad \begin{align*}
a. & \quad [\text{woll}_1] = [\lambda P_{<i,t>} \cdot \lambda t' \cdot \exists t'' (t'' > t' & P(t''))] \\
b. & \quad [\text{woll}_2] = [\lambda P_{<i,<i,t>} \cdot \lambda t' \cdot \exists t'' (t'' > t' & P(t'')(t''))]
\end{align*}
\]

\[\text{See Ogihara (1989), Von Stechow (2003) for an alternative explanation, according to which Past tense features on an embedded tense can be deleted at LF if the matrix tense is also Past. The resulting interpretation of the embedded tense is a “bound” one, i.e. anaphoric on the time provided by the matrix Past. Also see Stowell (1993), Kusumoto (1999), Zeijlstra (2012) for an alternative account, according to which there are dummy tenses that must be licensed in the syntax and operators over times that serve as such licensors (and a critical discussion of some aspects of this approach in Bjorkman (2015)). I return to the discussion of feature transmission and SOT in Chapter 9.}\]
As we will see in the next subsection, \( \text{woll}_2 \) is used in cases when its complement contains zero tense. Since zero tense must be locally bound, the extra temporal binder inside the complement of \( \text{woll}_2 \) binds zero tense and thus fulfills this restriction. \( \text{woll}_2 \) is thus used to account for the simultaneous interpretation of embedded clauses.

Finally, another option for Future is the one that is able to alter the local evaluation time of its complement by shifting its parameter of temporal evaluation. This version of \( \text{woll} \), which I will call \( \text{woll}_3 \), can be used to account for the LTM interpretation. It has a syncategorematic lexical entry is given in (48):

\[
(48) \quad [\text{woll}_3 \text{XP}_{<i,t>}^t] = [\lambda t'. \exists t''(t'' > t' \& [\text{XP}]^t(t''))]
\]

When the complement of \( \text{woll}_3 \) contains an embedded Past, which must receive the LTM interpretation, this interpretation arises because the temporal parameter of the XP that contains Past is shifted to the future time that is introduced by \( \text{woll}_3 \) and the Past shifts back from that future time. The three lexical entries for \( \text{woll} \) are summarized in (49):

\[
(49) \quad \begin{align*}
\text{a.} & \quad [\text{woll}_1] = [\lambda P_{<i,t>}^t \cdot \lambda t'. \exists t''(t'' > t' \& P(t''))] \\
\text{b.} & \quad [\text{woll}_2] = [\lambda P_{<i,<i,t>}>^t \cdot \lambda t'. \exists t''(t'' > t' \& P(t')(t''))] \\
\text{c.} & \quad [\text{woll}_3 \text{XP}_{<i,t>}^t] = [\lambda t'. \exists t''(t'' > t' \& [\text{XP}]^t(t''))]
\end{align*}
\]

In the next section, I show with concrete examples how these tools can be used to predict the existing readings of tense in relative clauses and rule out the non-existent ones.
2.2. Capturing the temporal readings of relative clauses

Relative clauses in English have been argued not to provide a temporal anchor for the tenses they contain. The lack of any temporal anchor in the left periphery of a relative clause was motivated by the behaviour of the modal *ought* illustrated by the contrast in (50) (see Von Stechow (1995a)):

(50)    a. John believed that Mary ought to study hard.
        b. John had a student who ought to study hard.

Observe that while *ought* can get a simultaneous interpretation in (50)a (according to John’s beliefs at a given past time, Mary had an obligation to study), *ought* does not have a simultaneous interpretation in (50)b (John’s student from the past ought to study at the utterance time and not at the time when John was her teacher). This contrast was one of the reasons behind a consensus that relative clauses in English do not license a local evaluation time.

This suggested that a tense inside a RC was not immediately provided with a local anchor. When embedded under a matrix Past, a Present or a Past could only get the indexical interpretation\(^6\). This view readily accounted for the readings revealed by Present-

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\(^6\) This approach was recently criticized in Alxatib & Sharvit (2017), who give reasons to believe that the unavailability of the simultaneous interpretation in (50)b results from other factors. In my own account of
under-Past (the forward-shifted reading) and Past-under-Past (the forward-shifted, back-shifted, and simultaneous reading) sentences in (34), repeated here:

(34) a. Mary met a guy who misses Kate. (FS with deictic Present)
    b. Mary met a guy who missed Kate. (FS, Sim, BS with deictic Past)

The schematic LF in (51) illustrates how these readings are generated:

(51)

To simplify this exposition, I do not require the indefinite in (51) to undergo QR for type reasons and assume that it can stay in situ and compose with the verb by a rule like Function Composition (Jacobson (1999))\(^7\). I also do not show the internal structure of the object DP.

tenses in RCs, I allow tenses to be locally anchored. However, for the purposes of my current discussion of the popular approach, I continue by assuming that this argument is valid.

\(^7\) The rule of Function Composition (FC) can be stated in the following way:
in order to avoid making extra assumptions here and just concentrate on the interpretation of the embedded tenses. In Chapter 5, I present my assumptions about the temporal interpretation of DPs in detail. At this stage, what is important is that since the RC is understood to be unable to provide a local anchor and the embedded tense (be it Present or

(i) \textit{Function Composition}: For every binary branching node X, such that Y and Z are its daughters, if \(\alpha, \beta, \gamma\) are semantic types and \([Y] \in D_{<\alpha,\beta>}\) and \([Z] \in D_{<\beta,\gamma>}\), then \([X] \in D_{<\alpha,\gamma>}\) and \([X] = [\lambda\alpha . [X](\langle Y \rangle(\nu))]\).

One way to look at FC is to treat it as an operation that allows Y and Z to compose by “passing up” a “lambda” (or an unsaturated argument position of Y). This operation can be viewed as proceeding in steps. First, \([Y]\)'s argument position is temporarily saturated with a dummy entity of type \(\alpha\) to create an entity of type \(\beta\). Next, \([X]\) is allowed to take this entity of type \(\beta\) as argument and output another entity of type \(\gamma\). Finally, a binder (or a lambda) is introduced to bind the argument position that was temporally taken up by the dummy entity. The result is an expression of type \(<\alpha,\gamma>\).

In a sentence like \textit{John met every girl}, the transitive verb \textit{met}, which is of type \(<e,et>\) and denotes the function \([\lambda e . \lambda z . e \; \text{met} \; z]\), can compose with the DP \textit{every girl}, which is of type \(<et,t>\) and denotes the function \([\lambda P . \forall y (y \; \text{is a girl} \rightarrow P(y))\]). Here, a version of FC is needed that would allow the external (i.e. the second) argument of \textit{meet} to be “passed up”. The version of FC that does that is shown in (ii):

(ii) If a binary branching node X has Y and Z as its daughters and \([Y] \in D_{<e,et>}\) and \([Z] \in D_{<et,t>}\), then \([X] = [\lambda x . [Z]([\lambda y . [Y](y)(x))]])\).

When \textit{met} and \textit{every girl} compose by (ii), the resulting VP \textit{met every girl} denotes \([\lambda x . \forall y (y \; \text{is a girl} \rightarrow x \; \text{met} \; y)]\). The “lambda” responsible for the external argument has been “passed up” from \textit{met} onto this VP.
Past) is interpreted as if it occurred in a matrix context: an embedded Present denotes \(c(\text{time})\) and the embedded \(P_{\text{ast}1}\) denotes \(g(1)\), which is presupposed to precede the matrix temporal parameter identical to the utterance time.

Anchored to the matrix EvalT, the embedded Past in (34)b can yield the LTM, simultaneous, and back-shifted interpretations depending on how the time it denotes is related to the time denoted by the matrix Past. The embedded Present in (34)a can only denote a time that overlaps \(c(\text{time})\). Therefore, only a forward-shifted reading is available. (In fact, a variant of a double-access interpretation is also available for the Present-under-Past sentence if \(c(\text{time})\) denoted by the embedded Present stretches far enough into the past so that it also overlaps the time denoted by the matrix Past.)

The sentence in (34)b cannot have an LF with a zero tense inside the embedded \(T^0\) because a zero tense must be locally anchored and there is no local temporal binder in (34)b.

As far the interpretations of tenses embedded under a matrix Future go, recall that the sentence in (30)a, repeated in (52), had the simultaneous and the back-shifted interpretation, suggesting that the embedded present tense can have the indexical as well as the simultaneous interpretation:

\[(52)\quad \text{Mary will meet a guy who misses Kate.}\]

The back-shifted interpretation resulting from the indexical construal of the embedded Present is associated with the following LF:
Here, again, the embedded Present is anchored to \( c(\text{time}) \). Future is generated with \( \textit{woll}_1 \) from (49)a, which does not introduce a temporal binder.

Under this LF, sentence (52) gets the following truth conditions:

\[
(54) \quad \llbracket (53) \rrbracket^e = 1 \text{ iff } \exists t' (t' > c(\text{time}) \& \exists x (x \text{ is a guy at } t' \& x \text{ misses Kate at } c(\text{time}) \& \text{Mary meets } x \text{ at } t'))
\]

The simultaneous interpretation of (52) is associated with the LF in (55):
Observe that this LF contains zero tense in the embedded clause, which is now licenced because matrix Future, unlike Past, can introduce a local temporal anchor (here, λ2). The presence of this extra binder is associated with \( \text{woll}_2 \) (see (49)b), which is able to take an argument of type \( <i, it> \). This extra binder binds zero tense.

The truth conditions predicted for (52) construed as (55) are given (56):

\[
[(55)] = 1 \text{ iff } \exists t'(t' > \text{c(time)} \& \exists x (x \text{ is a guy at } t' \& x \text{ misses Kate at } t' \& \text{Mary meets } x \text{ at } t'))
\]

Since \( \emptyset_2 \) in (55) is locally bound at LF and is c-commanded by a matrix Present at PF, the mechanism of Feature Transmission introduced in (46) applies, the present tense morphology is transmitted from the matrix tense onto the \( \emptyset_2 \). As a result, the latter surfaces with the present tense morphology. First, the tense features are lowered onto \( \text{woll}_2 \) by Tense
Lowering in (46)a. Next, they are transmitted onto \( \lambda 2 \) by Predication (see (46)b). Finally, they are sent down from \( \lambda 2 \) onto \( \emptyset 2 \) by FTUB from (46)c.

For the Past-under-Future configuration illustrated by (30)b, repeated in (57), two LFs are, in principle, possible. One of them contains \( \text{woll}_1 \) and the embedded past tense under the indexical interpretation. That LF is illustrated in (58):

\[
(57) \quad \text{Mary will meet a guy who missed Kate.}
\]

\[
(58)
\begin{array}{c}
\text{TP}_1 \\
\text{Pres} \\
\text{VP}^{a}_{(\lambda t)} \\
\text{woll}_1 \\
\text{VP}^{b}_{(\lambda t)} \\
\text{Mary}_c \\
\text{VP}^{c}_{(\lambda t)} \\
\text{meet}_{(\lambda t)} \\
\text{DP}_{(\lambda t),_w} \\
\text{a guy who Past}_2 \text{ misses Kate}
\end{array}
\]

The truth conditions predicted for this LF are given in (59):

\[
(59) \quad \llbracket (58) \rrbracket^{g,c,t} = 1 \text{ iff } \exists t'(t' > c(\text{time}) \& \exists x(x \text{ is a guy at } t' \& x \text{ missed Kate at } g(2) \\
\& \text{Mary meets } x \text{ at } t')) \text{, defined iff } g(2) < t
\]

According to the LF in (58), the guy in question missed Kate at a time that precedes the utterance time provided by the temporal parameter \( t \). This LF cannot predict the LTM interpretation that is also available for the sentence in (57). Sentence (57) gets the LTM interpretation if it is assigned the LF in (60):
Here, we can see an occurrence of \( \text{woll}_3 \), which shifts the temporal parameter of interpretation of its complement. The EvalT of VP\(^2\) is thus a future time provided by \( \text{woll}_3 \) and \( \text{Past}_2 \) denotes a time \( g(2) \) that precedes that future time and not the utterance time.

The truth conditions predicted for (60) are given below:

\[
(61) \quad \llbracket (60) \rrbracket^{g,c,t} = 1 \text{ iff } \exists t'(t' > c(\text{time}) \& \exists x (x \text{ is a guy at } t' \& x \text{ missed Kate at } g(2) \& \text{Mary meets } x \text{ at } t')), \text{ defined iff } g(2) < t'
\]

This concludes my discussion of the common approach to the semantics of tense in RCs. It is quite elegant and makes only those predictions that are borne out. The theoretical tools I employed in this discussion will also be extended and used in my discussion of tense in complement CPs, to which I turn after a necessary overview of the semantics of propositional attitude reports.
2.3. The semantics of *de dicto*, *de re* and *de se* attitude reports

2.3.1. *De dicto* attitude reports

According to the traditional view of the semantics of attitude reports that goes back to Frege (1948), expressions inside complement CPs denote their intensions and not their extensions. The intension of a clause is the proposition it expresses (whereas its extension is a truth value). Such attitude reports are known as *de dicto* reports. In Hintikka’s (1962, 1969) semantics, *de dicto* attitude reports are statements about the possible worlds that are compatible with the attitude holder’s conception of reality. Here, I adopt Heim & Kratzer’s (1998) perspective on attitude reports (discussed in more detail in Heim & Von Fintel (2011)) and treat them as statements about possible worlds that are compatible with what the attitude holder believes in the actual world.

A sentence like (62) gets the truth conditions in (63):

\[(62)\quad \text{John believes that snow is white.}\]
\[(63)\quad \llbracket (62) \rrbracket^s(w) = 1 \text{ iff } \forall w' \text{ DOX(John)}(w): \text{snow is white in } w'\]

In (63), DOX is a function that maps an individual \(x\) and a world \(w\) to the set of worlds that are compatible with the beliefs (of how the world is) held by \(x\) in \(w\):

\[(64)\quad \text{DOX is a function from individuals to functions from worlds to sets of worlds, such that for every individual } x \text{ and for every world } w, \]
\[\text{DOX}(x)(w) = \{ w : w \text{ is compatible with what } x \text{ believes in } w \}\]
What (63) states can be paraphrased in the following way: sentence (62) is true in world \( w \) (relative to the assignment function \( g \)) if and only if every world \( w' \) that is compatible with what John believes in \( w \) is such that snow is white in \( w' \).

When an attitude report is interpreted \textit{de dicto}, a verb like \textit{believe} is understood to compose with its complement CP by Function Application, introducing universal quantification over worlds in which the beliefs of the subject are true. The attitude verb \textit{believe} thus has the following interpretation:

\[
\llbracket \text{believe}_{\text{de dicto}} \rrbracket^g = [\lambda w . \lambda P_{<s,t>} . \lambda x . \forall w' \in \text{DOX}(x)(w) : P(w') = 1]
\]

Assuming that variables over possible worlds are represented at LF (Cresswell (1990)) and are abstracted over from the left periphery of a clause, the LF of (62) is as shown in (66):

\[
(66)
\]
Predicates are thus understood to contain a world argument that is saturated at LF (for simplicity of exposition, I will represent the world arguments as indices on predicates as in (68) below). Clauses are understood to contain abstracts over worlds in their left periphery that bind the world variables of DPs and VPs that they contain. The world argument of a matrix clause is saturated by the world of context when the clause is uttered.

2.3.2. *De re* attitude reports and the mechanism of *res*-movement

As is well known, the *de dicto* approach alone is not sufficient to account for all the readings that attitude reports can have. The next interpretation that I will discuss is the *de re* interpretation famously explored in Quine (1956). Quine’s goal was to avoid problems with the so-called *double-vision* scenarios in which sentences like (67) could be viewed as true and false at the same time:

(67) Ralph thinks that Ortcutt is a spy.

These are the scenarios in which Ralph meets Ortcutt in different situations and does not realize that in those situations he met one and the same person. He thinks that he met two different people and he thinks that the first one is a spy and the second one is not. The question is whether (67) is true.
Quine’s solution to this puzzle was based on the idea that the attitude verb could be treated as denoting a function that took the individual Ortcutt and the property of being a spy as separate arguments. Cresswell & Von Stechow (1982) implemented Quine’s intuition in an analysis that treated complement CPs as denoting *structured propositions* (i.e. ordered pairs of an entity and a property). However, the standard syntactic assumptions do not allow an attitude verb that takes a CP as complement to have separate access to the components of the CP. Res-movement was a technology introduced in Heim (1994) that resolved this complication. Applied to a sentence like (67), this solution allows the embedded DP to move out of its base position and become an individual argument of the attitude verb leaving a λ-abstract binding its trace \((λI)\) as shown in (68):

(68)
In this configuration, the function denoted by \textit{think} is understood to be able to take the individual Ortcutt, map it to an individual concept (an entity of type \(<s,e>\) that corresponds to one of the identities under which Ralph is acquainted with Ortcutt), and then, in every doxastic alternative of Ralph’s, attribute the property associated with the embedded CP to the unique individual that satisfies that concept in the doxastic alternative.

The lexical entry of an attitude verb that takes a \textit{res}-argument is illustrated in (69):

(69) \[ [\textit{think}\textsubscript{de\textsubscript{re}}] = [\lambda w . \lambda x . \lambda P_{<e,st>} . \lambda y . \exists R(uz[R(y)(z)(w)] = x \land \forall w' \in \text{DOX}(y)(w): P(uz[R(y)(z)(w')])(w') = 1)] \]

In (69), \(R\) stands for an \textit{acquaintance relation} that relates an individual (the \textit{res}-argument), the attitude holder and the world. For example, in the situation of Ralph, there is an acquaintance relation that relates Ortcutt to Ralph (the attitude holder) and the actual world (and outputs truth iff Ralph knows Ortcutt in the actual world as the man in the hat). In each of Ralph’s doxastic alternatives, the individual related by \(R\) to Ralph\(^8\) and that alternative is a spy. There is also a different acquaintance relation that relates Ralph, Ortcutt and the actual world and returns truth iff Ralph knows Ortcutt in the actual world as the man on the beach. In Ralph’s doxastic alternatives, the individual related in such a way to Ralph is not a spy. Thus, the attitude report in (67) can be true if understood to introduce

\(^8\) Or, rather, the individual center of the doxastic alternative (and not the actual attitude holder). I omit this detail here for the sake of simplicity and because I did not introduce doxastic alternatives as possible worlds with individual centers.
one acquaintance relation and false if it is understood to introduce another acquaintance relation⁹.

The truth conditions predicted for (67) construed as (68) are given below:

\[
[(68)]^g(w) = 1 \text{ iff } \exists R(iz[R(Ralph)(z)](w)) = \text{Ortcutt & }
\forall w' \in \text{DOX(Ralph)(w)}: iz[R(z)(w')] \text{ is a spy in } w'
\]

2.3.3. De se attitude reports

There is, finally, a special case of de re interpretation of an attitude report known as de se interpretation. De se attitude reports arise when an attitude holder has a belief (or some other attitude) about herself. Such reports were explored extensively in the philosophical literature in the 1970’s (e.g. Perry (1979), Lewis (1979)). A person can have a propositional attitude towards herself in two ways: by ascribing such and such a property to herself and being aware that she is the object of that ascription (this is a genuine de se attitude) or by ascribing a property to herself while thinking that the object of ascription is someone else (this happens when a person does not recognize herself as the object of a particular attitude and is a genuine case of a de re attitude).

De se beliefs about oneself are common, whereas de re beliefs about oneself are rare. An example that clearly distinguishes the two kinds of beliefs is Perry’s (1979) messy

---

⁹ See Cresswell & Von Stechow (1982), Schwager (2011) for a discussion of restrictions on acquaintance relations.
shopper example, in which Perry is at a grocery store with a torn sack of sugar in his cart that is making a mess on the floor. Perry sees the mess, but he does not know who is responsible for it. He does not realize that it is his sack that is torn and that he is making a mess. He sees himself in the mirror thinking that it is someone else (not him) and forms a belief that the guy he sees is the messy shopper. In this situation, there is a sense in which Perry’s belief is about Perry (this is his *de re* belief about himself being the messy shopper). There is also a sense in which Perry does not believe that *he* is the messy shopper (the belief about himself that he is lacking in the described situation is the *de se* belief). Thus, in the described situation, Perry thinks *de re* that he is the messy shopper but he does not think that *de se*. There must be a way to express this difference in terms of truth conditions and this is what much important work in the relevant subfield is about.

Building on Quine (1969), Lewis (1979) proposes to capture the truth conditions of *de se* attitude reports by treating them as “self-ascriptions of properties” in terms of a theory of centered possible worlds.

A theory of centered worlds is a mechanism to capture the first-person perspective in the perception of a world. Each attitude alternative is viewed as an ordered pair that consists of a possible world and an individual. The individual is understood to be the individual center (the “I”) of the world.

From this perspective, a complement CP is analyzed as a predicate of individual-world pairs, i.e. a property denoting expression. A *de se* attitude report is an assertion about an individual (denoted by the matrix subject) who self-ascribes the property of being the center of a world described by the property denoting complement CP.

As an illustration, consider (71):
Perry thinks he is the messy shopper.

From the perspective of Lewis (1979), under the de re construal this sentence states that Perry self-ascribes the property of being the center of a world in which Perry (the concrete individual, who is not necessarily the center of that world) is the messy shopper. Under the de se construal, Perry self-ascribes the property of being the center of a world in which the center of that world is the messy shopper.

The upshot of this is that a clear distinction between a de re and a de se reading allows us to interpret (71) without confusion.

Percus & Sauerland (2003) (P&S) argue that de se attitude reports must have their own LF. The example that they use is provided in (72) and the situation it is evaluated against is given in (73):

(72) Only John thinks he will win the election.

(73) Situation: A group of drunken election candidates watching campaign speeches on television do not recognize themselves in the broadcast. John, the only confident one, thinks, “I’ll win”, but does not recognize himself in the broadcast. Bill and Sam, both depressive, think “I’ll lose” but are impressed by the speeches that happen to be their own and are sure “that candidate” will win. Peter, also depressive, happens to be impressed not by his own speech but by John’s.
P&S report that (72) can be true in (73) and claim that it can be true only under the *de se* construal (under the *de re* interpretation of the embedded pronoun *he*, the report is false). John is the only person who, in each of his doxastic alternatives, attributes the property of being the person who will win to the center of that alternative. He does not think *de re* of himself as the winner in the sense that he doesn’t think that the guy he sees on TV will win even though the guy is he himself. Nobody else in this scenario thinks of themselves *de se* as future winners, even though some of them, namely Bill and Sam, have a *de re* perspective on themselves as future winners. Based on this example, P&S argue that *de se* attitude report must have a special LF and propose a mechanism to build such an LF.

From P&S’s perspective, the messy shopper example in (71) gets the LF in (74):

```
(74)
  \begin{tikzpicture}
    \node (S3) at (0,0) {$S^3$};
    \node (S2) at (-1,-1) {$S^2$};
    \node (S1) at (-2,-2) {$S^1$};
    \node (VP1) at (-3,-3) {$VP^1$};
    \node (VP2) at (-2,-3) {$VP^2$};
    \node (CP) at (-3,-4) {CP};
    \node (he) at (-2,-5) {he*};
    \node (w0) at (-3,-6) {$\lambda w_0$};
    \node (w2) at (-3,-7) {$\lambda w_2$};
    \node (t1) at (-4,-8) {$t_1$};
    \node (is) at (-3,-9) {is the messy shopper-$w_2$};
    \node (thinks) at (-3,-5) {thinks_{de se-$w_0$}};
    \node (Perry) at (-2,-6) {Perry};
    \draw (S3) -- (S2) -- (S1) -- (VP1) -- (VP2) -- (CP) -- (he) -- (w0) -- (w2) -- (t1) -- (is);\end{tikzpicture}
```
Following Chierchia (1989), P&S assume that in a *de se* report the complement CP denotes a property. They introduce the element *he* as a special variant of the pronoun *he* the only contribution of which is to make the embedded CP denote a property.

As was said above, attitude alternatives are centered worlds: for every x, w, \( \text{DOX}_c(x)(w) \) is understood to be the set of centered that are compatible with what x believes in w. An attitude verb introduces quantification over *centered worlds*. Under the *de se* construal, the lexical entry of the verb *think* is as shown in (75):

\[
\text{⟦} \text{think}_{de \ se} \text{⟧}_g = \lambda w. \lambda P_{\langle e, st >}. \lambda x. \forall < y, w' > \in \text{DOX}_c(x)(w): P(y)(w') = 1
\]

In (75), “\( \forall < y, w' > \in \text{DOX}_c(x)(w) \)” is an abbreviation that stands for “for all y and w' such that \( < y, w' > \in \text{DOX}_c(x)(w) \)”. The truth conditions predicted for (71) construed as (74) are provided in (76):

\[
\text{⟦}(74)\text{⟧}_g(w) = 1 \text{ iff } \forall < y, w' > \in \text{DOX}_c(\text{Perry})(w): y \text{ is the messy shopper in } w'
\]

This statement can be paraphrased as an assertion that in every centered world \( w' \) that is compatible with what Perry believes in \( w \), the center of \( w' \) is the messy shopper in \( w' \). The described situation obtains only if Perry thinks, “I am the messy shopper”.

With these ideas laid out, I now turn to considering the interpretation of tense in intensional contexts.
2.4. Introducing time into the semantics of attitude verbs

Tense in attitude reports has been discussed in terms of the *de se* and the *de re* approaches adapted accordingly. In this subsection, I discuss these adaptations and show how they are used to capture the temporal interpretations of attitude reports.

2.4.1. Temporal *de se*

It has been observed in the literature on tense that a purely deictic approach to the semantics of tense in complement CPs can lead to unacceptable predictions (e.g. Abusch (1994), Heim (1994), Von Stechow (1995b), Ogihara (1996)). Consider (77):

(77)  At five o’clock, John thought that it was seven o’clock.

This example can describe a usual situation in which someone wakes up wrongly believing that they overslept. According to a popular view, if the time denoted by the embedded tense is the same as the time denoted by matrix tense, then sentence (77) would ascribe John an inconsistent belief, namely, that five o’clock is seven o’clock. However, since John is like most of us, we want (77) to report an attitude he had at five o’clock without ascribing him the belief that 5 is 7.

Such considerations have lead theorists to treating the attitude holder’s belief in reports like (77) as not being about any actual time at all. It has been proposed that John is rather ascribing a temporal property to his subjective “now”, which is independent of any
actual time. When John wakes up at five, thinking that it is seven, he merely locates himself in a situation where it is already seven o’clock. In other words, it is seven at his subjective “now”, whereas in the actual situation of his thinking about time it is still five. Thus, the temporal attitude report in (77) does not ascribe inconsistent thoughts to John, if the embedded clause describes John’s subjective “now”.

An extension of the de se treatment of attitude reports to tense provides a working mechanism to (77). John is viewed as self-ascribing the property of being at a world and time where it is seven. The complement CP denotes a property of times. Zero tense (bound by a $\lambda$-abstract over tense in the left periphery of a clause) is viewed as a suitable temporal analogue of *he* discussed above. The LF predicted for (77) is given in (78):

(78)
In (78), zero tense is bound by the local temporal anchor licensed by the attitude verb. Because of this anchor, the complement CP is interpreted as a property of times (in a more accurate but more complicated exposition, it would be a predicate of individual-world-time triples). The Lewisian approach to *de se* temporal attitude reports described above can be applied here straightforwardly. The attitude verb is defined as in (79) and the truth conditions predicted for (77) are provided in (80).

\[(79)\quad \llbracket \text{think}_{de\, se} \rrbracket = [\lambda w. \lambda P_{<i, st>} . \lambda x. \lambda t. \forall < w', t' > \in \text{DOX}_t(x)(w)(t): P(t')(w') = 1] \]

\[(80)\quad \llbracket (79) \rrbracket^{g,t,c}(w) = 1 \text{ iff } g(1) = 5 \text{ o’clock and } \forall < w', t' > \in \text{DOX}_t(John)(g(1))(w): \text{it is seven o’clock at } t' \text{ in } w', \text{ defined iff } g(1) < t \]

For the lexical entry in (79), I assume that DOX\_t is similar to DOX\_c used in (75), but takes a time argument and outputs a set of worlds with temporal and not individual centers. The temporal center of a world is the local “now” of that world. The world-time pairs in this set are compatible with what the individual believes about the world and the time of the attitude. I define DOX\_t in the following way:

\[(81)\quad \text{DOX}_t \text{ is a function from individuals, worlds and times to sets of world-time pairs, such that for every individual } x, \text{ world } w, \text{ and time } t, \]
DOX_i(x)(w)(t) = \{<w', t'>: \text{it is consistent with } x \text{'s beliefs in } w \text{ at } t \text{ that } x \text{ occupies } w' \text{ at } t'\}

The presence of zero tense in (78) also explains why the embedded tense surfaces with the past tense morphology. Since the matrix tense is past, Feature Transmission applies and the temporal morphology from the matrix tense is transmitted onto the embedded zero tense.

Finally, since attitude holders (almost) never know the exact time, all attitude reports can be viewed as ascribing a property to the attitude holder’s “now” and not any particular time. For this reason, it was proposed in the literature that a tense inside a complement CP at LF always be analyzed in terms of the temporal de se approach, i.e. as locally bound zero tense.

2.4.2. Temporal de re and double-access

Of course, the simultaneous interpretation is not the only one that is possible for an embedded CP. As we saw Past-under-Past attitude reports like the one in (35), repeated in (82), can have a back-shifted interpretation.

(82) Mary thought that John missed Kate.

Under the back-shifted interpretation, Mary is past-oriented towards the state of missing Kate that she ascribes to John. In other words, in Mary’s doxastic alternatives that state
occurs at a time that precedes her subjective “now”. This reading of (82) cannot be predicted in terms of the temporal *de se* interpretation of the embedded Past.

Similarly, the Present-under-Past report from (37), repeated in (83), which yields only the double-access interpretation cannot be accounted for in terms of the *de se* analysis.

(83) Mary thought that John misses Kate.

Double-access requires that the embedded Present in (83) overlap the utterance time. This suggests that this tense is interpreted in the actual world and cannot be identified with the attitude holder’s “now”.

In order to predict these readings, the literature invokes the notion of *de re* attitude reports and adapts it to tense. The temporal *de re* approach is thus an extension of the *de re* interpretation of attitude reports is proposed by Abusch (1994), building on Quine (1956) and Cresswell & Von Stechow (1982). Under this approach, it is assumed that the embedded tense is the *res*-argument of the attitude verb and is mapped to a temporal concept that the attitude holder uses to represent that time in her attitude alternatives. The time denoted by the temporal *res*-argument is a time that the attitude holder is acquainted with as the bearer of some property. The time that she perceives in her attitude alternatives is the bearer of the same property in those alternatives. There are different mechanisms that can be used to carry out the mapping, but the bottom line is that, under the temporal *de re* approach, an embedded tense that is not interpreted *de se* must be mapped to a temporal concept that the attitude holder will perceive in her attitude alternatives.
In Heim (1994), an embedded *de re* tense is understood to undergo *res*-movement from the complement CP to the extensional position of the main verb’s *res* argument. The LFs predicted for the sentences in (82) and (83) are schematically presented in (84):

In (84), the embedded tense (be it Past or Present) moves out to an extensional position in two steps. First, it undergoes QR to the left periphery of the embedded CP. From that position, it moves to an argument position of the matrix verb *via res*-movement, i.e. without leaving a trace. In that position, the *res*-moved tense is interpreted as if it were a matrix tense. The time denoted by the *res*-moved tense is mapped to a temporal concept perceived by the attitude holder. The temporal property denoted by the complement CP is understood to be ascribed to that temporal concept in each of the attitude holder’s doxastic alternatives. In the case of (82), it is a temporal concept to which the attitude holder is past-
oriented and to which she ascribes the property of being the time at which John missed
Kate. In the case of (83), the present tense overlaps the UT and is mapped to a temporal
concept that the attitude holder perceives as contemporaneous with her subjective “now”
and to which she ascribes the property of being the time at which John misses Kate.

As presented so far, the *de re* analysis of tense, despite its similarity with the *de re*
analysis of DPs discussed above, is not sufficient. As is, it overgenerates significantly. To
begin with, it does not predict the lack of a forward-shifted interpretation in these
sentences. In neither of them, the attitude holder can be future-oriented. Given what has
been said so far, nothing disallows a forward-shifted reading in either (82) or (83).

One influential theory that accounts for the lack of the forward shifted interpretation
in these two sentences is presented in Abusch (1994), who introduces a constraint called
epistemic alternative is an upper limit for the reference of tenses. [...] the local evaluation
time is an upper limit for the reference of tenses” (see Heim (1994) for a discussion).

It might not be immediately clear how the ULC works. Taken at face value, the
ULC states that the denotation of an embedded tense cannot be later than the attitude
holder’s “now” or the local evaluation time. However, in a *de re* attitude report, the attitude
holder does not perceive the time denoted by the temporal *res* argument. The attitude holder
perceives the temporal concept that the temporal *res* argument is mapped to. It is the
temporal concept that precedes or overlaps the attitude holder’s “now” in a doxastic
alternative, not the reference of a *de re* tense. So, one way to interpret the ULC is to disallow
the temporal concept in a temporal *de re* attitude report to be in the future of the utterance
time. However, the ULC would then be about the concept and not the reference of an embedded *de re* tense.

Another way to interpret the ULC is in terms of the local evaluation time. However, it is also not immediately clear what time is the local evaluation time for an embedded *de re* tense. We saw that a *res*-moved tense is interpreted w.r.t. the UT, which is not the local evaluation time. One way to think about the local evaluation time is to treat it as the time of the attitude. However, in Abusch’s system the attitude time never serves as anchor for any tense. Moreover, it is still not clear why the relation between the temporal *res* and the attitude time should have an immediate affect on the possible temporal orientations of the attitude holder towards the temporal concept she perceives.

I believe that the best way to interpret the ULC is to treat it as a restriction that consists of two parts, as suggested in (85):

(85) The Upper Limit Constraint

a. a *de re* tense cannot denote a time that follows the attitude time;

b. the temporal concept that a *de re* tense is mapped to cannot follow the attitude holder’s “now”

In (83), the ULC does not allow the embedded *de re* Present to denote a time that follows the time of thinking provided by the matrix Past tense and John, the attitude holder, to perceive a temporal concept that follows his subjective “now”.

One may ask how this could be possible. How could a time denoted by Present not be in the future of the attitude time, which is provided by Past. According to its lexical
entry in (42), Present must denote $c(\text{time})$, i.e. a time that necessarily overlaps the utterance time. A matrix Past, on the other hand, is presupposed to precede the utterance time: according to (43), it denotes a time that precedes its EvalT and in an extensional context, EvalT is identical to the utterance time.

Abusch’s answer to this is that Present denotes $c(\text{time})$ and not the UT directly. $c(\text{time})$ can be viewed as overlapping the utterance time and the time of thinking. In order to do that, it must be able to extend enough into the past to overlap the time provided by the matrix tense. This allows the embedded present tense in (83), repeated in (86), not to violate (85a)

(86) Mary thought that John misses Kate.

The ULC is used to rule out the forward-shifted interpretation of (86) and I will shortly show how, but before I do that I would like to discuss another interpretation of (86) that needs to be ruled out.

Imagine a situation in which Mary was past-oriented towards the time of missing (i.e. it was in the past with respect to Mary’s subjective “now”). So, Mary did not necessarily think that John was missing Kate at the time when she was thinking. However, imagine that the speaker, just like in the case of the double-access interpretation, believes that Mary’s thought extends up until and including the utterance time. In other words, the speaker’s present-oriented temporal perspective towards the temporal $res$ overrides the past-oriented perspective of the attitude holder.
Sentence (86) cannot be true in such a situation. However, nothing seems to rule out this situation as a potential truth maker of (86). The ULC only will rule out the forward-shifted interpretation in a Present-under-Past report like (86), but the described situation does not contain the forward-shifted interpretation: the attitude holder is not future-oriented and the temporal res does not follow the attitude time.

What this shows is that there must be another restriction on the temporal concepts that an embedded tense can be mapped to. In the case of (86), a temporal concept that would make the attitude holder past-oriented (i.e. the temporal concept that precedes the attitude holder’s “now” in her attitude alternatives) will not do. The time denoted by the embedded Present in (86) can thus be mapped only to those concepts that are perceived by the attitude holder as overlapping her subjective “now”.

In order to capture these restrictions and rule out non-existent readings of attitude reports, Abusch (1994) proposes another constraint known as Intensional Isomorphism, according to which the relation between the time denoted by the embedded tense and the time denoted by the matrix tense (in a sentence like (86)) must be the same as the relation between the temporal concept which the time of the embedded tense is mapped to (by a relevant de re mechanism) and the attitude holder’s “now”. In other words, if the time denoted by the embedded tense overlaps the time denoted by the matrix tense, then the temporal concept must overlap the attitude holder’s “now” (i.e. the attitude holder must be present-oriented towards the concept)\(^\text{10}\).

\(^{10}\)Abusch (1994: 123-124; 1997: 43-44) writes, “The idea that the counterpart relation invoked by de re construal eliminates some of the […] combinations, by requiring that the actual and the belief worlds be
In the case of (86), the ULC and Intensional Isomorphism cooperate to produce the correct interpretation. The time denoted by the embedded (and res-moved) Present must overlap c(time), but (by the ULC) it must not be a time in the future of the time denoted by the matrix Past. As was said above, the only way to satisfy the ULC here is to allow the time denoted by the matrix Present to stretch enough into the past and overlap the time denoted by the matrix Past. Since the time of the embedded tense overlaps the time of the matrix tense, Intensional Isomorphism requires that the temporal concept overlap the attitude holder’s “now”. This rules out the forward-shifted interpretation as well as the back-shifted one, making double-access the only interpretation predicted for (86).

If we encode the ULC and Intensional Isomorphism as presuppositions into the semantics of attitude verbs, the interpretation of the attitude verb like think that allows for a de re treatment of tense will be as shown in (87):

\[
\begin{align*}
\text{(87)} & \quad \text{\{think\}temporal \text{de re}}] = [\lambda w . \lambda t'' . \lambda P_{<l, st>} . \lambda x . \lambda t . \\
& \quad \exists R_{<e, i, <l, st>>}(\{\mu z. R(x)(t)(z)(w)\}) = t'' \& \\
& \quad \forall <w', t'> \in \text{DOX}_t(x)(t)(w): P(\{\mu z. R(x)(t)(w')\})(w') = 1 \},
\end{align*}
\]

defined iff

(i) If \( R \) is an acquaintance relation, then \( \forall x, \forall w, \forall t, \forall t'' : \)

\[
\text{temporally isomorphic. The believing time } t_1 \text{ is a counterpart of the believer’s now } t_2, \text{ and PRS}_3 \text{ [i.e. the time denoted by the de re tense – P.K.] is a counterpart of TNS}_3 \text{ [i.e. the temporal concept in each alternative – P.K.]. With a reasonable acquaintance relation, when PRS}_3 \text{ overlaps the believing time } t_1 \text{ in the actual world, its counterpart TNS}_3 \text{ should overlap the believer’s now } t_2 \text{ in a belief world. When PRS}_3 \text{ precedes the believing time } t_1 \text{ in the actual world, its counterpart TNS}_3 \text{ should precede the believer’s now } t_2 \text{ in the belief world.”}
\]
if $t'' = [\mu z. R(x)(t)(z)(w) = 1]$ and $t''$ precedes / overlaps / follows $t$,
then $\forall < w', t' > \in \text{DOX}_t(x)(w)(t), [\mu z. R(x)(t)(z)(w') = 1]$ precedes / overlaps / follows $t'$, respectively;

(ii) it is not the case that $t'' > t'$

Just like the lexical entry in (69), the lexical entry of the temporal de re version of think introduces an acquaintance relation. But this time it is a relation between an individual at a given world and time and a particular time (the temporal res). The individual (attitude holder) at a given world and time is acquainted with the temporal res (i.e. related to the res by an acquaintance relation). In each attitude alternative, a particular time is related to the alternative, the “now” of the alternative and the attitude holder by the same relation. Doxastic alternatives are understood as world-time pairs generated by DOX$_t$ defined in (81) above. A certain property is ascribed to the time that is the bearer of the relevant temporal concept in the doxastic alternative.

Presupposition (i) in (87) is the requirement of Intensional Isomorphism. It states that the relation of ordering between the res-argument and the matrix tense on an abstract time line is reflected by the relation between the temporal concept and the attitude holder’s “now”\textsuperscript{11}. Presupposition (ii) is responsible for the ULC.

\textsuperscript{11}Ogihara (1989, 1995a) proposes a restriction that he calls the temporal directionality isomorphism, according to which the attitude holder’s perspective towards the temporal concept must be the same as the relation between c(time) and the time denoted by the de re tense. This is different from what Abusch proposes because she proposes to relate the time of a de re tense with the time of the matrix tense, not c(time). As far as double-access sentences are concerned, the proposals yield equivalent results. However, Ogihara’s
Notice that now because of Intensional Isomorphism the two-partite definition of the ULC in (85) receives a more intuitive explanation: a constraint according to which the time denoted by the de re tense cannot follow the time denoted by the matrix tense automatically entails that the temporal concept entertained by the attitude holder cannot be in the future of her subjective “now”. For this reason, stating that the temporal res cannot follow the time of the attitude means automatically requiring that the temporal concept perceived by the attitude holder cannot follow her subjective “now”.

The truth conditions predicted for (86), repeated in (88), are given in (89):

\[
(88) \quad \text{Mary thought that John misses Kate.}
\]

\[
(89) \quad \llbracket (89) \rrbracket^{g.t.e} (w) = 1 \text{ iff } \exists R (R \text{ is an acquaintance relation } \& \text{ c(time)=}\llbracket z(R(Mary)(g(1))(z)(w)) \rrbracket \& \forall <w',t'> \in \text{DOX}_{t}(Mary)(w)(g(I)):
\]

restriction also predicts that a de re Past-under-Past would only yield a back-shifted interpretation (because the time denoted by a de re Past necessarily precedes c(time), requiring the temporal concept to necessarily precede the attitude holder’s “now”). This prediction seems to be incorrect for English. A de re Past-under-Past can have a simultaneous interpretation. Consider the following example: *Yesterday, Bill said Mary was nauseous at the party two days ago. And so did John*. The back-shifted interpretation of the embedded Past in the first sentence suggest its de re analysis under the standard account (Heim (1994: 154)). VP-ellipsis requires that the embedded tense in the second sentence also be interpreted de re. However, this discourse can truly describe a situation in which John was at the party, saw Mary and said something like “Mary is nauseous”, i.e. was present-oriented w.r.t. to her nausea. Ogihara & Sharvit (2012) acknowledge that the temporal directionality based approach (copy-based approach in their terminology) might not be suitable for English.
John misses Kate in \( w' \) at \([tz(R(Mary)(t')(z)(w'))] \):

defined iff 

(i) If \( R \) is an acquaintance relation, then \( \forall x, \forall w, \forall t, \forall t'' \):

if \( t''=[iz.R(x)(t)(z)(w) = 1] \) and \( t'' \) precedes/overlaps/follows \( t \),

then \( \forall < w', t' > \in \text{DOX}_t \ (x)(w)(t), \ [iz.R(x)(t)(z)(w') = 1] \)

precedes /overlaps / follows \( t' \), respectively;

(ii) it is not the case that \( c(\text{time}) > g(1) \)

(iii) \( g(1) < t \)

In (89), \( g(1) \) precedes \( t \) (i.e. the utterance time) and \( c(\text{time}) \) overlaps both \( g(1) \) and \( t \). Only in that case will the ULC not be violated technically because despite the fact that the present tense denotes \( c(\text{time}) \) and \( c(\text{time}) \) includes \( t \), which is in the future of the time of the attitude, i.e. \( g(1) \), \( c(\text{time}) \) as a whole is not in the future of \( g(1) \) because it overlaps it too.

Now let us look at the predictions that the system makes for a Past-under-Past attitude report like (82), repeated below as (90), which can have either the simultaneous interpretation or the back-shifted one.

(90) Mary thought that John missed Kate.

We already saw that the simultaneous interpretation can be derived with the help of zero tense in a temporal \textit{de se} configuration. And we also said that the popular approach
requires that all embedded and locally bound tenses be interpreted \textit{de se}. This means that the back-shifted interpretation in a Past-under-Past attitude report like (90) cannot be derived in terms of the temporal \textit{de se} approach. If so, then the only way to derive the back-shifted interpretation for (90) is via a temporal \textit{de re} analysis (see Heim (1994: 154)).

The LF of (90) under the back-shifted interpretation is schematized in (84) and I will not repeat it here. The embedded Past (anchored to the matrix EvalT (= the UT) just like the matrix Past) denotes a time that precedes the time denoted by the matrix Past. The ULC does not apply in such a configuration, but Intensional Isomorphism does. Since the time denoted by the embedded Past precedes the time denoted by the matrix Past (i.e. the time of thinking), the corresponding temporal concept must precede the attitude holder’s “now”. I will not provide the truth conditions predicted for (90) under the back-shifted interpretation here hoping that in light of what has been said their generation should not be problematic.

The final comment here is that the ULC and Intensional Isomorphism are both necessary. As we saw, without the ULC, the double-access sentence in (86) would wrongly predict the possibility of a forward-shifted interpretation. Intensional Isomorphism alone would not rule out that possibility. Without Intensional Isomorphism, (86) would be able to truly describe a situation in which the attitude holder is past-oriented towards the relevant temporal concept. The ULC alone would not be able to rule out that possibility.

The system described above also allows a \textit{de re} Past-under-Past to yield the simultaneous interpretation. This happens when the embedded \textit{de re} Past and the matrix Past are understood to be co-referential (denoting the same time or overlapping times). In
that case, Intensional Isomorphism requires that the attitude holder be present-oriented towards the relevant temporal concept, which leads to the simultaneous interpretation of the whole attitude report.

This possibility, however, does not mean that the zero tense approach is redundant. Recall that the zero tense approach also generated the simultaneous interpretation of a Past-under-Past attitude report. When embedded zero tense surfaces with the past tense morphology, that morphology is understood to be transmitted from the matrix c-commanding Past and is vacuous from a semantic perspective. The Past tense that is underlingly zero tense does not back-shift from its anchor.

An independent need for the zero tense approach was already discussed in relation to the simultaneous readings of Present-under-Future in relative clauses. In attitude reports, it is needed in the Breakfast example from (41). Such examples are naturally captured by the temporal de se approach. The embedded Past is treated as zero tense.

2.4.3. Present and Past under Future

The system presented here successfully captures other interpretations that Present and Past can have under a matrix Future. Consider the case of Present-under-Future first:

(91) Mary will think that John misses Kate.
Besides the simultaneous interpretation, the present tense in (91) can also allow for the indexical interpretation. (The reformulation that makes this interpretation more salient contains *now* in the embedded clause: *Mary will think that John misses Kate now*)\(^{12}\).

Intensional Isomorphism relates c(time) to the time at which the matrix eventuality occurs (i.e. the time provided by “woll”)\(^{13}\) and requires that that the corresponding temporal context that Mary perceives in her doxastic alternatives be related to her subjective “now” in the same way. In other words, Intensional Isomorphism requires that Mary be past-oriented and contemplate a thought similar to this: “John missed Kate then”.

The simultaneous interpretation of (91) is generated in terms of the zero tense approach. A situation in which (91) (under the described reading) is true is given in (92):

\[(92) \quad \text{Situation: John and Kate are together and neither of them misses the other now. Mary knows that they are happy together. Mary and John are going on a business trip soon. During the business trip there will be a time at which Mary will look at John and think: “He misses Kate”.}\]

The LF predicted for this interpretation is suggested in (93). The truth conditions for this sentence are given in (94):

\(^{12}\) The availability of this interpretation is reported by Ogihara & Sharvit (2012) (see also Gennari (1999)).

\(^{13}\) In earlier cases, the time of the matrix eventuality was the same as the time provided by the matrix tense; here, the matrix tense is Present, but the time of thinking is in the future because of the contribution of *woll*.\(^{1}\).
The Past-under-Future version, provided in (95) below, allows for the LTM interpretation.

(95) Mary will think that John missed Kate.

Under this interpretation, John (in Mary’s thoughts in the future) missed Mary at a time that is in the past with respect to Mary’s subjective “now”, but this past time is still perceived by the speaker as a future time.
The LF for the LTM interpretation of (95) can be generated via the relative *de re* analysis of the embedded Past. The predicted LF is as follows:

(96)

Here, *woll*_3 shifts the temporal parameter of interpretation on *VP*³ and the denotation of Past, *g*(2), is computed with respect to that shifted temporal parameter. The time denoted by the Past tense thus precedes a future time and can still remain in the future of the UT. According to the *de re* interpretation, the time denoted by the past tense is mapped to a temporal concept that the attitude holder perceives and that precedes her subjective “now” (by Intensional Isomorphism because the time denoted by the res-argument precedes the time introduced by *woll*_3 that saturates the temporal argument of the main verb.)
The truth conditions predicted for (95) with the LF in (96) are given in (97):

\[(97) \quad \llbracket (96) \rrbracket^{g.t.c}(w) = 1 \text{ iff } \exists t''(t'' > c(\text{time}) \& \exists R \text{ is an acquaintance relation } \& \]

\[g(2) = [\iota z(R(Mary)(t'')(w)) \& \forall < w', t'> \in \text{DOX}_i(Mary)(w)(t''):
\]

John missed Kate in \( w' \) at \([\iota z(R(Mary)(t')(w'))]\), defined iff

(i) If \( R \) is an acquaintance relation, then \( \forall x, \forall w, \forall t, \forall t'' : \)

if \( t'' = [\iota z.R(x)(t)(z)(w) = 1] \) and \( t'' \) precedes/overlaps/follows \( t \), then \( \forall < w', t'> \in \text{DOX}_i(x)(w)(t) : [\iota z.R(x)(t)(z)(w') = 1] \)

precedes /overlaps / follows \( t' \), respectively;

(ii) it is not the case that \( g(1) > t'' \)

(iii) \( g(2) < t'' \)
CHAPTER 3
PRELIMINARIES II: CONCEPT GENERATORS FOR THE TEMPORAL DOMAIN

In this chapter, I discuss some well-known conceptual issues with res-movement as a mechanism for generating de re interpretation of attitude reports. I adapt Percus & Sauerland’s (2003) theory of concept generators for the purposes of temporal de re and discuss the correct predictions that it makes.

3.1. Res-movement and its problems

As successful as the res-movement analysis is in its predictions for double-access reports, it was known to be theoretically problematic already at the time of its introduction and, to my knowledge, was considered by Heim to be something like a temporary tool to deal with the problem of the structured proposition approach described above. Res-movement is nothing like any other known kind of movement. Recall our example of a double-access report and its predicted LF, repeated below.

(1) Mary thought that John misses Kate.
The movement of Pres in (2) can be viewed as proceeding in two steps: first, the embedded Present undergoes local QR from its base position creating a $\lambda$-abstract that binds its trace in the base position; after that, Pres moves into the argument position of thought. This position is not a c-commanding position; moreover, in this second hop Pres does not leave any trace behind. No other known kind of movement does anything like that\textsuperscript{14}.

For de re attitude reports about entities, it has been shown that the res-movement analysis is empirically inadequate. Charlow & Sharvit (2014) provide convincing

\textsuperscript{14} But see Deal (2018) for an argument based on data from Nez Perce according to which the Universal Grammar might still allow for such an unusual movement.
arguments that *res*-movement must be substituted by an analysis in terms of concept generators in the spirit of Percus & Sauerland (2003) (P&S).

The idea of adapting a concept generator-based analysis to *de re* tenses has been discussed in the literature, but, to my knowledge, has been criticized, rather than defended\(^\text{15}\). Most researchers who deal with the temporal *de re* adopt some kind of movement approach.

### 3.2. Concept generators for the temporal domain

#### 3.2.1. Percus & Sauerland (2003): concept generators over entities

Percus & Sauerland (2003) introduce concept generators (CGs) as devices that map individuals (or objects) to individual concepts. CGs are thus functions of type \(< e, < se > >\). An individual concept can be thought of as an identifying property of an object. In a given world \(w\), different individual concepts can uniquely identify one and the same object \(o\) (these concepts just map \(w\) to \(o\)). For example, in the actual world the individual Barack

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\(^{15}\) Bar-Lev (2015) explores a theory of temporal concept generators built on the ULC-based approach to *de re* tenses. However, that version of the ULC-based approach does not include Abusch’s Intensional Isomorphism. For this reason, it yields incorrect predictions that Bar-Lev (2015) identifies and discusses. The analysis proposed by Bar-Lev is movement-based and does not appeal to Intensional Isomorphism either. My proposal here is built on my discussion of temporal *de re* in the previous chapter and incorporates the constraint of Intensional Isomorphism.
Obama is the output of individual concepts like \( [\lambda w . \text{the 44th president of the United States in } w] \), \( [\lambda w . \text{the husband of Michelle Obama in } w] \) and many others. In different worlds, one and the same individual concept \( c \) can pick out different individuals (that possess the identifying property associated with \( c \)). For example, in the actual world the concept \( [\lambda w . \text{the 44th president of the United States in } w] \) picks out Obama, but in another possible world it picks out John McCain (in light of a different outcome of the 2008 elections).

Different people can use different individual concepts to identify one and the same individual. Moreover, in different worlds one and the same person can associate one and the same object with different individual concepts: in the actual world, I use the individual concept \( [\lambda w . \text{the husband of my neighbor Sally in } w] \) to pick out her actual husband, in a different world (that is similar to the actual world but not fully identical to it), the same concept could pick out some other guy for me. Since the output of a CG depends on an individual in a world, CGs are relativized to an individual and a world. For me in the actual world, there is a CG that maps Sally’s actual husband to the individual concept \( [\lambda w . \text{the husband of Sally in } w] \), but in a world where Sally married some other guy, but I still happen to know her actual husband, there would not be a CG that would map him to the individual concept \( [\lambda w . \text{the husband of Sally in } w] \) for me, but there would be a CG that would map him to some different concept (a concept to which this guy might not be mapped in the actual world).

Using such intuitions, P&S define a concept generator and an acquaintance-based concept generator (p. 237). I reproduce their definitions here:
(3) $G$ is a concept generator for an individual $x$ in $w$ iff
   a. $G$ is a function from individuals to individual concepts ($<e,<s,e>$)
   b. $\text{Dom}(G) = \{z : x \text{ is acquainted with } z \text{ in } w\}^{16}$

(4) $G$ is an acquaintance-based concept generator for an individual $x$ in $w$ iff
   a. $G$ is a concept generator for an individual $x$ in $w$
   b. the concepts $G$ yields are “acquaintance-based” in the sense that for all $z$ in $\text{Dom}(G)$, there is an acquaintance relation $R$ such that $x$ bears $R$ uniquely to $z$ in $w$, and for all $<y,w'>$ in $\text{DOX}_{x,w}$, $y$ bears relation $R$ uniquely to $G(z)(w')$ in $w'^{17}$.

A CG is introduced by an attitude verb and is always understood to be a CG for the attitude holder in the world and time of evaluation of the attitude verb. The CP that is taken as argument by the attitude verb contains a CG-variable and a $\lambda$-abstract over that variable in its left periphery. The CG-variable accompanies the DP that receives the $de$ $re$ interpretation. The CP thus denotes a function with an unsaturated argument slot for CG.

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16 There is another condition of crucial importance that P&S do not mention in their definition. This condition has to do with the requirement that if $G$ is a concept generator for $x$ in $w$, then for all $z \in \text{Domain}(G)$: $G(z)(w) = z$. Because of this requirement, any concept generator for $x$ in the actual world maps an object $z$ to a concept that returns $z$ in actual world.

17 In other words, if John is in the domain of $G$ for Bill in $w$, then Bill is acquainted with John in $w$ and for every doxastic alternative of Bill’s, call it $w'$, with a center $y$, $G(John)(w')$ is the individual that $y$ in related to by the same relation $R$ in $w'$ as John is related to Bill in $w$. 
The CG introduced by the verb saturates that slot. The result is a de re treatment without res-movement. I illustrate this with Quine’s original example repeated in (5), for which the predicted LF is given in (6):

(5) Ralph thinks that Ortcutt is a spy.

(6) 

\[
\begin{array}{c}
S^3 \\
\lambda w_0 \\
S^2 \\
\hline \text{Ralph} \\
\hline \text{thinks}-w_0 \\
\hline \text{CP}^3 \\
\lambda G_{(e,se)} \\
\hline \text{CP}^2 \\
\lambda w_1 \\
\hline \text{CP}^1 \\
\hline \text{that} \\
\hline \text{S}^1 \\
\hline G \\
\hline \text{Ortcutt} \\
\hline \text{is a spy}-w_1
\end{array}
\]

The attitude verb here is understood to be able to take an argument of type \( << e,se >>, < s, t >> \) and the embedded subject Ortcutt is accompanied by a CG variable abstracted over from the left periphery of the embedded CP. The lexical entry that is assumed here for think is given in (7):

(7) \([\text{think}] = [\lambda P_{<<e,se>,<st>>} \cdot \lambda x \cdot \lambda w \cdot \exists G \ (G \ is \ an \ acquaintance-based \ CG \ for)\]

93
The truth conditions predicted for (5) construed as (6) are given in (8):

\[(8) \left[ (6) \right] = 1 \text{ iff There is a } G, \text{ s.t. } G \text{ is an acquaintance-based CG for Ralph in } w \text{ and } \forall w' \in \text{Dox}(Ralph,w): G(\text{Ortcutt})(w') \text{ is a spy in } w'.\]

This illustrates how the embedded subject Ortcutt in (5) gets a \textit{de re} interpretation \textit{in situ} under P&S's CG-based approach.

3.2.2. Introducing temporal concept generators

A CG-based \textit{de re} analysis for tense works essentially in the same way: a CG variable accompanies the embedded tense and is abstracted over from the left periphery of an embedded CP. The CG supplied by the attitude verb maps the time denoted by the embedded tense to a corresponding temporal concept that the attitude holder is understood to perceive. However, there is one important aspect in which the \textit{de re} approach to tense is different: temporal \textit{de re} readings are more restricted. Abusch’s ULC and Intensional Isomorphism discussed in the previous chapter apply and rule out many readings that would otherwise be available.

I propose to encode Intensional Isomorphism into the notion of a temporal CG. Recall that according to Intensional Isomorphism the order of the times denoted by the matrix and the \textit{de re} tenses must be mirrored by the order of the attitude holder’s “now”
and the temporal concept to which the time of the *de re* tense is mapped. To capture this, I define a metalinguistic function ORDER in (9):

\[(9) \quad \text{ORDER is a function of type } <i, <i, <i, <i, t >>>>, \text{ i.e. (a schonfinkelized version of a function) from quadruples of times to truth values. For any } t_1, t_2, t_3, t_4 \in D_i, \quad \text{ORDER}(t_1)(t_2)(t_3)(t_4) = 1 \text{ iff } t_1 \text{ is ordered w.r.t. } t_3 \text{ in the same way as } t_2 \text{ is ordered w.r.t. } t_4.\]

In (9), being ordered in the same way for time \(a\) and \(c\), on the one hand, and \(b\) and \(d\), on the other, means that if \(a\) precedes/is simultaneous with/follows \(c\), then \(b\) precedes/is simultaneous with/follows \(d\), respectively.

Temporal concepts that are generated by temporal CGs must obey ORDER. This is why I define a temporal CG as shown in (10):

\[(10) \quad G \text{ is a temporal CG for } x \text{ in } w \text{ at } t \text{ iff}
\begin{align*}
\text{a. } & G \in D_{<i, <i, <i, i>>}; \\
\text{b. } & \text{Domain}(G) = \{t''': x \text{ is acquainted with } t''' \text{ at } t \text{ in } w\}; \\
\text{c. } & \text{the concepts that } G \text{ outputs are such that for any } t'' \in \text{Dom}(G), \text{ every } w', t' \in \text{Dox}_i(x, t, w) \text{ is such that } \text{ORDER}(t')(t)(G(t'')(t')(w'))(t'') \\
\text{d. } & \text{for any } t'' \in \text{Dom}(G), G(t'')(t)(w) = t''
\end{align*}
\]

The definitions in (9) and (10) suggest that a temporal CG must have access to three elements: the time denoted by the embedded *de re* tense, the time denoted by the matrix
tense, and the attitude holder’s “now”. The temporal concept it outputs is ordered with respect to the attitude holder’s “now” in the same way as the time denoted by the de re tense is ordered with respect to the time denoted by the matrix tense.

3.2.3. The ULC as a restriction on temporal concept generators

What about the ULC? Nothing I have said so far accounts for it. Nothing restricts the time denoted by the embedded tense and the temporal concept that a temporal concept generator generates will be in the future of the attitude holder’s “now”, if the time of the de re tense is later than the time of the matrix tense. In order to account for the ULC, there must be a way to rule out cases when the de re tense denotes a time that is later than the time of the matrix eventuality. This subsection provides a discussion of some issues that arise in relation to the ULC within a system that appeals to temporal concept generators.

Under the res-movement approach, the embedded tense becomes an argument of the attitude verb and since the matrix tense is also one of its arguments, it is possible to introduce a restriction according to which the time of a de re tense may not follow the time of the matrix tense (see presupposition (ii) in (87) in the previous chapter). However, in a theory that appeals to concept generators no particular function takes both the matrix and the embedded tense as its arguments. The attitude verb that takes the matrix tense as argument does not apply to the embedded tense any more. Its interaction with the

18 In recent literature, the ULC has been criticized by several authors. I discuss some of those criticisms in Chapter 9.
embedded tense is indirect and established via a concept generator it introduces. The concept generator introduced by the verb applies to the embedded tense but the matrix tense remains out of its reach. It is thus not immediately clear how to encode the ULC into the semantics of an attitude verb or any other familiar operator that a *de re* attitude report can contain.

3.2.3.1. **Encoding the ULC in the definition of a temporal CG**

One option would be to encode the ULC into the definition of a temporal concept generator as a restriction on its domain: the domain of a temporal concept generator $G$ for $x$ in $w$ at $t$ would be the set of times that $x$ is acquainted with in $w$ at $t$ such that each time in this set is not later than $t$. This option makes the ULC part of the notion of a temporal concept generator. Temporal concept generators would then get a revised version of the definition from (10):

(11) $G$ is a temporal CG for $x$ in $w$ at $t$ iff

a. $G \in D_{<t, <l, <s, l>>};$

b. Domain($G$)={$t'''$ : $x$ is acquainted with $t'''$ at $t$ in $w$ & it is not the case that $t'''$ is later than $t$};

c. the concepts that $G$ outputs are such that for any $t'' \in \text{Dom}(G)$, every $w', t' \in \text{Dox}_t(x, t, w)$ is such that ORDER($t'$)($t$)($G(t'')(t')(w')(w''))($t''$)

d. for any $t'' \in \text{Dom}(G)$, $G(t'')(t)(w) = t''$
In (11), the underlined part stands for the ULC. Abusch’s Intentional Isomorphism captured here by the metalinguistic function ORDER makes sure that the order between the time of the matrix event and temporal res is reflected in the order of the attitude holder’s “now” and the temporal concept perceived by the attitude holder. So restricting the domain of G to times that the attitude holder is acquainted with and that are not in the future of the time of the attitude automatically disallows the concept generated by G to be in the future of the attitude holder’s “now”. This reflects the content of our definition of the ULC given in (85) in the previous chapter.

With the definition in (11), the forward-shifted (LTM) interpretation of a Present-under-Past attitude report like (1), repeated in (12), would not be predicted, because the relevant temporal concept generator would not be defined to output such an interpretation.

(12) Mary thought that John misses Kate.

Under this perspective, the only option for the embedded Present to compose with a temporal concept generator would be to denote a time that overlaps the time of the attitude. In other words, (12) would be undefined if the embedded Present does not overlap the matrix Past leading to the double-access interpretation.

3.2.3.2. A potential issue with encoding the ULC as a restriction on the denotation of a de re tense
One reason why I think that encoding the ULC into the definition of a temporal CG might be undesirable has to do with the predictions for a sentence like (13):

(13) John thinks that Mary will scold the person who didn’t turn off the stove.

This sentence definitely has the later-than-matrix (LTM) interpretation according to which the time of not turning off the stove precedes the time of scolding but still remains in the future for the attitude holder. At the same time, there are reasons to believe that the time introduced by the embedded Past is provided by the relevant assignment function (as far as not turning off the stove is concerned, this example does not seem to be different from Partee’s (1973) classic example that was used as evidence in support of the pronominal approach to tense). Now, a de re Past is not evaluated w.r.t. the attitude holder’s “now”, as discussed in the previous chapter. However, in a sentence like (13), the de re Past cannot anchor to the matrix evaluation time (i.e. to the utterance time) because that would not deliver the LTM interpretation. It must rather anchor to the time that is introduced by woll. This suggests that woll must itself introduce a time that is independent of the attitude holder’s “now”. According to our definition of woll, the time it outputs is in the future of its input time. Thus, the input time of woll must also be independent of the attitude holder’s “now”.

The CP of (13) is predicted to have the following structure:
In (14), the time introduced by \( \text{woll}_3 \) not only saturates the temporal argument of \( \text{VP}^3 \), but also becomes the temporal parameter of evaluation of the complement of \( \text{woll}_3 \) and, consequently, the embedded Past2 anchors to that future time.

Recall the lexical entry for \( \text{woll}_3 \) repeated in (15):

\[
[ \text{woll}_3 \text{XP}_{<i,t>} ]^t = [ \lambda t'. \exists t''(t'' > t' \& [ \text{XP}]^{t''}(t'')) ]
\]

\( \text{Woll}_3 \) takes c(time), denoted by \( \text{Pres} \), as input time. The time introduced by \( \text{woll}_3 \) must be mapped to a temporal concept by a temporal concept generator. Since temporal concept generators take an argument of type \( i \), they cannot compose directly with \( \text{woll}_3 \). For this
reason, *woll₃* in (14) undergoes local QR leaving a trace of type *i* that can cobine with a variable over concept generators (see Charlow & Sharvit (2014) for a proposal in which concept generators apply to the traces of quantifiers). The time introduced by *woll₃* can now be mapped to a temporal concept. The raised *woll₃* also shifts the temporal parameter of VP⁵ and the anchor for *Past₂*. Consequently, *Past₂* can shift back from a time that is in the future of c(time) and output a time that is still in the future of c(time) denoted by the embedded present tense. The time denoted by *Past₂* is also in the future of the attitude time, since this time is also c(time).

*Past₂* is also accompanied by the same variable over concept generators that applies to the trace of *woll₃* and is bound from by the periphery of the CP. The time denoted by *Past₂*, namely *g(2)*, is also mapped to a temporal concept. Importantly, this temporal concept must be in the future of the attitude holder’s “now” as required by the LTM interpretation and Intensional Isomorphism.

If the concept generator has the ULC incorporated into its definition as suggested in (11), sentence (13) is predicted to be undefined because *g(2)* will not be in the domain of the relevant temporal CG. If, however, the ULC is not incorporated into the definition of a temporal CGs, as suggested in (10), the LTM interpretation can be predicted for *Past₂* in sentence (13). In that case, the question of accounting for the ULC would still remain open.

There is more than one way that this problem could be dealt with. First, the ULC can remain a global constraint as was suggested by Abusch. Secondly, the past tense could also be allowed to have a purely quantificational interpretation with an optional lexical entry in (16):
In that case, the time of the event of not having turned off the stove would not be provided by the assignment function. This option is explored in Von Stechow (1995b). The undesired part of this proposal is multiple lexical entries for the past tense.

A third option builds on Von Stechow (1995a), which suggests that *woll* is a modal that can provide a local binder of its own. If *woll* introduces another layer of modality with an additional local “now”, then one could allow concept generators to be sensitive to the local “now” in the future of the attitude holder’s “now” created by the attitude verb. Here, I will not explore this option further and leave its more detailed investigation for the future.

The nature of the ULC has been questioned recently in a number of papers. I return to the discussion of some of the relevant arguments in Chapter 9. For now, I assume that either Abusch’s global approach to the ULC or its incorporation in the notion of a temporal concept generator functions as a restriction on the temporal reference in complement CPs.

With these preliminary considerations in place, I turn to presenting the new data.
Despite all the significant amount of important work dedicated to the temporal readings that English sentences can have, little attention has been paid to tense in fronted constructions. Yet given that fronted constructions are known to give rise to such potentially relevant effects as connectivity, it is natural to expect them to be able to provide us with important insights into how tense works too. As I show below, different kinds of fronting indeed reveal a significant range of temporal readings and contrasts that call for a revision of our understanding of tense and factors that are involved in the computation of the temporal meaning of sentences in English. This section presents new data on Present-under-Past in English along with some comments as to why it is theoretically interesting.\footnote{Partly, these data were presented and discussed in my talks at UMass in 2016 and 2017, at MIT in 2018 at NELS-48 and PLC-42 and are published in Kusliy (2018), Kusliy (2019).}

4.1. Present-under-Past in fronted constituents: novel data

The first piece of data comes from fronted VP constructions, which I will occasionally provide with a minimal context to make them sound more natural and less like Yoda-talk. Consider (1):
Everyone expected that John would have an opinion about Sally’s condition and... Think that Sally is tired, John did. (‘simultaneous)

Native speakers report that (1) can be true in a situation where, at some point in the past, John was thinking that Sally was tired (at the time of thinking). Crucially, neither John, nor the speaker need to believe that Sally’s alleged state of being tired extends up until and including the utterance time. In other words, the embedded Present in (1) can have a purely simultaneous (non-indexical) interpretation and the whole sentence thus be synonymous with (2), which represents a more familiar way to express simultaneity under Past:

(2) John thought that Sally was tired.

In (1), the double-access reading is also available and it is the only possible reading of its non-fronted version in (3):

(3) John thought that Sally is tired.

One thing that is puzzling about these data is that (2) and (3) are not synonymous (they do not have a common reading). (1) is a fronted VP version of (3). Fronted VPs are known to undergo obligatory reconstruction at LF (Takano (1995), Heycock (1995)), so we should not expect to see any differences between (1) and (3) at LF. Yet (1) shares an interpretation with (2), i.e. reveals a reading that its reconstructed version in (3) does not have.
More examples of Present-under-Past in a CP complement to a fronted verb are given in (4):

(4)  a. We all expected Mary to pretend to do something no one would like, and... Pretend that she wants to leave, Mary did.

b. Believe that John has money with him, Mary did (only when she saw him).

c. (On that day, everyone expected Bill to say something about the weather and) say that the weather is nice, Bill did.

d. Suspect that the patient is in bad condition, Dr. Green did.

Adjunct CPs inside fronted verb phrases can also allow for a simultaneous Present-under-Past. Consider (5):

(5) At this time last Friday, John was looking for a hungry person, and, finally... Meet a guy who is hungry, John did. (*simultaneous)

Native speakers report that (5) can have an interpretation according to which the sentence is true when there are no hungry people at the utterance time. In other words, it can be true
if John met a hungry guy at a point in the past\textsuperscript{20}. This also suggests availability of a simultaneous Present-under-Past in (5).

The sentence in (5) also reveals the kind of contrasts we saw between (1), (2), and (3). It shares a reading with the simultaneous Past-under-Past configuration in (6) and this is the reading that its reconstructed version in (7) does not have:

(6) John met a guy who was hungry.
(7) John met a guy who is hungry.

More examples similar to (5) are given in (8):

(8) a. Interview a refugee who has just crossed the border, John did (without asking anyone for permission).

b. Everyone knew Bill would give food at least to one person in the camp, and... feed a child who is sick, Bill did.

c. On this day last year, our reporter John was at a competition trying to meet a male participant, and, finally... Meet a guy who is a participant, John did.

d. Hire a guy who has fewer than three children, Mary did two years ago.

\textsuperscript{20} For some speakers, it is easier to get this reading in a version of (5) where “is” is contracted: Meet a guy who’s hungry, John did.
These sentences can be synonymous with the ones in (9), respectively:

(9) a. Without asking anyone for permission, John interviewed a refugee who had just crossed the border.
    b. Bill fed a child who was sick.
    c. John met a guy who was a participant.
    d. Two years ago, Mary hired a guy who had fewer than three children.

However, fronting a constituent that contains an embedded Present does not automatically license its simultaneous interpretation as illustrated by (10):

(10) That Mary is tired, John announced (after it had already become clear to everyone). (*simultaneous)

The native speakers I asked do not get the simultaneous interpretation in (10). The state of being tired must overlap c(time). The only interpretation available in (10) is double-access.

We thus see that the type of fronting can determine the availability of a simultaneous Present-under-Past.

Moreover, it does not look like the kind of fronting is the only factor that has impact on the availability of a simultaneous Present. Consider the fronted VP configuration in (11), which does not license the simultaneous interpretation:
Natural speakers report that (11) does not allow for a simultaneous Present-under-Past and only allows for an indexical interpretation of the embedded Present: the guy must be hungry at c(time) in order for this sentence to be true.

The contrast between (5), repeated below, and (11) is another puzzle.

(5) Meet a guy who is hungry, John did. (*simultaneous)

The only difference between these two sentences is the determiner: the indefinite object is compatible with a simultaneous interpretation, whereas the definite object is not. This contrast, however, does not seem to be just about definite and indefinite objects, as illustrated in (12) and (13):

(12) a. Meet some men who are sick, John did. (*simultaneous)
    b. Feed children who are hungry, we did. (*simultaneous)

(13) a. Meet most men who are sick, John did. (*simultaneous)
    b. Feed every refugee who is hungry, she did. (*simultaneous)

The data above suggest that the borderline between direct objects that allow for a simultaneous Present and those that do not has to do with the distinction between “weak” and “strong” DPs (in the sense of Milsark (1974)). However, from a more general
perspective, what we see here is that fronted VPs do not always allow for a simultaneous Present-under-Past, but only when certain conditions obtain. It looks like one such condition is whether the determiner of the DP complement to a fronted verb is strong or weak.

Interestingly, if we insert a pronoun bound by a matrix quantifier inside a strong DP object to a fronted verb, a simultaneous Present-under-Past is again available:

(14) a. Meet the guy who is in love with her₁ mother, every girl₁ did five years ago. (*simultaneous)
    b. Meet the guy who is in love with her₁ mother, Mary₁ did five years ago. (*simultaneous)
    c. Meet the guy who is in love with Bill’s mother, Mary did five years ago. (*simultaneous)

Native speakers told me that it is much easier to get the simultaneous interpretation in a sentence like (14)a, than in examples like (14)b and (14)c.

Even if a strong DP object to a fronted verb does not contain a pronoun overtly bound by a matrix quantifier, but is understood to have a denotation that co-varies with a matrix quantifier, the simultaneous Present-under-Past is possible.

(15) a. Turn in every paper that is due, every student did. (*simultaneous)
    b. Turn in every paper that is due, John did. (*simultaneous)
If the object to a fronted verb is a comparative superlative the simultaneous Present is again licensed:

(16)  a. Greet the tallest guy who is a participant, Mary did. (*simultaneous)
     b. Greet the guy who is a participant, Mary did. (*simultaneous)

(17)  a. Inspect the youngest patient who has a high temperature, Mary did.
     (*simultaneous)
     b. Inspect the patient who has a high temperature, Mary did.
     (*simultaneous)

Weak definite objects inside fronted VPs also license simultaneous Present-under-Past:

(18)  a. Point at the only participant who is left standing, John did. (*)sim
     b. Point at the participant who is left standing, John did. (*sim)

(19)  a. Question the first witness who behaves suspiciously, the detective did.
     (*simultaneous)
     b. Question the witness who behaves suspiciously, the detective did.
     (*simultaneous)

Even though the judgments with weak definites are harder to get, native speakers told me that they perceive a contrast between the a- and the b-versions in the above examples.
Just like in the case of strong DP objects of fronted verbs, the presence of a bound pronoun inside a fronted CP construction also licenses the simultaneous interpretation of Present-under-Past. If the pronoun her inside a fronted CP is anaphoric to a proper name in the matrix clause, and not a quantifier, it becomes harder to get the simultaneous interpretation.

(20)  

a. That her₁ kids are home alone, every mother₁ thought when the boss made everyone stay late at work. (*simultaneous)

b. That her₁ kids are home hungry, Mary₁ thought when the boss made everyone stay late at work. (*simultaneous)

(21)  

a. That her₁ students miss her₁, every professor₁ thought during the winter break. (*simultaneous)

b. That her₁ students miss her₁, Jane thought during the winter break. (*simultaneous)

Binding an embedded Present with a matrix quantifier (along the lines proposed in Partee (1973)) has the same effect on fronted CPs: when the embedded Present is understood to be anaphoric to the matrix temporal quantifier, the simultaneous interpretation becomes available:

(22)  

a. That he₁ is on vacation, John₁ ’s secretary told me every time I called him₁ last month. (*simultaneous)
b. That he$_1$ is on vacation, John$_1$’s secretary told me *when I called him$_1$ last month.*

The above data suggest that many different factors conspire in determining whether the simultaneous Present-under-Past is available in a given fronted construction. Discussing these data in detail and presenting an account that captures the observed patterns is the goal of the chapters that follow. However, before I proceed, I would like to say a few words about the data that are beyond the scope of this discussion.

4.2. Data beyond the scope of the current discussion

4.2.1. Present tense in fronted DP constructions

The constructions that will not be fully accounted for in this study are those that involve DP-fronting. Native speakers agree that sentences like (23) and (24) do not allow for the simultaneous Present-under-Past:

(23) A guy who is hungry, Sally (finally) met at the refugee center. (*sim)

(24) Which guy who is hungry did Sally meet at the refugee center? (*sim)

These two sentences pattern with the fronted CP example in (10), repeated here:
(10) That Mary is tired, John announced (after it had already become clear to everyone). (*simultaneous)

The two fronted DP constructions pattern with this CP-fronting configuration. The analysis that I will propose will capture them too. However, as it turns out, this pattern breaks down under variable binding. Inserting a bound variable inside a fronted DP does not make it easier to get a simultaneous Present-under-Past (at least, according to my consultants):

(25) The/a guy who is in love with her_1 mother, every girl_1 met five years ago.
    (*simultaneous)

(26) Which guy who is in love with her_1 mother did every girl_1 meet five years
    (*simultaneous)

In both of the above cases, only the indexical Present-under-Past is available. Even inserting a temporal quantifier into the matrix clause does not make the simultaneous interpretation easier to get:

(27) A guy who is hungry, I fed every time I went to the shelter. (*sim)

(28) Which refugee who misses his family did you interview during your visit to the refugee center? (*sim)

This is particularly surprising, given that we know from Partee (1973) that Present tense morphemes can have a “bound” interpretation that makes them non-indexical:
When you eat Chinese food, you’re always hungry an hour later.

In (27) and (28), the temporal quantifier fails to allow the embedded Present have a simultaneous interpretation even though it was possible under CP-fronting in examples like (20) and (21) above.

In the course of my discussion, I will discuss DP-fronting a little more, but nothing I will say will be sufficient to account for their resistance to license the simultaneous interpretation for Present-under-Past.

4.2.2. Simultaneous Present-under-Past in non-fronted attitude reports

One other fact that I will not explore here, but still would like to be mentioned, is the simultaneous Present that is sometimes available even in non-fronted Present-under-Past reports that do not even contain a *would*. Building on corpus studies, Altshuler et al. (2015) report the following example (see also Bary & Altshuler (2015)):

(30) My next appointment after that is 31/01 when hopefully we will find out if all this pain and suffering has done its stuff. I’ll admit to being VERY nervous now! *I was thinking that the radiotherapy is now finished so everything will sort itself out.*
Under the most salient interpretation of the last sentence in (30), the embedded Present is understood to have a relative interpretation. Altshuler et al. (2015) propose that the embedded Present can be an instance of the so-called historical Present in an embedded context. If this is right, historical Present is another phenomenon for a theory of embedded tense to account for.

4.2.3. I-level, s-level predicates and the Progressive

I would also like to mention some other factors that affect the judgments of many speakers I consulted. However, the detailed exploration of these factors goes beyond the scope of the present study.

The reader might have already noticed that in the data that revealed instances of the simultaneous Present-under-Past, I only used stative predicates like be tired, be hungry, miss, be on vacation, etc. These are Carlson’s (1977a) stage-level predicates associated with temporal properties of individuals and not individual-level predicates like be Russian, have blue eyes, etc. that tend to indicate properties that last for a considerably long time (potentially a lifetime).

Individual-level predicates in a Present-under-Past fronted VP construction give rise to readings in which the embedded eventuality (state) overlaps the matrix one as in (31):

(31) Meet a guy who has blue eyes, John did.
The problem here is that it is clear that having blue eyes lasts and necessarily overlaps not only the time of the meeting, but also the utterance time. For this reason, individual-level predicates are not revealing as far as the availability of a genuine simultaneous Present-under-Past is concerned.

To avoid this complication, one could try using temporal adverbials to make sure that the relevant state cannot overlap the utterance time as in (32):

(32) (... and, finally, on this day 200 years ago) meet a guy who has blue eyes, John did. It happened exactly here.

We can imagine a situation in which John is an important historical figure and he had never seen people with blue eyes (red hair, who are over two meters tall, etc.), only heard that they existed and tried hard to find one, until he finally did. Of course, John and the person he met both died years ago and there is no one today who could have blue eyes and who John could have met two hundred years ago. So, there seems to be no overlap with the utterance time. However, using temporal adverbials to enforce the simultaneous interpretation tends to make the relevant examples more complicated. It is hard to get clear judgments for sentences like (32).

The so-called habitual reading that normally arises when Simple Present is used with an eventive predicate is another reason why I use stage-level stative predicates in my examples. In English, a sentence like (33) only means that John is a smoker (i.e. has a
disposition to smoke on a regular basis). It does not imply that John is in the process of smoking at the utterance time\textsuperscript{21}.

\textbf{(33)}  John smokes.

It can be said that the habit described in (33) overlaps the utterance time. However since habits normally last for a quite a long time, habituals face the same issue as I-level predicates. Sentences that contain them do not present clear cases that support the simultaneous interpretation of Present-under-Past.

The Progressive is often treated as a verbal modifier that changes an activity predicate into a stative one (Dowty (1979), Gennari (2003)). Stative predicates that are created this way are much closer to the stage-level predicates that I used in my examples because they describe an ongoing action. However, many (albeit not all) speakers report that they cannot get the simultaneous interpretation in a sentence like (34). They only get the indexical interpretation.

\textbf{(34)}  Meet a guy who is smoking a cigar, John did.

\textsuperscript{21}That is true in typical utterance contexts, however there are at least three well-known contexts in which Simple Present gets an episodic interpretation: (i) sports announcing; (ii) Historical Present (already mentioned above); (iii) stage directions. In these contexts, a verb combined with Simple Present describes an ongoing eventuality. I will not explore these uses in this study.
Some speakers (but still not all) find it easier to get the simultaneous interpretation for such a progressive construction in a context that biases them towards it:

(35) In our gentlemen’s club, we smoke cigars on Fridays. So, everyone in our smoking room last Friday had a cigar in their mouth. This was when John, who wanted to meet someone smoking a cigar and take a picture of him, entered the room. And, yes… Meet a guy who’s smoking a cigar, John did.

Still, a progressive construction, somehow, makes an indexical interpretation much more salient. However, as observed by Barbara Partee (p.c.), the more a progressive construction describes a property, rather than an ongoing action, the easier it is to interpret it non-indexically:

(36) Hire a guy who’s living with his mother, Mary did two years ago.

Currently, I do not have a full account of this contrast. Yet, it does not seem impossible to provide indirect evidence that progressive constructions that describe an ongoing action can allow for a simultaneous interpretation, under a matrix Past. Observe what happens in an ellipsis construction of the kind discussed in Alxatib & Sharvit (2017):

(37) Right now, John is meeting with a guy who is smoking a cigar. And Sally was yesterday.
The sentence in (37) can have a reading according to which Sally was meeting with a guy who was smoking a cigar at the time of their meeting. Assuming an identity condition between the ellipsis site and its antecedent (Sag (1976), Fiengo & May (1994)), the availability of the described reading shows that a progressive construction in the ellipsis antecedent can have a simultaneous interpretation. This, in turn, suggests that whatever are the reasons that make it harder to get a simultaneous interpretation for Present tense in a progressive construction inside a fronted VP, they do not seem to constitute fundamental evidence against the possibility of a simultaneous construal of Present Progressive under a matrix Past.
In this chapter, I discuss the temporal interpretation of “weak” and “strong” DP objects in fronting constructions. The examples that represent the key contrasts that will be explored here are given below:

(1) Meet a guy who likes Mary, John did. (**simultaneous**)
(2) John met a guy who likes Mary. (**simultaneous**)
(3) Meet the guy who likes Mary, John did. (**simultaneous**)
(4) A guy who likes Mary, John met. (**simultaneous**)

As was pointed out in the previous chapter, the contrast between sentences like (1) and (3) arises not from a difference between definite and indefinite DPs, but from a broader distinction between “weak” and “strong” DPs.

According to Milsark (1974, 1977), “weak” DPs are the ones that can be used in existential constructions. “Weak” DPs take the narrowest scope and in some languages they are incorporated into the verb.

In this chapter, I build on McNally & Van Geenhoven (1998) who argue that “weak” DPs in object positions can have a predicative interpretation. Under such an

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22 See Carlson (2006) for other properties of “weak” DPs.
interpretation “weak” DPs are property denoting expressions. Following Chung & Ladusaw (2004), I treat “weak” DPs as modifiers of the main verb that compose with it by an operation known as Restrict, which is followed by Existential Closure of the internal argument of the verb.

I extend this perspective to the temporal interpretation of “weak” object DPs and allow them to be construed as functions from times that act as verbal modifiers and restrict the verb’s temporal argument. However, unlike the object argument, the temporal argument of the verb is not existentially closed but is rather saturated by the main tense. This proposal is in line with Musan’s (1995) arguments that the temporal interpretation of “weak” DPs depends on the main tense.

According to the view developed in this chapter, when a “weak” DP object contains a relative clause (RC), the tense inside the relative clause is “anchored” to the main tense of the sentence. Together with a number of assumptions that are similar to the ones that were mentioned in Chapter 2 in relation to Feature Transmission, I show how the proposed view allows us to derive the simultaneous interpretation of Present-under-Past in VP-fronting configurations.

“Strong” determiners will be construed as temporally independent from the main tense. Building on Enç (1981, 1986) I propose that they contain an independent temporal argument that saturates the temporal argument of their restrictor. Present-under-Past in a relative clause that is inside a “strong” DP becomes necessarily anchored to c(time) and does not license the simultaneous interpretation. The same reasoning applies to fronted DPs. Building on Diesing (1992), I assume that indefinites front as “strong” DPs and are
thus not expected to license the simultaneous Present-under-Past, just like “strong” DP objects to fronted verbs.

5.1. Background: the temporal interpretation of “weak” and “strong” DPs

5.1.1. “Strong” DPs are temporally independent

The interpretation of DPs involves the temporal dimension as well. Enç (1981, 1986) showed that the temporal interpretation of a “strong” DP can be different from that of the VP it combines with. Her famous example is provided in (5):

(5) Every fugitive is in jail.

Since the sentence in (5) has a non-contradictory meaning, the temporal interpretation of the NP fugitive inside the subject DP must be different from that of the predicate be in jail: being fugitive must precede being in jail. Since the temporal argument of be in jail is saturated by the present tense, the temporal argument on fugitive cannot be saturated by it.

According to Enç, “strong” DPs contain an independent temporal operator that saturates the time argument of their restrictor. I implement her proposal adapting Keshet’s (2008b) and Schwarz’s (2009, 2012) treatment of “strong” determiners in situation semantics. I make the following assumptions.

The temporal argument inside a “strong” determiner is provided by a silent temporal operator that is similar to a tense:
(6) $[[\text{Op-Pres}]]^{c} = c(\text{time})$

(7) $[[\text{Op-Past}]]^{x} = g(i)$, defined iff $g(i) < t$

A temporal operator is located in the specifier of a “strong” DP. Structurally, the DP *every fugitive* is represented as shown in (8):

(8) $\quad \text{DP}_t^1$

\[\text{O}_{\text{Op-Past}} \quad \text{D}' \quad \text{every} \quad \text{NP}_{(e,t)} \quad \text{fugitive}\]

The determiner *every* receives the following lexical entry:

(9) $[[\text{every}]]^g = [\lambda P_{<e, it>} . \lambda t_1 . \lambda Q_{<e, it>} . \lambda t_2 . \forall x (P(x)(t_1) = 1 \rightarrow Q(x)(t_2) = 1)]$

“Strong” determiners are thus functions that take an independent time argument that saturates the temporal argument of their restrictor. Sentence (5) receives the following LF:
In (10), the temporal independence of the “strong” DP is accounted for by the extra time argument provided by the operator $Op-Past_1$. As a result, the functions denoted by NP and VP are saturated by two different times. Assuming, as before, that the present tense denotes $c(time)$, (5) gets the following truth conditions:

\[
\llbracket (10) \rrbracket^{g.t.c} = 1 \text{ iff } \forall x (x \text{ is a fugitive at } g(1) \to x \text{ is in jail at } c(time)), \\
\text{defined iff } g(1) < t
\]

5.1.2. “Weak” DPs are temporally dependent

Musan (1995) shows that the interpretation of “weak” DPs is not temporally independent of that of the main predicate:

\[
?\text{There is a fugitive in jail.}
\]
Sentence (12) sounds inconsistent suggesting that the predicate *fugitive* cannot be understood to describe a time that is different from the time described by the main predicate *in jail*.

I implement Musan’s proposal adapting again Keshet’s (2008b) and Schwarz’s (2009, 2012) treatment of “weak” determiners for the purposes of my argument. I treat “weak” determiners as denoting identity functions and “weak” DPs as denoting relations between individuals and times. Under the “weak” interpretation, the indefinite determiner receives the following lexical entry:

\[
\llbracket \text{a}_{\text{weak}} \rrbracket = [\lambda P_{<e, it>} . P]
\]

“Weak” DPs are thus relations between individuals and times:

\[
\llbracket \text{a fugitive} \rrbracket^\diamond = [\lambda x . \lambda t . x \text{ is fugitive at } t]
\]

Under the “weak” interpretation, an indefinite does not introduce a discourse referent because it does not involve existential quantification over individuals. Whenever a DP has a predicative interpretation, existential quantification over individuals that it describes must come from elsewhere. In a sentence like (12), it comes from the operator of Existential Closure that is associated with *there* as suggested in the LF illustrated in (15):
In (15), \( \exists \) is an operator that is associated with \textit{there} and functions as Existential Closure, defined below:

In (15), \( \exists \) is an operator that is associated with \textit{there} and functions as Existential Closure, defined below:

\[
(15) \quad \begin{align*}
& \text{TP}_t \\
& \quad \begin{align*}
& \text{Pres} \\
& \quad \begin{align*}
& \exists \\
& \quad \begin{align*}
& \text{VP}_{t}^{3} \\
& \quad \begin{align*}
& \text{VP}_{t}^{2} \\
& \quad \begin{align*}
& \text{DP}_{t}^{e, it} \\
& \quad \begin{align*}
& \text{a fugitive} \\
& \quad \begin{align*}
& \text{VP}_{t}^{1} \\
& \quad \begin{align*}
& \text{is in jail}
\end{align*}
\end{align*}
\end{align*}
\end{align*}
\end{align*}
\end{align*}
\end{align*}
\end{align*}
\end{align*}
\end{align*}
\)

DP and \( \text{VP}^1 \) in (15) compose by a version of Heim & Kratzer’s (1998) Predicate Modification that applies to relations and the temporal arguments on both predicates are \textit{identified} just like the individual arguments:

\[
(16) \quad \text{If } P \text{ is an } n\text{-place predicate that takes arguments } a_1, a_2, \ldots, a_n \text{ in the order of the numeration and } a_1 \in D_e, \text{ then } \llbracket \exists P \rrbracket = [\lambda a_2 . \ldots . \lambda a_n . \exists x (\llbracket P \rrbracket(x)(a_2)\ldots(a_n))] 
\]

\[
(17) \quad \text{\textit{Predicate Modification}: If } \alpha \text{ has two daughters } \beta \text{ and } \gamma, \text{ such that } \llbracket \beta \rrbracket \in D_{<e, it>} \text{ and } \llbracket \gamma \rrbracket \in D_{<e, it>}, \text{ then } \llbracket \alpha \rrbracket \in D_{<e, it>} \text{ and } \llbracket \alpha \rrbracket = [\lambda y . \lambda t . \llbracket \beta \rrbracket(y)(t) \& \llbracket \gamma \rrbracket(y)(t)].
\]

The identification of the temporal argument is obligatory due to Keshet’s (2008a; 2011) Intersective Predicate Generalization (IPG):
(18) Two intersecting predicates cannot describe different situations [here: times].

Keshet justifies this generalization with the contrast between (19) and (20):

(19) Every U.S. Senator got straight A’s in college.

(20) ??Every U.S. Senator in college got straight A’s.

The anomaly of (20) is explained by the requirement that the two intersecting predicates, U.S.Senator and in college, be interpreted with respect to the same time and the expected inconsistency of such an interpretation, given our knowledge of the world (no one is expected to be a college student and a U.S. senator at the same time). In (19), these two predicates do not intersect and can be interpreted with respect to different times. Therefore, the anomaly does not arise.

In light of the IPG, sentence (12), which involves the intersection of the predicative indefinite a fugitive with the predicate is in jail and, therefore, requires that they be interpreted with respect to the same time, is also predicted to be anomalous, since no one can be a fugitive and in jail. The truth conditions predicted for its LF in (15) are given below:

(21) $[(15)]^c = 1$ iff there is a fugitive at c(time) and she is in jail at c(time)
5.1.3. The interpretation of “weak” and “strong” DPs in object positions

Originally, the predicative interpretation of “weak” DPs was assigned to them only in predicative positions (Partee 1986). Sentence (12), in which the indefinite receives a predicative interpretation is an existential sentence in which the position of the indefinite is also predicative (McNally 1998). Object positions of transitive verbs are not predicative. In a VP like meet a boy the verb meet is of type $<e, <e, it>$. Under the predicative interpretation, the indefinite a boy is of type $<e, it>$ and cannot compose with the verb by Function Application. Function Application is applicable only if the indefinite has its familiar quantificational interpretation and undergoes QR leaving a trace that can be taken as argument by the attitude verb.

However, building on Sadock (1980) and Van Geenhoven (1998), McNally & Van Geenhoven (1998) argue that DPs in object positions can also behave as predicates and be discourse transparent (compose with the transitive verb without introducing a discourse referent via existential quantification). Cases of nouns incorporated into verbs in West Greenlandic reveal empirical evidence that the verb, and not the noun, can introduce a novel discourse referent that is merely described by the noun. McNally & Van Geenhoven (1998) extend this perspective to non-incorporating languages like English and propose that “weak” DPs in object positions of transitive verbs can have a predicative interpretation

The mechanism they propose for composing a “weak” object with a transitive verb is called semantic incorporation and involves an optional lexical entry for each transitive

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23 For details see Section 3.2 of McNally & Van Geenhoven (1998).
verb that allows it to take a predicate as an argument. This is illustrated below for the verb *meet*:

\[
\begin{align*}
(22) & \quad [\text{meet}^1] = [\lambda y . \lambda x . \lambda t . x \text{ meets } y \text{ at } t] \\
& \quad [\text{meet}^2] = [\lambda P_{e,i} . \lambda x . \lambda t . \exists y (x \text{ meets } y \text{ at } t \& P(y)(t) = 1)]
\end{align*}
\]

When interpreted as shown in (22)b, the verb *meet* can compose with a predicate. In McNally & Van Geenhoven’s (1998) exposition of this idea, the predicate does not take the time argument. In (22)b, it does, and after the verb applies to the predicate, the predicate’s temporal argument is understood to be saturated by the temporal argument of the verb, whereas the individual argument is saturated by the discourse referent introduced by the existential quantifier. This view is in line with Keshet’s (2008) and Schwarz’s (2009) treatment of “weak” objects, according to which they identify their situation argument with that of the verb.

The result of a composition of *meet*\(_2\) with *a boy* interpreted predicatively is given in (23):

\[
(23) \quad [\text{meet}^2 \text{ a boy}] = [\lambda x . \lambda t . \exists y (x \text{ meets } y \text{ at } t \& y \text{ is a boy at } t)]
\]

As can be seen in (23), identifying the temporal argument of the predicate with that of the transitive verb is an important step in the composition of a transitive verb with a predicative argument. It introduces the requirement of the simultaneous temporal
interpretation of the predicate and the verb. In a VP like \textit{meet a boy}, the time at which the relevant individual is a boy is the same time as the time of the meeting.

Introducing an ambiguity into the lexical semantics of a transitive verb is not the only way by which it can compose with a predicative argument. Chung & Ladusaw’s (2004) operation called \textit{Predicate Restriction} or \textit{Restrict} allows a predicative object argument of a transitive verb to function as a modifier of the verb’s internal argument position (as was already mentioned in Chapter 2). The rule introduced by Chung & Ladusaw (2004) does not account for the temporal arguments of predicates and can be expressed as shown in (24):

\begin{equation}
\text{If } \alpha \text{ has two daughters } \beta \text{ and } \gamma, \text{ such that } \llbracket \beta \rrbracket \in \mathcal{D}_{<e,et>} \text{ and } \llbracket \gamma \rrbracket \in \mathcal{D}_{<e,t>}, \text{ then}
\end{equation}

\[
\llbracket \alpha \rrbracket \in \mathcal{D}_{<e,et>} \text{ and } \llbracket \alpha \rrbracket = [\lambda y . \lambda x . \llbracket \beta \rrbracket (y)(x) & \llbracket \gamma \rrbracket (y)].
\]

A version of Restrict that accounts for the temporal interpretation of a predicative DP object is given (25):

\begin{equation}
\text{Restrict}
\end{equation}

\[
\text{If } \alpha \text{ has two daughters } \beta \text{ and } \gamma, \text{ such that } \llbracket \beta \rrbracket \in \mathcal{D}_{<e,<e,lt>} \text{ and } \llbracket \gamma \rrbracket \in \mathcal{D}_{<e,lt>}, \text{ then}
\]

\[
\llbracket \alpha \rrbracket \in \mathcal{D}_{<e,<e,lt>} \text{ and } \llbracket \alpha \rrbracket = [\lambda y . \lambda x . \lambda t . \llbracket \beta \rrbracket (y)(t) & \llbracket \gamma \rrbracket (y)(t)].
\]

As a special mode of semantic composition, Restrict allows us to compose predicative DP objects with transitive verbs without introducing lexical ambiguity in the semantics of the latter. Restrict is similar to Heim & Kratzer’s (1998) operation of Predicate
Modification given in (17): it identifies all arguments of a predicate with the corresponding arguments of the expression that the predicate combines with. In the case of Predicate Modification, a predicate combines with a predicate of the same type, so all of their arguments are identified. When Restrict applies, a predicate composes with a predicative expression of a different type which has more unsaturated arguments than the predicate. Restrict allows the predicate to identify all of its unsaturated arguments with those of the predicative expression (in our case, a verb) without any effect on the extra unsaturated arguments of the predicative expression. Thus, because of Restrict a predicative DP object can function as a modifier of the transitive verb that takes it as its complement.

After Restrict applies, the internal argument position on the resulting predicate remains unsaturated (as can be seen from the definition in (25)). Thus, when meet and a boy compose by Restrict the result is still a relation:

\[(26) \text{Restrict([meet])([a boy])} = [\lambda y . \lambda x . \lambda t . x \text{meets } y \text{ at } t \& y \text{ is a boy at } t]\]

In order to close the unsaturated internal argument on meet a boy, Existential Closure must apply as a next step in the derivation of the meaning. The structure of the VP meet a boy then looks the following way:

\[(27) \exists_{VP2} [VP1 \text{meet [DP_<e,\it> a boy]]}\]

\(VP^2\) in (27) is an expression of type \(<e,\it>\), just like meet\(_2\) a boy in (23) above. In what follows, I will assume that “weak” DP complements of transitive verbs compose with
them by Restrict, identifying all of their unsaturated arguments with the corresponding arguments of those verbs.

“Strong” DPs are not predicted to have a predicative interpretation. “Strong” DP objects do not compose with transitive verbs by Restrict. As was said above, the “strong” DP every fugitive contains an independent temporal operator, which saturates the temporal argument on its NP restrictor. The temporal interpretation of the restrictor of a “strong” DP object of a transitive verb cannot be dependent on the temporal interpretation of the verb (even thought the time provided by the invisible operator can overlap the time at which the main predicate is interpreted). The composition of the object DP every fugitive with the verb meet in a VP meet every fugitive can proceed by Function Application after the quantificational DP undergoes QR for type reasons. A sentence like (28) receives the LF in (29) and the truth conditions in (30):

(28) Mary met every fugitive.

(29)
(30) \( \llbracket (29) \rrbracket^{g,t} = 1 \) iff \( \forall x(\text{x is a fugitive at } g(2) \rightarrow \text{Mary met x at } g(1)) \),

defined iff \( g(1) < t \) and \( g(2) < t \)

The truth conditions in (30) allow \( g(2) \) to overlap \( g(1) \) and output the simultaneous interpretation. However, this simultaneity arises from the fact that the tense and the temporal operator happen to have overlapping denotations and not from any dependence of the temporal interpretation the predicate \textit{fugitive} on that of the main predicate.

With this background on the temporal interpretation of “strong” and “weak” DPs, I proceed to the proposal by which I capture the availability of the simultaneous interpretation of Present-under-Past in (1) and lack thereof in (2)-(4).

5.2. Anchored tenses

In order to account for the simultaneous Present-under-Past in sentence (1), repeated here as (31), I revise the lexical entries of tenses.

(31) Meet a guy who likes Mary, John did. \( (\checkmark \text{simultaneous}) \)

I propose that English has two relative tenses: the simultaneous tense and the past tense. Building on Grønn & Von Stechow (2010) and Ogihara & Sharvit (2012), I propose that the anchors of tenses are represented at LF and that tenses have two indices: the higher
index that indicates the anchor and the lower index that is mapped to the denotation of the tense by the relevant assignment function. The lexical entry for the past tense is given in (32):

\[
(32) \quad \llbracket \text{Past}^j \rrbracket^g = g(i), \text{ defined iff } g(i) < g(j)
\]

Past is understood to denote a concrete time to which the relevant assignment function maps the lower index of the past tense. This time is presupposed to precede the time provided by the anchor (associated with the upper index).

An important requirement is that temporal anchors always be bound at LF. I propose that the left periphery of a TP contains a lambda-abstract over times that binds the anchor index on the main tense of the TP. The TP of a simplex sentence denotes a function with an unsaturated argument for the temporal anchor of the main tense of the TP. When the sentence is pronounced, that argument is saturated by the context time (c(time)).

Sentence (33) is predicted to have the LF in (34) and truth conditions given in (35).

(33) John liked Mary.

(34) \textbf{LF}: [TP2<,i,> λt0 [TP1<,i,> Past01 [VP<,i,> John liked Mary]]]

(35) \llbracket (34) \rrbracket^g.c(c(time)) = 1 \text{ iff } \text{John liked Mary at } g(1), \text{ defined iff } g(1) < c(time)

The lexical entry for the simultaneous tense is given in (36):

\[
(36) \quad \llbracket \emptyset \rrbracket^g.c = g(i), \text{ defined iff } g(i) \otimes g(j) \quad (\otimes \text{ stands for temporal overlap})
\]
The simultaneous tense outputs a contextually salient time that overlaps its anchor. Just like zero tense discussed in Chapter 2, the simultaneous tense lacks its own morphology and acquires it at surface structure. In Chapter 9, I discuss the issues with feature transmission at more length taking into account facts accumulated and discussed in Chapters 4-6. For the purposes of the current discussion, I propose that the simultaneous tense acquires its morphology by the following mechanism:

(37) The temporal morphology of the simultaneous tense
   a. The morphology of the simultaneous tense is determined at surface structure.
   b. If an embedded simultaneous tense is c-commanded by a Past tense (or an Op-Past) at surface structure and is not anchored to the context time, it surfaces with the past tense morphology.
   c. In all other cases, it surfaces with default present tense morphology.

This rule suggests that the present tense morphology is just the default morphology on the “empty” simultaneous tense that appears on it in all cases when it is not in the scope of a past tense operator at surface structure. Consider an example of a simplex sentence in (38) with the LF in (39) and truth conditions in (40):

(38) John likes Mary.

(39) \(LF: [TP2_{i,t} \lambda t_0 [TP1_t \emptyset_0 [VP_{i,t} John likes Mary]]] \)
\[(40) \quad \llbracket(39)\rrbracket^{g,c}(c(\text{time})) = 1 \text{ iff } \text{John likes Mary at } g(I), \text{ defined iff } g(I) \otimes c(\text{time})\]

In (38), the simultaneous tense surfaces with the present tense morphology because it is not c-commanded by a past tense or a past operator.

The lexical entry given in (36) presents the simultaneous tense as referential. However, that lexical entry does also allow for the two indices on the tense to be identical, as illustrated in (41).

\[(41) \quad \llbracket\emptyset\rrbracket^{g,c} = g(i), \text{ defined iff } g(i) \otimes g(i) \quad (\otimes \text{ stands for temporal overlap})\]

Importantly, when its two indices are identical, as in (41), the simultaneous tense will be non-referential. The \(\lambda\)-abstract in the left periphery of a TP binds the lower index in addition to the upper one.

**5.3. Relative clauses with anchored tenses**

In this subsection, I explore the structure and interpretation of relative clauses in light of the proposed treatment of tenses. I adopt a popular assumption that relative pronouns are identity functions. I treat them as functions of type \(<<e, it>, <e, it>\) that move for type reasons leaving a trace of type \(e\). The relative clause in (42) gets the LF presented in the linear form in (43) and as a tree diagram in (44). The interpretation is given in (45):
(42) who likes Mary

(43) \[ TP^4_{<e,it>} \text{ who } [TP^3_{<i,t>} \lambda_2 [TP^2_{<i,t>} \lambda t_1 [TP^1_t \emptyset_1 [VP_{<i,t>} t_2 \text{ likes Mary}]]) ]\]

The semantic composition by which this relative clause composes with the head noun proceeds by Predicate Modification. To create the NP in (46), the relative clause composes with the noun \textit{guy}. The structure of this NP and its interpretation are given below:
Observe that when *guy* and *who likes Mary* compose by Predicate Modification, the temporal argument of *guy* is identified with the temporal argument of the relative clause and the time of being a guy becomes the temporal anchor of the simultaneous tense inside the relative clause.

5.4. The simultaneous Present-under-Past inside a weak DP
Recall that “weak” determiners are identity functions that map the predicate they compose with to itself (Partee 1986; McNally and Van Geenhoven 1998). The lexical entry given to \( a \) in (13) is repeated in (49):

\[
(49) \quad \left[ a_{\text{weak}} \right] = \left[ \lambda P_{\text{<e,it>} . P} \right]
\]

Thus, the interpretation of the “weak” DP \( a \text{ guy who likes Mary} \) is the same as that of the NP in \( \text{guy who likes Mary} \):

\[
(50) \quad \left[ \left[ \text{DP a guy who likes Mary} \right] \right] = \left[ \lambda x . \lambda t: t \otimes g(3) . x \text{ is a guy at } t \& x \text{ likes Mary at } g(3) \right]
\]

As was said above, “weak” DPs compose with the verb by Restrict. This results in the creation of a complex predicate of type \( \text{<e,<e,it>}> \), in which the embedded tense is anchored to the temporal argument of the main verb:

\[
(51) \quad \text{meet a guy who likes Mary}
\]

\[
(52) \quad [\text{VP meet a guy who likes Mary}] = \left[ \lambda x . \lambda y . \lambda t: t \otimes g(3) . x \text{ is a guy at } t \& x \text{ likes Mary at } g(3) \& y \text{ meet } x \text{ at } t \right]
\]

As before, Existential Closure follows immediately saturating the first individual argument of this predicate. The resulting LF and interpretation are given below:
This explains how the embedded simultaneous tense gets anchored to the temporal argument of the main verb giving rise to the simultaneous interpretation of the relative clause. What remains is to say why it surfaces with the present tense morphology.

According to (37), the simultaneous tense gets its morphology at surface structure. In sentence (31), repeated below as (55), the simultaneous tense is not c-commanded by
any Past at surface structure schematized in (56). By (37)c, this means that it surfaces with default present tense morphology.

(55) Meet a guy who likes Mary, John did.

(56) Surface Structure:

At LF, the fronted VP reconstructs to its base position illustrated in (57) and gets the simultaneous truth conditions provided in (58):
(57) LF:

\[
\lambda_{\alpha} TP^6 \\
\lambda_{\beta} TP^5 \\
\lambda_{\gamma} TP^4 \\
\lambda_{\delta} TP^3 \\
\lambda_{\epsilon} TP^2 \\
\lambda_T TP^1 \\
\emptyset_a V_P^2 \\
_t_2 V_P^1 \\
\text{likes } Mary
\]

(58) \( [(57)]_{g,c}(c(\text{time})) = 1 \) iff \( \exists x \text{ is a guy at } g(4) \) & \( x \text{ likes Mary at } g(3) \) & \( \text{John met } x \text{ at } g(4), \)

defined iff \( g(4) < c(\text{time}); g(3) \otimes g(4) \)

The same result would obtain if the embedded empty tense carried the same indices as suggested in (41). More importantly, the proposed perspective explains the contrast between (55) and its non-fronted version, repeated in (59), where the only interpretation of Present that is available is indexical.
(59) John met a guy who likes Mary. (*simultaneous)

In (59), the embedded present tense morphology, which is only possible on the simultaneous tense, is c-commanded by the matrix past tense at surface structure. Yet, the embedded simultaneous tense does not carry the past tense morphology. By (37)b,c, this is possible only if the time denoted by the simultaneous present anchors to the utterance time. Therefore, (59) is predicted to be incompatible with the simultaneous interpretation and only allow for the indexical interpretation. This is a welcome prediction. We’ll see how the proposed system accounts for the indexical interpretation of an embedded Present-under-Past when we look at the interpretation of tense inside “strong” DP objects.

The proposed view on the embedded simultaneous tense also predicts the simultaneous interpretation of a Past-under-Past configuration in (60):

(60) John met a guy who liked Mary.

Again, the LF predicted for (60) is given in (57), but now the time denoted by $\emptyset_3$, i.e. g(3), is in the scope of the matrix Past at surface structure. (37)c requires that it carry the past tense morphology.

This derives the contrasts between (55), on the one hand, and (59) and (60), on the other.
5.5. The interpretation of tense inside “strong” DPs

We saw that “strong” DP objects do not allow for the simultaneous Present-under-Past. Example (3) is repeated here as (61):

(61) Meet the guy who likes Mary, John did. (*simultaneous)

In section 5.1, I discussed the temporal independence of “strong” DPs and adopted Enç’s (1986) proposal according to which “strong” DPs contained silent temporal operators in their specifiers. Those operators, $Op-Pres$ and $Op-Past_i$, were defined in (6) and (7). Here, I adapt those definitions to the proposed perspective on the semantics of tense according to which the temporal anchor of the past tense is not provided by the temporal parameter and make both operators sensitive to $c(\text{time})$.

The semantics of $Op-Pres$ is just $c(\text{time})$. The semantics of $Op-Past_i$ is a concrete time that precedes $c(\text{time})$:

(62) $[Op-Pres]^{c,g} = c(\text{time})$

(63) $[Op-Past_i]^{c,g} = g(i)$, defined iff $g(i) < c(\text{time})$

In a sentence like (61), the lexical entry of the “strong” determiner $\text{the}$ is assumed to be as shown in (64). The independent temporal operator is taken as the second argument:

(64) $[\text{the}]^{g,c} = [\lambda P_{<e,\text{it}>} . \lambda t : \exists! x (P(x)(t) = 1) . \forall x (P(x)(t) = 1)]$
The LF in (65) is predicted for sentence (61) (the fronted VP is in its base position):

\[
(65) \quad \lambda_0 \lambda f \lambda^i \lambda^j \lambda^k \lambda^l \lambda^m \lambda^n \lambda o \lambda p \lambda q \lambda r \lambda s \lambda t \lambda u \lambda v \lambda w \lambda x \lambda y \lambda z
\]

\[
\text{The truth conditions predicted for (65) are given in (66):}
\]

\[
(66) \quad \llbracket (65) \rrbracket^\mathfrak{g}(c(\text{time})) = 1 \iff \text{John met } \exists x (x \text{ is a guy at } c(\text{time}) \land x \text{ likes Mary at } g(3)) \text{ at } g(4),
\]

\[
\text{defined iff } g(4) < c(\text{time}), g(3) \otimes c(\text{time})
\]

In (65), NP is just like it was before: the embedded simultaneous tense is anchored to the temporal argument of guy. However, this argument is now saturated by the time provided by \textit{Op-Pres}, i.e. \textit{c(time)}. The time denoted by the simultaneous tense, namely
g(3), must overlap its anchor, i.e. c(time). By (37)b,c, the temporal morphology on the embedded simultaneous tense is Present.

The time denoted by the simultaneous tense can in principle extend back into the past and overlap the time of the meeting. However, this is not enough to license the simultaneous interpretation, because that time still overlaps c(time).

The only configuration in which the embedded simultaneous tense does not overlap c(time) but overlaps the time of meeting is the one according to which the object DP contains Op-Past illustrated in (67):

(67)

However, in such a configuration, the simultaneous tense cannot appear with the present tense morphology. (37) requires it to surface with the past tense morphology,
because it is in the c-command domain of a Past operator and is not anchored to c(time).
Thus the proposed perspective excludes the possibility of a Present-under-Past configuration to have the simultaneous interpretation if Present is inside a “strong” DP object.

This perspective also explains how the forward-shifted interpretation of sentence (59), repeated here as (68), becomes available.

(68) John met a guy who likes Mary.

The object indefinite a guy who likes Mary receives the “strong” quantificational interpretation, under which the lexical entry of a is as shown in (69):

(69) \[
\left[ a_{\text{strong}} \right] = \left[ \lambda P_{<e,1>} \cdot \lambda t_1 . \lambda Q_{<e,1>} \cdot \lambda t_2 . \exists x (P(x)(t_1) = 1 \land Q(x)(t_2) = 1) \right]
\]

The LF predicted for (68) is given in (70):
Recall the convention made in the discussion of the structure in (51) in Chapter 2 according to which I do not require object quantifiers to undergo QR at LF and assume that they compose with transitive verbs by Function Composition. In (70), the time denoted by the embedded empty tense is understood to overlap the time provided by \( Op-Pres \) in the specifier of the DP, which is in the future of the time of the meeting. The forward-shifted interpretation is reflected in the truth conditions provided in (71):

\[
\llbracket (70) \rrbracket^g(c(\text{time})) = 1 \text{ iff } \exists x (x \text{ is a guy at } c(\text{time}) \text{ and } x \text{ likes Mary at } g(3)) \\ \\
& \text{& John met } x \text{ at } g(4)), \\ \\
\text{defined iff } g(4) < c(\text{time}), g(3) \otimes c(\text{time})
\]
Finally, the proposed perspective can provide us with an insight into the reason why DP-fronting does not license the simultaneous interpretation of Present-under-Past. Recall the sentence in (4), repeated here as (72):

(72) A guy who likes Mary, John met. (*simultaneous)

Building on Diesing (1992), I propose that if a DP is fronted, it is “strong” (ignoring puzzles about bare plurals24). Some DPs are always “strong”. Other DPs like most indefinites can be “weak” or “strong”, but when they move, they are always “strong”.

From this perspective, fronted indefinites, as “strong” DPs, are predicted to have the quantificational interpretation given in (69). They contain an independent temporal operator that does not allow the simultaneous tense inside an embedded relative clause to have the simultaneous interpretation with respect to a matrix past tense. We thus do not predict the simultaneous interpretation for sentence (72). What is predicted is the LF in (73) and truth conditions in (74).

24 Bare plurals are known not to allow for a “strong” interpretation. However, fronted bare plurals still do not license the simultaneous Present-under-Past. Consider: “Patients who are hungry, John fed at the refugee center”. This sentence still does not license the simultaneous Present-under-Past. The only interpretation that is available for the Present tense is indexical. One potential explanation that can be used here is the referential interpretation of the fronted DP. According to this interpretation, the DP denotes a concrete plurality and is thus similar to a definite description. I leave a more detailed investigation of this matter for future research.
The proposal that a moved DP is always “strong” is also in agreement with the observation that DP objects that allow for the simultaneous Present-under-Past are always scopally inert. As an illustration, consider the sentences in (75) and (76):

(75) Meet a guy who is hungry, John didn’t.

(76) Meet a guy who likes Mary, every girl did.
If the indefinite is understood to scope above the negation in (75) or the universal in (76), the embedded Present tense only has the indexical interpretation.

Of course, the narrow scope interpretation of an object indefinite does not require it to be “weak”. A “strong” indefinite object in which the Present tense has the indexical interpretation can still take scope below a matrix negation or a universal subject. What is predicted under this proposal is that a “weak” object DP always take the narrowest scope and this seems to be a welcome prediction.
In Chapter 4, I provided novel data suggesting that Present-under-Past can be captured in a fronted VP attitude report like (1):

(1) Say that Sally is tired, John did.  \(^\text{simultaneous}\)

In this chapter, I provide a theoretical account of tense in complement CPs. This account is the same in nature as the one provided in Chapter 5 for the simultaneous interpretation of Present-under-Past in relative clauses. It suggests that in sentences like (1) the tense underlying the present tense morphology is the simultaneous empty tense that is anchored to the temporal argument of the matrix verb. In other words, the account that I provide for a sentence like (1) is that of a locally anchored de re simultaneous tense.

I motivate this account with evidence from VP and CP-fronting constructions and implement it by adapting Kratzer’s (2006) theory of CP complementation, which suggests that complement CPs function as modifiers that compose with attitude verbs by Restrict. This perspective allows me to construct a unified perspective on tense in complement CPs and relative clauses.
6.1. Motivating the temporal \textit{de re} analysis of the simultaneous Present-under-Past in VP-fronting constructions

The approach to the simultaneous Present-under-Past in VP-fronting constructions that was presented in Chapter 5 suggested that such configurations obtained when the simultaneous embedded tense was locally anchored to the temporal argument of the matrix verb. Extending this approach to the simultaneous interpretation of Present-under-Past of attitude reports is not an obvious move in light of our earlier discussion of the popular approach to tense. First of all, neither the temporal \textit{de se}, nor temporal \textit{de re} approach is immediately compatible with anchoring an embedded tense to the temporal argument of the attitude verb. Under the \textit{de se} treatment, an embedded tense is bound by the $\lambda$-abstract associated with the attitude holder’s “now”. Under the \textit{de re} approach, an embedded tense is anchored to the utterance time (or denotes it directly). Secondly, it might seem that such an extension is not needed, because the tools provided by the common approach might be enough to capture the simultaneous Present in sentences like (1). In particular, it might seem possible to capture (1) in terms of temporal \textit{de se}.

In Chapter 2, I presented temporal \textit{de se} as a common approach to the semantic treatment of attitude reports that yielded the simultaneous interpretation. According to that approach, embedded zero tense occurs in the embedded T$^0$. It is locally bound at LF by the $\lambda$-abstract associated with the attitude holder’s “now”. The whole complement CP is treated as a relation between worlds and times that maps to truth every world and time compatible with an attitude holder’s beliefs at an actual time in the actual world.
From the perspective of temporal *de se* the following LF could be predicted for a sentence like (1):

(2) *De se* LF for (1):

\[
\begin{array}{c}
\text{TP}^2 \\
\text{do+Past}_1 \\
\text{John} \\
\text{say} \\
\lambda t_2 \\
\lambda w_3 \\
\text{that} \\
\emptyset_2 \\
\text{Sally is tired-}w_3
\end{array}
\]

The simultaneous truth conditions described above would be predicted for this LF.

The availability the present tense morphology can be accounted for in terms of the general principles given in Chapter 5 and repeated here as (3).

(3) The temporal morphology of the simultaneous tense

a. The morphology of the simultaneous tense is determined at surface structure.
b. If an embedded simultaneous tense is c-commanded by a Past tense (or an Op-Past) at surface structure and is not anchored to the context time, it surfaces with the past tense morphology.

c. In all other cases, it surfaces with default present tense morphology.

According to (3), the embedded zero tense in (2) must surface with the present tense morphology. We thus predict the availability of the simultaneous interpretation of (1) without turning to any extra technical tools.

What I want to show now is that temporal de se analysis is not sufficient for the simultaneous Present-under-Past in attitude reports. There is more than one way to do this. In this subsection, I provide evidence from VP-fronting constructions because they are the main object of my discussion here. When I turn to CP-fronting in subsection 6.4, I discuss another piece of evidence in favor of the temporal de re analysis. However, before I begin, I would like to remind the reader that temporal de se only predicts the simultaneous interpretation. As was demonstrated in Chapter 2, the back-shifted interpretation of Past-under-Present or Past-under-Past attitude reports can be generated only in terms of temporal de re. With this in mind, I would like to turn to the following example.

(4)  

a. Think that her husband is scared, Mary did at the time of the crime, but…

b. Now she doesn’t.
Native speakers report that Present-under-Past in (4)a can have the simultaneous interpretation, according to which the state of being scared that Mary ascribed to her husband at the time of the crime is not understood to obtain at the utterance time. This is directly suggested by the continuation in (4)b. The availability of the simultaneous interpretation of (4)a means that the elided VP in (4)b must contain a past tense. In other words, if the elided VP in (4)b becomes visible, the whole sentence should look as (5):

(5) Now she doesn’t think that her husband was scared.

I argue that this fact calls for a de re analysis of the simultaneous Present-under-Past in (4)a, which provides the antecedent for the elided VP in (4)b. My argument can be presented in the following way:

• the Past-under-Present attitude report in (4)b must have the temporal de re analysis;
• hence, the tense in the elided VP must be a de re tense;
• assuming that VP ellipsis requires semantic identity, the antecedent VP must also contain an embedded de re tense;
• therefore, the simultaneous Present-under-Past report in (4)a requires a temporal de re analysis.

An immediate challenge to the de re approach to the interpretation of the embedded Present in (4)a is to explain how it gets anchored locally. So far, temporal de re was only compatible with an indexical interpretation of a de re tense. However, as we saw in Chapter
the indexical interpretation of the present tense in (4) a would lead to the double-access interpretation of the whole attitude report and not to the simultaneous interpretation. We need a mechanism that would allow the embedded de re present tense to anchor locally and give rise to the simultaneous interpretation.

I find such a mechanism in Kratzer’s (2006) theory of CP complementation explored in detail in Moulton (2009). I present an overview of that theory in the next subsection.

6.2. Kratzer (2006): complement CPs as modifiers of attitude verbs

According to Kratzer (2006), attitude verbs are like transitive verbs. They take an internal argument of individual type. This argument is called the content argument. Content arguments are the content of an attitude. Contents can also be referred to by such expressions as this story, this rumor which denote “the kinds of things that can be believed or reported” (Kratzer 2006: 1). The sentence in (6) is a case when such a DP that contains a content noun saturates the content argument of the verb believe:

(6) I believe this story.

With respect to the denotation of content DPs, CPs behave as predicates. With reference to Higgins (1973) and Stowell (1981), Moulton (2009: 17) shows that CPs can appear in the predicative post-copular positions after such DPs:
(7)   a. The theory is that pigs fly.
    b. The claim/claim/observation is that pigs fly.

This reasoning is applied to attitude reports like (8), which do not involve overt DP complements.

(8) I believe that Fred didn’t report his income.

In such a report, the CP is still understood to act as a description of a content individual. Since the function denoted by the attitude verb believe takes such an individual as its internal argument, the CP becomes a modifier of the internal argument position of the attitude verb.

Let’s explore Kratzer’s (2006) implementation of this reasoning in more detail. She considers the following example:

(9) Lucy believes that there are ghosts.

According to her proposal, TPs denote propositions:

(10) $\llbracket \text{There are ghosts} \rrbracket^g = \lambda w . \exists y (\text{ghosts}(y)(w))$
A crucial component of the internal semantics of a CP is the complementizer, which
denotes a function that applies to a proposition. It also introduces quantification over
possible worlds, and outputs a predicate of content individuals:

\[(11) \ [\text{that}] = [\lambda p_{s,t} . \lambda x_c . \forall w (\text{compatible}(x)(w) \rightarrow p(w) = 1)]\]

In (11), the \(\lambda\)-abstract over variable \(x\) is the unsaturated position for a content
individual argument. Such arguments are of type \(e\). The subscript \(c\) on \(x\) does not stand for
the semantic type. It merely marks the content individual argument making it visually
distinguishable from other individual arguments.

Complement CPs are thus predicates of content individuals. They describe content
individuals whose content is expressed by a proposition. CPs are thus expressions of type
\(< e, t >\). The semantics predicted for a CP like \(\text{that there are ghosts}\) is illustrated below:

\[(12) \ [\text{that there are ghosts}] = [\lambda x_c . \forall w (\text{compatible}(x_c)(w) \rightarrow \text{there are ghosts in } w)]\]

As was already mentioned, attitude verbs in Kratzer’s system resemble transitive verbs
with an internal argument of individual type. Building on Kratzer’s proposal, I provide the
following lexical entry for the verb \(\text{believe}\) (13):\(^{25}\):

\[\text{25 The lexical entry in (13) departs from Kratzer’s (2006) original entry in a number of technical details (see her example (3) and a discussion that follows).} \]
Kratzer (2006) says that a CP and an attitude verb combine by Restrict\textsuperscript{26}, which means that a CP functions as a verbal modifier adding an extra description to the content argument of the verb and thus restricting it.

\begin{equation}
\text{Restrict}([\text{believe-w}_0])([\text{that there are ghosts}]^\text{g}) = [\lambda x. \lambda z. \exists y \text{ ghosts}(y)(w'))]
\end{equation}

After the content argument of the CP and the verb have been identified by Restrict, the unsaturated position of the content argument on the resulting expression is existentially closed, which results in the function of type \textless e, st\textgreater :

\begin{equation}
[\lambda z. \exists x(z \text{ believes}(x)(g(0)) & \forall w'(\text{compatible}(x)(w') \rightarrow \exists y \text{ ghosts}(y)(w'))])
\end{equation}

The subject argument is then taken by the function in (15) in the familiar way and the denotation of the whole attitude report in (9), i.e. the proposition that Lucy believes that there are ghosts, is thus derived. The truth conditions for (9) are given in (16):

\begin{footnotesize}
\begin{itemize}
\item[\textsuperscript{26}] See my discussion of Restrict in Chapter 2.
\end{itemize}
\end{footnotesize}
(16) \[ [(9)]^g(w) = 1 \text{ iff } \exists x (\text{Lucy believes}(x)(w) \land \forall w' (\text{compatible}(x)(w') \rightarrow \exists y \text{ ghosts}(y)(w'))) \]

One comment that I would like to make about Kratzer-Moulton has to do with cases when rigid designators occur inside a complement CP. Consider again Quine’s sentence example about Ralph:

(17) Ralph believes that Ortcutt is a spy.

According to Kratzer-Moulton, the embedded TP must denote the proposition in (18):

(18) \[ [(17)] = [\lambda w . \text{Ortcutt is a spy in } w] \]

This proposition must describe the relevant content individual so that the CP *that Ortcutt is a spy* becomes the predicate that truly describes that individual:

(19) \[ [\text{that Ortcutt is a spy}] = [\lambda x_c. \forall w' (\text{compatible}(x_c)(w') \rightarrow \text{Ortcutt is a spy in } w')] \]

However, we know from Quine’s example that in a double-vision scenario, there is a sense in which (17) is true and there is a sense in which it is false. If there is a content

\[ 27 \text{ Within Kratzer/Moulton theory it must also be assumed that for any individual } x \text{ and content individual } y, x \text{ believes } y \text{ iff } \text{the content of } y \text{ is true in all of } x \text{'s doxastic alternatives.} \]
individual $c$, which is truly described by the CP *that Ortcutt is a spy*, it is not clear whether Ralph believes $c$ or not.

Given what we said about *de re* attitude reports in Chapter 2, Ralph believes of Ortcutt under one guise that he is a spy and under another guise that he is not. This means that he believes in the content described by the proposition $[\lambda w . \text{the man in a hat in } w \text{ is a spy in } w]$, but not in the content described by the proposition $[\lambda w . \text{the man on the beach in } w \text{ is a spy in } w]$. Consequently, there must be a way to map the TP *Ortcutt is a spy* to one of these propositions in one case, to the other proposition in another. Therefore, unless there is a way to map Ortcutt to different individual concepts that would allow the embedded TP to be mapped to different propositions by the relevant interpretation function, the double-vision problem will re-emerge.

Nothing that Kratzer (2006) or Moulton (2009, 2015) write excludes the possibility of accounting for this mapping. Here, I would like to explore one way by which I believe this could be done. This is the option of introducing a concept generator that would map an individual to an individual concept. The semantics of the TP *Ortcutt is a spy* could then be as shown in (20):

\[
(20) \quad [\lambda G. \lambda w'. G(\text{Ortcutt})(w') \text{ is a spy in } w']
\]

This, however, is not enough. As we saw in Chapter 2, concept generators are dependent on the identity of the attitude holder and the world of attitude. For this reason, the required mapping of Ortcutt to an individual concept becomes possible only when the identity of the attitude holder is known. Since access to the attitude holder is possible only
via the attitude verb, which denotes a function that takes the attitude holder as argument, the saturation of the argument over concept generators is possible only at the level of the matrix VP.

This means that the mode of composition between the complementizer and its complement TP must also be revised. I propose that the complementizer retains its semantics assigned to it in (11) and repeated here as (21) and that \( \lambda G \) in (20) is allowed to be “passed up” in the way discussed above with reference to Function Composition.

\[
(21) \quad \llbracket \text{that} \rrbracket = [\lambda p_{<st>} . \lambda x_c . \forall w (\text{compatible}(x)(w) \rightarrow p(w) = 1)]
\]

Here is how the composition proceeds. First, the concept generator argument in (20) gets temporarily saturated by a dummy argument \( G \) to result in \( [\lambda w'. G(\text{Ortcutt})(w')] \) is a spy in \( w' \)], which is a proposition. Next, we apply the function denoted \( \text{that} \) in (21) to this proposition to get a set of content individuals \( [\lambda x_c . \forall w (\text{compatible}(x)(w) \rightarrow G(\text{Ortcutt})(w) \text{ is a spy in } w)] \). Finally, we make the position of the concept generator argument in this function again unsaturated to make it a relation between concept generators and content individuals: \( [\lambda G . \lambda x_c . \forall w (\text{compatible}(x)(w) \rightarrow G(\text{Ortcutt})(w) \text{ is a spy in } w)] \).

The CP \( \text{that Ortcutt is a spy} \) gets the following interpretation:

\[
(22) \quad \llbracket \text{that Ortcutt is a spy} \rrbracket = [\lambda G_{<e,se>} . \lambda x_c . \forall w' (\text{compatible}(x_c)(w') \rightarrow G(\text{Ortcutt})(w') \text{ is a spy in } w')]\]
Unlike CPs in Kratzer’s (2006) original proposal, CPs that also describe a concept generator cannot have a simple predicative semantics and be expressions of type \(<e, t>\). Even if we follow Kratzer and assume content individuals as arguments of attitude verbs, the semantics of attitude verbs must now be more complicated in order for them to be able to compose with CPs that take concept generators as arguments. The mode of composition between an attitude verb and a CP must also ensure the concept generator that maps the \(res\)-argument to an individual concept is relativized to the attitude holder and the world of attitude.

I propose the following interpretation for \textit{believe}:

\[
\langle \text{believe} \rangle = [\lambda w . \lambda G_{<e, se>} . \lambda x_c . \lambda y . \ G \text{ is a CG for } y \text{ in } w \ & y \text{ believes } x \text{ in } w]
\]

Under this interpretation, \textit{believe} can first take a world argument, e.g. \(w_0\) denoting \(g(0)\) with respect to a contextually salient assignment function \(g\). Then \([\text{believe-} w_0]\) composes with the CP in (22) purely by Restict to yield:

\[
[\lambda G_{<e, se>} . \lambda x_c . \lambda y . \ G \text{ is a CG for } y \text{ in } g(0) \ & y \text{ believes } x \text{ in } g(0) \ & \forall w' (\text{compatible}(x_c)(w') \rightarrow G(John)(w') \text{ is a spy in } w')]
\]

The function in (24) results from the identification of the content individual and concept generator arguments on the verb and on the CP. An application of Existential Closure over the content argument and the CG argument still gives us (25):
(25) \( \lambda y. \exists x \exists G \text{ is a CG for } y \text{ in } g(0) \& \ y \text{ believes } x \text{ in } g(0) \& \)
\[ \forall w' (\text{compatible}(x_c)(w') \rightarrow G(\text{John})(w') \text{ is a spy in } w'))] \]

All the tools that I discussed and explored in this subsection will be needed in my discussion of the temporal interpretation of the simultaneous Present-under-Past to which I now proceed.

6.3. Deriving the simultaneous de re Present-under-Past

Recall the lexical entries for the simultaneous and past tense from Chapter 5:

(26) \( [\text{Past}]^i = g(i), \text{ defined iff } g(i) < g(j) \)

(27) \( [\emptyset]^i = g(i), \text{ defined iff } g(i) \otimes g(j) \quad ("\otimes" \text{ stands for temporal overlap}) \)

Also recall the definition of a temporal concept generator from example (11) in Chapter 3.

(28) \( G \) is a temporal CG for \( x \) in \( w \) at \( t \) iff

a. \( G \in D_{\ll l, <l, <s, d>, >s} ; \)

b. \( \text{Domain}(G) = \{ t'': x \text{ is acquainted with } t'' \text{ at } t \text{ in } w \& \text{ it is not the case that } t''' \text{ is later than } t \} ; \)
c. the concepts that $G$ outputs are such that for any $t'' \in \text{Dom}(G)$, every 
$w', t' \in \text{Dox}(x, t, w)$ is such that $\text{ORDER}(t')(t)(G(t'')(t')(w'))(t'')$

d. for any $t'' \in \text{Dom}(G)$, $G(t'')(t)(w) = t''$

Finally, recall again the general mechanism by which the simultaneous tense
acquires its morphology:

(29) The temporal morphology of the simultaneous tense

a. The morphology of the simultaneous tense is determined at surface
structure.

b. If an embedded simultaneous tense is c-commanded by a Past tense (or
an Op-Past) at surface structure and is not anchored to the context time,
it surfaces with the past tense morphology.

c. In all other cases, it surfaces with default present tense morphology.

The simultaneous Present-under-Past report under analysis is repeated in (30):

(30) Think that her husband is scared, Mary did at the time of the crime.

Let me begin with the structure of the embedded TP her husband is scared.

In Chapter 5, I discussed tense in relative clauses and dealt with extensional
sentences. From the perspective developed in that chapter, a matrix sentence like this TP
received the following analysis:
In (31), the anchor index of the simultaneous tense is bound by the $\lambda$-abstract in the left periphery of the clause. This means that this tense is anchored to $c$(time) and, by (27), the time it denotes overlaps $c$(time). By (29)c, the temporal morphology is present.

However, in (30) this TP is inside a complement CP, i.e. an intensional context. This means that the intensional component must be accounted for in the analysis of this TP. First, the TP itself must be able to denote a proposition (a set of world-time pairs). Secondly, since we are after a temporal de re analysis of (30), the machinery of temporal concept generators must be introduced into the structure of this TP.

From the Kratzerian perspective, which I adopt here, the embedded TP *her$_1$ husband is scared* is predicted to have the following structure:

\[
(32) \quad [\text{TP} \lambda G [ \lambda t_2 [ \lambda w_4 [ \lambda t_5 [[[G \emptyset^2_3] t_5] w_4] [\text{VP} her_1 \text{ husband- } w_4 \text{ is scared- } w_4]]]]]
\]

For better clarity, I also present an annotated variant of (32):
In (33), the subordinate tense remains anchored, but its anchor is independent of the attitude holder’s “now”. The anchor remains extensional, because the subordinate tense is a \textit{de re} tense. However, the operators $\lambda w_4$ and $\lambda t_5$, which are associated with the attitude holder’s attitude alternatives and their temporal centers are still present in the LF. They bind the variables that are taken as arguments by the temporal concept generator.

The interpretation of this TP is given in (34):

\[
\text{(34) } \llbracket (33) \rrbracket^g = [\lambda G_{<i,<i,si>>} . \lambda t' : t' \otimes g(3) . \lambda w'' . \lambda t'' . g(1)’s \text{ husband in } w'' \text{ is scared in } w'' \text{ at } G(g(3))(t'')(w'')]
\]

Following Kratzer (2006) and Moulton (2009), I assume that the complementizer

- introduces quantification over worlds and times;
- applies to a TP saturating the arguments for the world of evaluation and the subjective “now” ($\lambda w_4$ and $\lambda t_5$ in (32));
- returns a predicate of content individuals.

The lexical entry for the complementizer is given in (35). Its only difference from the lexical entry given in (21) above is that the complementizer now denotes a function that applies to a proposition understood as a relation between worlds and times.

\[
\text{(35) } \llbracket \text{that} \rrbracket = [\lambda P_{<s,fs>}. \lambda x_c . \forall w',t' \text{ (compatible}(x_c)(w')(t') \rightarrow P(w')(t') = 1)]
\]
The CP *that her₁ husband is scared* has the following LF:

\[(36) \quad [\text{CP} \quad \lambda \lambda t_2 \lambda w_4 \lambda t_5 \quad [[[G \, \emptyset^2_3] \, t_5] \, w_4] \, \text{her₁ husband-w₄ is scared-w₄}]\]

At this point, a complication arises. Given that TP is an expression of type \(<<i, <i,s_i>> , <i, <s,i t>>\) and the complementizer only takes arguments of type \(<s,i t>\), we get an apparent type mismatch, because the complementizer cannot apply to TP by Function Application.

I propose that the composition between *that* and TP proceeds in a way that is similar to the way discussed above in relation to the derivation of (22), where Function Composition applied and the unsaturated concept generator argument of the embedded TP was temporarily ignored in order to let the complementizer compose with an argument of propositional type and was then reintroduced into the result of that composition.

In the case of (36), two arguments of the function denoted by TP, namely the argument over temporal concept generators and the argument of the temporal anchor of the *de re* tense, are temporarily saturated with a dummy concept generator G and a time t, making the function a relation between worlds and times \([λw' . λt' . g(1)'s\, husband\, in\, w'\, is\, scared\, in\, w'\, at\, G(g(3))(w')(t')]\), where \(g(3) \otimes t\). The function denoted by *that* applies to the proposition and outputs a set of content individuals \([λx . \forall w',t'(compatible(x)(w')(t') \rightarrow g(1)'s\, husband\, in\, w'\, is\, scared\, in\, w'\, at\, G(g(3))(w')(t'))]\), where \(g(3) \otimes t\). Finally, the two argument positions are made unsaturated again. The result is the denotation of CP given in (37). (I assume that the index on *her₁* is mapped to Mary by the assignment function).
\[ (37) \quad \llbracket (36) \rrbracket^g = [\lambda G_{\llangle i,i,si\gg} \cdot \lambda t': t'' \otimes g(3) \cdot \lambda x_c \cdot G \text{ is a temporal CG} & \\
\forall w',t' \text{(compatible}(x_c)(w')(t') \rightarrow \\
\text{Mary’s husband-w’ is scared in w’ at G}(g(3))(t')(w'))] \]

Again for clarity I present (37) with annotations below:

A CP is thus a predicate that takes three arguments. First, it takes a temporal CG argument. Next, it takes a time argument (the anchor of the de re tense), and, finally, a content individual argument.

The next step is to show how the CP composes with the attitude verb \textit{think}, for which the lexical entry is given in (39). The only difference between this lexical entry and the one given above in (24) is that the verb’s CG argument is now of a different type (it is stated that the CG is a temporal concept generator for the attitude holder) and that the verb also takes a temporal argument.

\[ (38) \quad \llbracket \text{think} \rrbracket = [\lambda w \cdot \lambda G_{\llangle i,i,si\gg} \cdot \lambda y \cdot \lambda t \cdot y \text{ thinks } x_c \text{ in w at } t \text{ and } G \text{ is a} \]
As was said earlier, Kratzer (2006) proposes that attitude verbs compose with their CP complements by Restrict. Recall the definition of this operation given in (25) in Chapter 5 and repeated here as (40):

$$(40) \quad \text{Restrict}$$

If $\alpha$ has two daughters $\beta$ and $\gamma$, such that $\llbracket \beta \rrbracket \in D_{<e,<e,lt>}>$ and $\llbracket \gamma \rrbracket \in D_{<e,lt>}>$, then $\llbracket \alpha \rrbracket \in D_{<e,<e,lt>}>$ and $\llbracket \alpha \rrbracket = [\lambda y . \lambda x . \lambda t . \llbracket \beta \rrbracket(y)(x)(t) \& \llbracket \gamma \rrbracket(y)(t)]$. 

As defined in (40), Restrict applies to relations between individual and times. However, its crucial component has to do with fact that one constituent composes with another by identifying all of its unsaturated arguments with the corresponding arguments of the other constituent, which has more unsaturated arguments that the first one. The constituent with fewer unsaturated arguments thus modifies the constituent with more unsaturated arguments. The result is an expression of the same type as the type of the modified constituent. I extend Restrict to other cases and propose that after the verb think takes its world argument $w$ it composes with its complement CP by Restrict and the CP (interpreted as shown in (37)) identifies all of its unsaturated arguments with the corresponding arguments of think-$w$:

- the temporal anchor of the embedded tense ($\lambda t''$) is identified with the temporal argument of the attitude verb;
• the CG argument of the CP is identified with the CG argument of the verb;
• the content individual argument of the CP is identified with the content individual argument of the verb.

(41) Restrict(⟦think-w₀⟧)(⟦(36)⟧) =

\[\lambda G . \lambda x_c . \lambda y . \lambda t: t \otimes g(3) . y \text{ thinks } x_c \text{ in } g(0) \text{ at } t & G \text{ is a temporal CG for } y \text{ at } t \text{ in } g(0) & \forall w', t'(\text{compatible}(x_c(w')(t') \rightarrow \text{Mary’s husband-}w' \text{ is scared in } w' \text{ at } G(g(3))(t')(w'))]

After the CP has composed with the verb, the unsaturated CG argument and content individual argument are closed by Existential Closure. The VP *think that her₁ husband is scared* receives the structure in (42), expressed below as a tree diagram:
This is the structure of the fronted VP in sentence (30). Its interpretation is given in (43):

\[
[(42)]^\# = [\lambda y . \lambda t: t \otimes g(3) . \exists x_c \exists G(y \text{ thinks } x_c \text{ in } g(0) \text{ at } t \text{ and } G \text{ is a temporal } CG \text{ for } y \text{ at } t \text{ in } g(0) \& \forall w',t'(\text{compatible}(x_c)(w')(t') \rightarrow \text{Mary’s husband-}w' \text{ is scared in } w' \text{ at } G(g(3))(t')(w'))]
\]

The surface structure of the whole report can be represented as shown in (44):

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(44)
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For this reason and in light of (29)c, the embedded simultaneous *de re* tense surfaces with the present tense morphology. However, at LF the fronted VP reconstructs to its base position, as shown in (45). The truth conditions predicted for (45) in w at c(time) are given in (46):

\[
[(45)]^{g,c} (w)(c(\text{time})) = 1 \text{ iff } \exists x \exists G (\text{Mary thought } x \text{ in } w \text{ at } g(7) \& G \text{ is a temporal CG for } \text{Mary in } w \text{ at } g(7) \& x \text{ is a content individual such that } \\
\forall w',t' (\text{compatible}(x_c)(w')(t') \rightarrow \\
\text{Mary's husband is scared in } w' \text{ at } G(g(3))(w')(t'));
\text{defined iff } g(7) < c(\text{time}), g(7) \otimes g(3)
\]
The truth conditions in (46) are the truth-conditions for the simultaneous interpretation of a *de re* Present-under-Past. The temporal *res*, namely g(3), is required to overlap its temporal anchor because this is required by the semantics of the simultaneous tense. The temporal anchor is identified with the temporal argument of the attitude verb. Thus, the temporal *res*, g(3), is required to overlap the time of thinking. The time of thinking, g(7), is provided by the matrix past tense and therefore precedes the utterance time. Because g(3) and g(7) overlap, Intensional Isomorphism requires the temporal concept (that g(3) is mapped to) to overlap the attitude holder’s “now” in each attitude alternative. The attitude holder is thus present-oriented with respect to the temporal concept she perceives. We thus get the simultaneous interpretation. Since the time of thinking is in the past, the interpretation is simultaneous under Past. As was said above, the *de re* tense surfaces with the present tense morphology. This makes sentence (30), repeated below as an instance of the simultaneous *de re* Present-under-Past.

(47) a. Think that her₁ husband is scared, Mary₁ did at the time of the crime,  
b. …but now she₁ doesn’t.

Recall that (47)b could have the back-shifted interpretation. The corresponding continuation makes it look like (48):

(48) Now she₁ doesn’t <think that her₁ husband was scared>.
I assume that an elided VP must be semantically identical to its antecedent VP under the same parameters of interpretation (cf. e.g. Alxatib & Sharvit 2017: 701). Under this perspective, the semantics of the VP in (48) must be equivalent the semantics of VP\textsuperscript{t} given in (43) and repeated here:

\[(49) \quad \text{\[VP\]}^g = [\lambda y . \lambda t: t \otimes g(3) . \exists x, \exists G(y \text{ thinks } x \text{ in } g(w) \text{ at } t \text{ and } G \text{ is a temporal CG for } y \text{ at } t \text{ in } g(w) \text{ and } \forall w', t'(\text{compatible}(x, e)(w')(t') \rightarrow Mary's \text{ husband-}w' \text{ is scared in } w' \text{ at } G(g(3))(t')(w'))]
\]

One aspect in which the VP in (48) is different from its antecedent is temporal morphology: it is present in (47)a and past in (47)b. The past tense in (48) suggests that the attitude holder has a different temporal perspective towards the same temporal res in the situation described in (48) (= (47)b) than she has in the situation described in (47)a. The sameness of the temporal res suggests that it is still g(3) that the attitude holder is related to. The difference in perspective (the attitude holder is now past-oriented) suggests (by Intensional Isomorphism) that the g(3) is in the past of the attitude time. Since the main tense in (47)b is Present and the time of thinking is c(time), g(3) must precede c(time).

We get the required configuration for (48) if we allow g(3) to precede its anchor in the elided VP (cf. the Vehicle Change mechanism discussed in Fiengo & May 1994) as shown in (50):

\[(50) \quad \text{The interpretation of the elided VP:}
\]
\[
\quad [\lambda y . \lambda t: t > g(3) . \exists x, \exists G(y \text{ thinks } x \text{ in } g(w) \text{ at } t \text{ and } G \text{ is a temporal CG}}
\]
for \( y \) at \( t \) in \( g(w) \) & \( \forall w',t'(compatible(x_c)(w')(t') \rightarrow \\
Mary's\ husband-w'\ is\ scared\ in\ w' \) at \( G(g(3))(t')(w'))\]

The structure that is thus predicted for (48) is given in (51) and the truth conditions are provided in (52):

\[
[(51)]^{g, c}(w)(c(\text{time})) = 1 \iff \exists x \exists G (Mary\ thinks\ x\ in\ w\ at\ g(7) \& \\
G\ is\ a\ temporal\ CG\ for\ Mary\ in\ w\ at\ g(7) \& \\
x\ is\ a\ content\ individual\ such\ that \\
\forall w',t'(compatible(x_c)(w')(t') \rightarrow \\
Mary's\ husband\ is\ scared\ in\ w' \) at \( G(g(3))(w')(t'))\);
\]
defined iff \( g(7) \otimes c(\text{time}), g(7) > g(3) \)

The truth-conditions provided in (52) are back-shifted. According to them, the temporal \( res, g(3) \), precedes the time of thinking, \( g(7) \), and, by Intensional Isomorphism, the temporal concept that \( g(3) \) is mapped to precedes the attitude holder’s “now”.

Native speakers have reported that it is harder to get the double-access interpretation in a sentence like (47)a even if it does not have the continuation in (47)b. In other words, it is harder to understand (47)a as suggesting that Mary’s belief about her husband being scared still applies at the utterance time.

I believe that the lack of the double-access interpretation in (47)a can be due to world knowledge. We normally do not expect states of being scared to last long enough to license the double-access interpretation in a sentence like (47)a. For this reason, the double-access interpretation might not be available in (47)a.

This is reminiscent of the famous contrast described in (53):

(53)  

a. A week ago, John said that Mary is pregnant.

b. #Two years ago, John said that Mary is pregnant.

Since human pregnancy is not expected to last for two years, the double-access interpretation of (53)b is anomalous, and since this sentence does not seem to allow for any other interpretation, it is anomalous altogether.
However, the double-access interpretation is normally available for Present-under-Past in a VP-fronting configuration. A sentence like (1), repeated here as (54), has the double-access as well as the simultaneous interpretaiton.

(54) Say that Sally is tired, John did. (\textit{simultaneous, double-access})

I turn to a discussion of double-access in the next section, where I account for Present-under-Past in fronting CP-constructions. The analysis that I propose there applies to (54) under the double-access interpretation as well (see the discussion of example (80) below).

One final comment relates to Barbara Partee’s (p.c.) point about the pair of sentences in (47), repeated below as (55).

(55) a. Think that her husband is scared, Mary did at the time of the crime, but…  
     b. Now, she doesn’t.

She observes that it is possible to get the simultaneous interpretation in (55)b in addition to the back-shifted interpretation. According to the simultaneous interpretation, (55)b can be reproduced in full form as (56):

(56) Now, she doesn’t think that her\textsubscript{1} husband is scared.
According to the simultaneous interpretation, (55)b states that Mary does not think that her husband is scared at the utterance time. The availability of the simultaneous interpretation seems to be predicted by the account developed in this study. The sentence in (55)a receives the following LF:

\[
(57) \quad [\text{TP } \lambda t_0 [\text{TP } \lambda w_6 [\text{TP do+Past}^0_1 [\text{VP } \exists c [\text{VP } \exists CG [\text{VP think-w}_6 [\text{CP that } [\text{CP } \lambda G [\text{CP } \lambda t_2 [\text{TP } \lambda w_4 [\text{TP } \lambda t_5 [\text{TP } [[[G \emptyset^2_2] t_5] w_4] [\text{VP her}_1 \text{husband-w}_4 \text{is scared-w}_4]]]]]]]]]]]]]
\]

In (57), the lower and the upper indices on the embedded simultaneous empty tense are the same ($\emptyset^2_2$) and are bound by the $\lambda$-abstract that stands for the temporal anchor of that tense. The antecedent VP is as shown in (58):

\[
(58) \quad [\text{VP } \exists c [\text{VP } \exists CG [\text{VP think-w}_6 [\text{CP that } [\text{CP } \lambda G [\text{CP } \lambda t_2 [\text{TP } \lambda w_4 [\text{TP } \lambda t_5 [\text{TP } [[[G \emptyset^2_2] t_5] w_4] [\text{VP her}_1 \text{husband-w}_4 \text{is scared-w}_4]]]]]]]]]]]]]
\]

In this VP, the embedded de re tense is anchored to the temporal argument of the verb, i.e. the time provided by the matrix tense. In (55)a, the interpretation that arises is the simultaneous interpretation of Present-under-past. However, when this VP is copied to (55)b, the embedded de re tense is interpreted as simultaneous with the time provided by the matrix present tense. The LF predicted for (55)b is given in (59) and the truth conditions are given in (60):

180
(59)  \[TP\lambda t_0[TP\lambda w_6[TP\text{do+}]]_{0,0} [VP \text{Mary } [\text{NegP } \text{n’t } [VP \exists_c [VP \exists_{CG} [VP \text{think-w}_6}]
\]
\[CP \lambda G \[CP \lambda t_2 [CP \text{that } [TP \lambda t_5 [TP \lambda w_4 [TP [[[G \emptyset^2_2] t_5] w_4] [VP \text{her husband-w}_4 \text{is scared-w}_4]]]]]]]]]])]

(60)  \[[59]]^{g,c}(c(t)(w)) = 1 \iff \neg \exists x \exists G \text{(Mary thinks x in w at c(time))} \&
\quad G \text{ is a temporal CG for Mary in w at c(time)} \&
\quad x \text{ is a content individual such that}
\quad \forall w',t'(\text{compatible}(x_c)(w')(t') \rightarrow
\quad \text{Mary’s husband is scared in w’ at G(c(time))(w')(t'))}
\quad \text{defined iff c(time) } \otimes \text{c(time)}^{28}

Since the time of thinking is c(time) and saturates the temporal anchor of the embedded tense, the time that the embedded tense outputs is also c(time). By Intensional Isomorphism, an overlap between the times denoted by the matrix and embedded tense requires an overlap between the attitude holder’s “now” and the temporal concept perceived by the attitude holder. This gives rise to the simultaneous interpretation of (55)b.

This concludes my discussion of the simultaneous interpretation of Present-under-Past attitude reports. It introduced a novel configuration of the simultaneous de re empty

\[28\text{ The existential quantifier cannot take scope above negation. For a discussion of the interaction between concept generators and downward entailing operators, see Cable (2018).} \]
tense. The proposed account unifies the treatment of tense in relative clauses and complement CPs, showing how embedded tenses in both environments can anchor to the temporal argument of the matrix verb.

In the next subsection, I discuss the temporal interpretation of fronted CPs, which do not allow for the simultaneous interpretation of Present-under-Past and only license the double access interpretation.

6.4. Present tense in fronted CPs

Recall that fronted CPs in examples like (61) do not license the simultaneous Present-under-Past. The only interpretation that (61) allows for is double-access.

(61) That Mary is tired, John announced. (*simultaneous)

In this subsection, I propose an account that predicts this behaviour of fronted CPs.

6.4.1. Background: fronted and in situ CPs differ in semantic types

Fronted CPs in subject and topic positions have been known to leave a type e trace (e.g. Davies & Dubinsky (1999, 2001), Alrenga (2005), Takahashi (2010) and references therein). The relevant evidence comes from the contrast between the so-called hope-class
verbs that do not tolerate a type-e complement and *capture*-class verbs that require a type-e argument. The examples below are from Alrenga (2005):

(62)  *Most baseball fans {hoped/felt/wished/insisted/reasoned} that.

(63)  This formulation of the rule {expresses/captures/reflects/brings out} *(the fact) that these nouns behave differently.

Moreover, *hope*-class verbs are compatible with a CP-complement, but not fronted CPs, whereas *capture*-class verbs are compatible with fronted CPs, but not *in situ* CPs (the last point is already illustrated in (63)).

(64)  a.  Most baseball fans {hoped/felt/wished/insisted/reasoned} that the Giants would win the World Series.

b.  *That the Giants would win the World Series, (I think that) most baseball fans{hoped/felt/wished/insisted/reasoned}.

(65)  That these nouns behave differently is {expressed/captured/reflected/ brought out} by this formulation of the rule.

Many verbs, e.g. *believe* or *think*, are compatible with either a DP or a CP complement. Takahashi (2010) points out that this suggests that an *in situ* CP is of a different type than a moved one. Moreover, the type of an *in situ* CP cannot be referential (because of incompatibility with *capture* in (63) and compatibility with *hope* as in (64)a).
And the type of the trace of a moved CP must be type-e (as the evidence from (64)b and (65) suggests). His proposal is that a CP moves only inside a DP. Thus, a CP that is moving must be generated inside a definite DP. Takahashi (2010: 352-353) writes, “I argue that English has a covert definite determiner, which can take a clausal complement CP as its complement”.

From Takahashi’s (2010) perspective, a CP that moves has the following structure:

(66)  [DP [D' THE [CP that these nouns behave differently]]]

In the next subsection, I adapt this approach to my treatment of the structure and temporal interpretation of CPs.

6.4.2. The temporal interpretation of fronted and in situ CPs

With these basic assumptions about fronted CPs, I believe, the temporal data can be derived. A fronted CP is like a “strong” definite, because it leaves a referential type trace. As we saw in Chapter 5, the temporal argument of the restrictor of a “strong” definite is saturated. For this reason, there is no way that a fronted CP, which is actually a fronted DP, can yield the simultaneous interpretation for a Present-under-Past. The temporal operator that it contains will require that the interpretation be indexical in the way discussed for “strong” objects of fronted verbs in Chapter 5. This explains the lack of the simultaneous interpretation in (61).
Recall the semantics of the temporal operators that occur inside “strong” DPs introduced in Chapter 5:

\[(67)\] \(\llbracket Op{-}Pres\rrbracket^{c,g} = c(\text{time})\)

\[(68)\] \(\llbracket Op{-}Past\rrbracket^{c,d} = g(i), \text{ defined iff } g(i) < c(\text{time})\)

Before I illustrate how exactly I propose to account for the temporal interpretation of fronted CP constructions, I would like to address the question of the structure and interpretation of a moved CP. Above, I followed Kratzer’s (2006) discussion of in situ CPs as predicates of content individuals. But when they move as “strong” DPs, their semantics must be different.

I build on Moulton (2009) and his discussion of Potts (2002). Moulton proposes the following referential version for Kratzer’s (2006) predicative account of CPs (cf. his example (34)b):

\[(69)\] \(\llbracket \text{that we destroy Alaska} \rrbracket = \)

\[t x_c (\llbracket \lambda w. \text{compatible}(x_c)(w) \rrbracket = \llbracket \lambda w. \text{destroy(Alaska)(we)(w)} \rrbracket)\]

According to Moulton (2013: 34), a CP under such an interpretation denotes “the unique individual whose content is expressed by the complement proposition”.

I adopt this idea for my own analysis. Since I follow Kratzer (2006) in treating complementizers as expressions that introduce quantification over worlds and CPs as predicates of content individuals, times and concept generators, my realization of this idea
is somewhat different. Moreover, one crucial component that I believe must be added to the semantics of such a DP inside which a CP moves is the requirement that this DP be “strong”, i.e. contain a temporal operator in its specifier just like strong DPs that I explored in Chapter 5.

Recall the fronted CP construction from (61), repeated below as (70). It can only allow for an indexical interpretation of the embedded Present, which would lead to the double-access interpretation.

(70) That Mary is tired, John announced. (*simultaneous)

The semantics of a CP like that Mary is tired is as shown in (71):

(71) \[\llbracket \text{that Mary is tired} \rrbracket^{g,c} = [\lambda G_{<i,<t,si>>} . \lambda t : g(3) \otimes t . \lambda x_c .
\forall w',t'(\text{compatible}(x_c(w')(t')) \rightarrow \text{Mary is tired in } w' \text{ at } G(g(3))(t')(w'))] \]

The semantics of the definite determiner that applies to a CP, which I call \textsc{TheCP}, is given in (72) and the structure of the whole resulting DP is given in (73):

(72) \[\llbracket \textsc{TheCP} \rrbracket = [\lambda P_{<i,<t,si>>,<i,<e,t>>} . \lambda t . \lambda G_{<i,<t,si>>} . \lambda x(P(G)(t)(x)=1)] \]
Since the temporal operator is located in the specifier of this DP, the temporal argument of the CP gets saturated by the time provided by the operator. The concept generator argument of the CP, however, does not get saturated within the DP. The concept generator argument must be identified with concept generator argument of the verb in order to be specified in relation to the attitude holder. The resulting DP is thus an expression of type \( \langle i, \langle i, si \rangle, e \rangle \). Its interpretation is as follows:

\[
\llbracket (73) \rrbracket^{g,c} = [\lambda G_{<i,<i,si>>} \cdot \lambda x_c (\forall w', t' \text{compatible}(x_c)(w')(t') \rightarrow \text{Mary is tired in } w' \text{ at } G(g(3))(t')(w'))]; \text{defined iff } g(3) \otimes c(\text{time})
\]

The LF predicted for (70) is given in (75) (there is no obvious need for the CP to reconstruct into its base position at LF):
In (75), the raised CP inside a DP-layer leaves a trace of individual type and creates a λ-abstract that binds that trace. The semantics of the attitude verb *announce* is provided in (76). It is similar to the lexical entry for *think* given in (39) above.

\[
\text{[announce]} = [\lambda w . \lambda x_c . \lambda G . \lambda y . \lambda t . y \text{ announces } x_c \text{ in } w \text{ at } t \text{ and } G \text{ is a temporal concept generator for } y \text{ at } t \text{ in } w]
\]
The attitude verb applies to the content argument creating VP². At this stage of the derivation, however, nothing saturates its temporal CG argument. As in previous derivations, the unsaturated temporal CG argument is saturated only temporarily to allow VP² to take the matrix subject as argument yielding an expression of type <i, t>. Then the unsaturated argument over temporal CGs is reintroduced making VP³ an expression of type of type <i, i, si>, i, t>. The following two steps of the derivation are executed in the same manner: the unsaturated argument of the temporal CG gets temporarily saturated and then reappears again as the first argument of the created node. When the past tense is merged, it saturates the temporal argument of VP³ and the unsaturated argument of type <i, i, si> reappears as the first argument of TP⁶. Similarly, when the trace position is abstracted over, the unsaturated temporal CG argument reappears as the first argument of TP⁷.

When DP and TP⁷ compose, TP⁸, which is of type <i, i, si>, t>, is created. The step that allows this composition is special and not something we have seen so far. Yet it consists of familiar components that we have seen many times before. I propose that DP and TP⁵ compose by the following rule:

\[(77) \quad \text{If } \alpha \text{ is a branching node and } \beta, \gamma \text{ are its daughters such that } \llbracket \beta \rrbracket \in D_{<\delta, t>} \text{ and } \llbracket \gamma \rrbracket \in D_{<\delta, <t, \tau>}, \text{ where } \delta \text{ is any semantic type, } \tau \text{ is an individual type and } t \text{ is the familiar type for truth-value denoting expressions, } \llbracket \alpha \rrbracket \in D_{<\delta, \tau>} \text{ and } \llbracket \alpha \rrbracket = [\lambda P_\delta . ([\llbracket \gamma \rrbracket(P))([\llbracket \beta \rrbracket(P))]].\]

In the earlier discussion of ways by which an unsaturated argument could be passed up, the temporary argument saturation applied only to one of the two elements that
composed. Rule (77) temporarily saturates the unsaturated argument position with one and
the same variable in both elements that compose and then introduces one λ-binder over
both variables. This is partly similar to what happens under Predicate Modification (see
(17) in Chapter 5), when both predicates are saturated by one and the same variable which
is then abstracted over. Under Predicate Modification, the two expressions that result after
the temporary argument saturation are conjoined, whereas under (77) the operation that
applies is not conjunction, but function-argument application.39

TP8 is thus created via (77). It is an expression of type <i,<i,<si>>>,t> with the
semantics given in (78):

(78)  \[ \langle TP^8 \rangle^g_c = [\lambda G_{i,<i,<si>>} . John announced (i x_c (\forall w', t' (compatible(x_c)(w')(t')) →
Mary is tired in w' at G (g(3))(t')(w')))) in g(7) at g(1) &
G is a temporal concept generator for John in g(7) at g(1)];
defined iff g(3) \otimes c(time) and g(1) < g(0)

As a next step in the derivation, Existential Closure applies to the unsaturated
argument over temporal CGs. After that, abstracts over times and worlds are introduced in
the left periphery of the matrix TP binding the world argument on announce and the
temporal anchor of the matrix past tense.

The truth conditions predicted for the whole sentence are given in (79):

39 This is something that also happens under Jacobson’s (1999) mode of composition called ε. I will explore
it in more detail in Chapter 8.
\[(79) \quad \llbracket (75) \rrbracket^{g,c}(w)(c(\text{time})) = 1 \text{ iff } \exists G \text{ is a temporal CG for John in } w \text{ at } g(1) \]
& John announced \((\forall x_c)(\forall w',t'(\text{compatible}(x_c)(w')(t') \rightarrow \text{Mary is tired in } w') \text{ at } G(g(3))(t')(w'))\) in \(w\) at \(g(1))\)
\[\text{ defined iff } g(3) \otimes c(\text{time}) \text{ and } g(1) < c(\text{time})\]

According to (79), the time denoted by the embedded simultaneous tense, namely, \(g(3)\), overlaps \(c(\text{time})\) and the time denoted by the matrix past, i.e. \(g(1)\), precedes \(c(\text{time})\). The interpretation that naturally arises is the forward-shifted interpretation that is not available for (70). Recall from Chapters 2 and 3 that the Upper Limit Constraint rules out this interpretation. According to the definition of a temporal concept generator proposed in (11) of Chapter 3, the times that make up the domain of a temporal CG for an individual \(x\) in world \(w\) at time \(t\) cannot follow \(t\). This means that \(g(3)\) cannot be in the domain of any temporal CG for the attitude holder in (70), if it follows \(g(1)\). The only way for \(g(3)\) to be in the domain of the relevant temporal CG is to overlap \(g(1)\) in addition to \(c(\text{time})\). \(g(3)\) thus needs to be stretched in time, as was originally proposed by D. Abusch.

As a result, the double-access interpretation is predicted for (70). Because \(g(3)\) overlaps \(g(1)\), Intensional Isomorphism requires that the temporal concept perceived by the attitude holder overlap the attitude holder’s “now” making the the attitude holder present-oriented. Recall that Intensional Isomorphism is encoded into the meaning of the temporal CG that applies to \(g(3)\) and maps it to the relevant temporal concept (see (11)c as well as the definition of the metalinguistic function ORDER in (9) of Chapter 3). At the same time,
g(3) overlaps c(time) and is, therefore, perceived by the speaker as occurring at his or her “now”.

The temporal morphology on the embedded simultaneous tense is Present because the tense denotes a time that overlaps c(time).

This accounts for the unavailability of the simultaneous Present-under-Past in CP-fronting constructions in a way that is uniform with the behaviour of fronted DPs discussed in Chapter 5.

Finally, let us consider again the double-access interpretation that is available in VP fronting configurations like (54), repeated here as (80):

(80) Say that Sally is tired, John did. (✓ simultaneous, ✓ double-access)

Just like an in situ DP can always have a “strong” interpretation, the CP in (80) can also be interpreted as a “strong” DP that contains an independent temporal operator that anchors the embedded empty tense. Under the double-access interpretation, (80) gets the LF in (81) with the VP in base position:

(81) LF:
The truth conditions predicted for this LF are given below:

\[(82) \quad \llbracket (81) \rrbracket^{\text{gc}}(w)(c(\text{time})) = 1 \text{ iff } \exists G(G \text{ is a temporal CG for John in } w \text{ at } g(1) \text{ and John said } (\mu x_c(\forall w',t'(\text{compatible}(x_c)(w')(t') \rightarrow \text{Sally is tired in } w')) \text{ in } w \text{ at } g(1)); \]

\[\text{defined iff } g(3) \otimes c(\text{time}) \text{ and } g(1) < c(\text{time})\]

As the reader can confirm by comparing it to (79), the truth-conditions in (82) represent a double-access reading for sentence (80).
CHAPTER 7
THE SIMULTANEOUS PRESENT-UNDER-PAST IN WEAK DEFINITES

In this chapter, I explore the availability of Present-under-Past in “weak” definite DPs that are objects to fronted verbs. Such objects include DPs that contain exclusive adjectives (like adjectival only or first), relative superlatives, and possessive “weak” DPs. I repeat that the judgments here are more delicate, but the speakers I consulted could definitely perceive the contrast between the a- and the b-versions.

First, let us note that definite DPs containing exclusive adjectives (1)a-(2)a seem to exceptionally allow for simultaneous readings of Present-under-Past:

(1) a. Point at the only participant who is left standing, John did. (**sim)
    b. Point at the participant who is left standing, John did. (**sim)

(2) a. Question the first witness who has a desire to speak, the detective did. (**simultaneous)
    b. Question the witness who has a desire to speak, the detective did. (**simultaneous)

Such simultaneous readings are also possible in definites containing superlative constructions (3)a.

(3) a. Inspect the youngest patient who has a high temperature first, Mary
b. Inspect the patient who has a high temperature first, Mary did. (*simultaneous)

Finally, we see in (4)a and (5)a that definite DPs containing relational nouns
accompanied by non-referential, “weak” possessors also appear to allow for simultaneous
Present-under-Past readings.

(4) Everyone expected that the committee members would not limit themselves to
discussing the work of the students in the audience. And so…

a. Discuss the work of some students who are absent, they also did
after the first break. (*simultaneous)

b. Discuss the work that is relevant, they did after the first break. (*simultaneous)

(5) a. Greet the parents of a student who is embarrassed, Mrs. Smith did.

(*simultaneous)

b. Greet the parents who are embarrassed, Mrs. Smith did.

(*simultaneous)

In my discussion of these cases, I appeal to the literature that suggests that the
determiners in such DPs function as identity functions. I propose that these DPs can have
a predicative interpretation with the referential component coming from elsewhere. This allows me to analyze these cases in the spirit of the analysis applied to weak indefinites.

7.1. Two types of definites

The literature distinguishes between definites in which the NP complement of the definite determiner expresses a unique property and definites in which the NP does not. Each class can be viewed as consisting of two types of definites.

The first class of definites, in which the NP indicates a unique property, contains definites in which the NP can be said to do this overtly (due to the meaning of the expressions it contains). An example is provided in (6):

(6) The richest man in town is running for mayor.

The uniqueness condition associated with the DP can be said to arise from the meaning of the superlative. The NP is then associated with a singleton set by its own meaning (the meaning of the pronounced words).

This class of definites also contains those in which the pronounced NP does not by itself denote a singleton set, but it is contextually understood to express a unique property. Schwarz (2009: 38) illustrates this with example (7a) from Krifka (1984), which is contrasted with (7)b:
(7) What is going on?
   a. The mailman is coming.
   b. ?The man is coming.

He quotes Krifka’s discussion of the difference: “The mailman [...] refers to a particular functional role that is no more required to be introduced in domestic contexts than unique entities such as the moon. The man, however, can only refer to a referent introduced in the ongoing discourse in most contexts. Being a man usually does not identify one entity in the common world knowledge of speaker and hearer" (p. 39).

In other words, by its own meaning the NP mailman, unlike the NP strongest man, does not denote a singleton set. However, it can be used contextually as an NP that picks out a singleton set, given our common knowledge that mailman usually describes some particular individual.

Definites that belong to this class are called weak and are believed to presuppose uniqueness (i.e. the definite article they contain is defined only for those NP arguments that denote a singleton set).

Since the uniqueness condition in “weak” definites is already present in the NP, the semantic contribution of the determiner can be viewed as the same as that of the indefinite determiner a(n). Yet, a(n) is not licensed with such NPs (especially with those in which the uniqueness condition is expressed by an element that is pronounced: *a strongest man). The infelicity of the indefinite determiner with such NPs can be accounted for in terms of the pragmatic principle “Maximize Presupposition!” maxim (Heim 1991, Percus 2006, Schlenker 2012). We can think of a general pragmatic principle that requires us to choose
the definite determiner whenever the uniqueness condition is accepted by the participants of a discourse. The use of the indefinite article would then signal that there is an “anti-presupposition” according to which the description provided by the NP component is not unique. Examples like *a strongest man trigger a clash between the content of the NP and the “anti-presupposition” of the indefinite.30

Thus, if the use of a in weak definites is ruled out by independent considerations, then there is no obvious problem with treating the inside such definites as an equivalent of a.

The second class of definite descriptions, where the NP does not express a unique property, can also be divided into two types, the first of them being the so-called “bound”-definites, i.e. definites that function as bound variables. An example from Elbourne (2005b) is given in (8):

(8) Mary talked to no senator before the senator was lobbied.

In (8), the definite is associated with a variable bound by the quantifier no senator. No uniqueness of the property of being a senator is assumed here. The denotation of the definite is still of type e. When a definite is bound, its denotation varies along with the objects that its binder quantifies over. The ability to be bound suggests the presence of a

30 I use anti-presupposition (of uniqueness) associated with the indefinite article with scare quotes because there is much more to be said about this phenomenon in light of the known cases when it does not behave as a presupposition (Sauerland 2008, Alonso-Ovalle et al. 2011).
pronominal element in the structure of this kind of definite. If so, then it is natural to expect that this kind of definite could be used with the pronominal element being free. Elbourne (2005b) argues that the example reproduced in (9) below is a case of such use:

(9) Senator Thad Cochran, the Mississippi republican, announced today that...

The definite in (9) is referential even though there is more than one republican in Mississippi. This suggests that the uniqueness requirement, which is not satisfied by the NP in the world of evaluation, ends up being satisfied due to the contribution of the definite determiner. Elbourne (2005b) suggests that the referential status of this definite comes from the pronominal element provided by the definite determiner. This pronominal element is free in (9) and is interpreted with respect to the relevant assignment function that assigns the correct individual to it.

Definites that have this deictic element are called strong. Elbourne (2005) suggests that the difference between strong and weak DPs accounts for Donnellan’s (1966) famous distinction of the referential and attributive uses of definite descriptions.

7.2. Simultaneous Present in “weak” definites with an exclusive adjective

In this subsection, I account for the simultaneous Present-under-Past in (1)a and the contrast between (1)a and (1)b, repeated below in (10):
(10)  
   a.  Point at the only participant who is left standing, John did.  (*sim)
   b.  Point at the participant who is left standing, John did.  (*sim)

Coppock & Beaver (2012) explore definites that contain *only* and argue that in predicative positions and sometimes in argument positions such definites do not introduce existence presuppositions:

(11)  Scott is not the only author of *Waverley*.

(12)  Anna didn’t give the only good talk at SALT.

The sentence in (11) can be true in a situation where there is more than one author of *Waverley*, and the sentence in (12) can be true if there was more than one good talk at SALT. They argue that such definites should be associated only with a *weak uniqueness presupposition*, which requires the cardinality of the predicate to be no greater than one. They propose the following lexical entry for *the*:

(13)  \[
\langle \text{the}_{\text{weak}} \rangle = [\lambda P: |\lambda y . P(y) = 1| \leq 1 . P]
\]

As seen from this definition, *the*_{weak} is an identity function defined for singleton sets. The uniqueness of an NP like *only good talk at SALT* is contributed by adjectival *only*, which they take to have the following semantics, where \( \subseteq_i \) stands for Link’s (1983) individual-part relation and \( *P \) stands for the individual sum operation:
(14) \[\text{[ONLY]} = [\lambda P \cdot \lambda x: P(x) = 1 \cdot \forall y(x \triangleleft y \rightarrow \neg^* P(y) = 1)]\]

When it combines with the predicate \textit{good talk at SALT}, it yields a predicate with a semantics implies that uniqueness of the described property that the weak definite determiner can select for.

In predicative positions where no discourse referent is introduced, weak definities retain their predicative status. In argumental positions where a discourse reference is introduced, Coppock & Beaver (2012) apply one of Partee’s (1986) type-shifters (A or IOTA) to make sure that the individual argument of the predicative definite gets saturated.

I observe that Coppock & Beaver’s (2012) proposal is compatible with McNally & Van Geenhoven’s (1998) and Chung & Ladusaw’s (2004) treatment of predicative indefinites and their composition with transitive verbs discussed in Chapter 5. Recall that according to their proposal the unsaturated individual argument on a predicative indefinite was saturated in the process of its composition with the transitive verb. According to McNally & Van Geenhoven (1998), a transitive verb could optionally take a predicative argument, identify its unsaturated internal argument with the predicate’s unsaturated individual argument, and close the unsaturated position with existential closure. In terms of Chung & Ladusaw’s (2004) approach, a predicative DP composed with the verb by Restrict and the unsaturated internal argument position on the resulting predicate was closed off by an application of Existential Closure as a next step in the derivation.

Here, I extend Chung & Ladusaw’s (2004) treatment to cases of “weak” definite objects. A transitive verb like \textit{point at}, which is of type \(<e,<e,it>>\) composes with a predicative argument of type \(<e, it>\) by Restrict. All the unsaturated arguments of the
predicative DP are identified with the corresponding arguments of the verb: the individual argument of the DP is identified with the internal argument of the verb and its temporal argument is identified with the temporal argument of the verb. The resulting expression is still of transitive type \(<e,<e,it>\). After that, Existential Closure applies to the internal individual argument position. The temporal argument is saturated by the matrix tense.

In example (10)a, the weak definite the only participant is composed of three elements that have the semantics given below:

\[
\text{(15)} \quad \llbracket \text{participant} \rrbracket = [\lambda x . \lambda t . \text{x is a participant at } t ]
\]

\[
\text{(16)} \quad \llbracket \text{ONLY} \rrbracket = [\lambda P_{<e,it>} . \lambda x. \lambda t. P(t)(x) = 1 \& \forall y(x \sqsubseteq y \rightarrow \neg \text{participant}(y)(t) = 1)]^{31}
\]

\[
\text{(17)} \quad \llbracket \text{the weak} \rrbracket = [\lambda P_{<e,it>} . \lambda x . \lambda t: [\lambda y . P(y)(t) = 1 \leq 1] . P(x)(t) = 1]
\]

Since \llbracket \text{only} \rrbracket composes with \llbracket \text{participant} \rrbracket only when it denotes a singleton set, the result of their composition, i.e. \llbracket \text{only participant} \rrbracket, satisfies the presupposition of \llbracket \text{the weak} \rrbracket. The only participant, thus, receives the following denotation:

\[
\text{(18)} \quad \llbracket \text{the only participant} \rrbracket = [\lambda x . \lambda t . \text{x is a participant at } t \& \forall y(x \sqsubseteq y \rightarrow \neg \text{participant}(y)(t))]
\]

---

<sup>31</sup> This lexical entry is a simplification of the original version proposed by Coppock & Beaver’s (2012) and provided in (14). Here, ‘P(t)(x) = 1’ is part of the value statement and not the presupposition.
After times are introduced into the semantics of NPs, the lexical entry of *point at* becomes as shown in (19):

\[
\text{[point at]} = [\lambda y. \lambda x. \lambda t . x \text{ points-at } y \text{ at } t]
\]

With this semantics, we can get back to the contrast in (1), repeated below, and, in particular to (20)a, which allows for the simultaneous reading:

\[
\begin{align*}
(20) & \quad \text{a. Point at the only participant who is left standing, John did.} & (\sim \text{sim}) \\
& \quad \text{b. Point at the participant who is left standing, John did.} & (*\text{sim})
\end{align*}
\]

I assume that the RC *who is left standing* contains the simultaneous tense and has the structure in (21) and the interpretation in (22):

\[
\begin{align*}
(21) \quad & \quad \text{RC} \\
& \quad \lambda_1 \quad \text{TP}^2 \\
& \quad \lambda_2 \quad \text{TP}^1 \\
& \quad \emptyset_3^2 \quad t_1 \quad \text{VP} \\
& \quad \text{is left standing}
\end{align*}
\]

\[
\text{[(22)]} = [\lambda x . \lambda t : t \otimes g(3) . x \text{ is left standing at } g(3)]
\]

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The composition of *participant* and *who is left standing* proceeds by Predicate Modification:

(23) \[ [\text{participant who is left standing}]^g = [\lambda x. \lambda t: t \otimes g(3) . x \text{ is a participant at } t & x \text{ is left standing at } g(3)] \]

The DP is generated when *the*weak applies to the result of the composition of *only* and *participant left standing*.

(24) \[ [\text{only participant who is left standing}]^g = [\lambda x. \lambda t: t \otimes g(3) .
\]
\[ x \text{ is a participant at } t & x \text{ is left standing at } g(3) & \forall y(x \sqsubseteq_i y \rightarrow
\]
\[ \neg^* [y \text{ is a participant at } t & y \text{ is left standing at } g(3)] \]

The predicative DP *the only participant who is left standing* describes an individual who is the only participant left standing iff there is only one such individual. This requirement is automatically satisfied in light of the presupposition of *only* (see Coppock & Beaver 2012: 535-536). Thus, \[[\text{the}_\text{weak}]\] does not introduce any restriction on the denotation of any ‘only NP’ when it combines with it. For this reason, I do not mention it in (25):

(25) \[ [\text{the only participant who is left standing}]^g = [\lambda x. \lambda t: t \otimes g(3) .
\]
\[ x \text{ is a participant at } t & x \text{ is left standing at } g(3) & \forall y(x \sqsubseteq_i y \rightarrow
\]
\[ \neg^*[y \text{ is a participant at } t \& y \text{ is left standing at at } g(3)] \]

To generate the fronted VP in (20)a, first the verb *point at* composes with the predicative definite by Restrict. The semantics of the resulting expression is given in (26):

\[
(26) \quad \llbracket VP \rrbracket^g = \text{Restrict}(\llbracket \text{point at} \rrbracket^g)(\llbracket \text{the only participant who is left standing} \rrbracket^g) = \\
[\lambda x . \lambda z . \lambda t: t \otimes g(3)] .
\]

\[ x \text{ is a participant at } t \& x \text{ is left standing at } g(3) \& \forall y(x \sqsubseteq_i y \rightarrow \neg^*[y \text{ is a participant at } t \& y \text{ is left standing at at } g(3)] \& z \text{ point at } x \text{ at } t] \]

Next, the internal argument of this expression is closed by Existential Closure, giving us the denotation of the fronted VP in (20)a:

\[
(27) \quad \llbracket \exists \text{ VP} \rrbracket^g = [\lambda z . \lambda t: t \otimes g(3)] .
\]

\[ \exists x (x \text{ is a participant at } t \& x \text{ is left standing at } g(3) \& \forall y(x \sqsubseteq_i y \rightarrow \neg^*[y \text{ is a participant at } t \& y \text{ is left standing at at } g(3)] \& z \text{ point at } x \text{ at } t)] \]

In (26), the temporal arguments of the DP and the verb have been identified. The temporal anchor of the embedded tense is now dependent on the time that will saturate the temporal argument of the verb (i.e. the time that is provided by the matrix tense). In (27), the internal argument of the resulting predicate is saturated by Existential Closure making the fronted VP an expression of type \(<e, it>\).

The structure of this VP looks as shown in (28).
At LF, VP\(^4\) is in base position as shown in (29):
The truth conditions predicted for (20)a with the LF in (29) are given in (30):

(30) \([\text{(29)}]_{g.(c.(\text{time}))} = 1 \text{ iff}
\begin{align*}
\exists x \text{(} & x \text{ is a participant at } g(5) \& x \text{ is left standing at } g(3) \& \forall y (x \sqsubseteq_i y \rightarrow \\
& \neg [y \text{ is a participant at } g(5) \& y \text{ is left standing at } g(3)]) \& \\
& \text{John pointed at } x \text{ at } g(5))
\end{align*}
This interpretation is simultaneous under Past because \( g(5) \) precedes \( c(\text{time}) \) and \( g(3) \) overlaps \( g(5) \).

At surface structure, \( \text{VP}^4 \) is in the fronted position and the embedded simultaneous tense stays outside the scope of the matrix Past, as illustrated in (31).

![Diagram](image)

The embedded simultaneous tense surfaces with default present tense morphology making (20)a an instance of the simultaneous Present-under-Past.

The sentence in (20)b contains a strong definite to which the described analysis is not applicable. The strong determiner in (20)b contains a temporal operator that does not
allow the tense it embeds to get a simultaneous interpretation. The analysis of (20)b proceeds along the lines suggested in Chapter 5.

The analysis of examples like (2) proceeds along the same lines. The presence of the exclusive adjective *first* inside the definite object in the a-version leads to the weak interpretation of the whole definite. The definite composes with the verb in a way that allows it to identify the temporal anchor of the embedded tense with the temporal argument of the matrix verb licensing the simultaneous Present-under-Past. In the b-version, the definite objects remain “strong” and do not license the simultaneous Present-under-Past.

7.3. Other cases of “weak” definites that license the simultaneous Present-under-Past

In this subsection, I discuss the two remaining cases of “weak” definites: comparative superlatives and the weak possessives. I build on the literature in which the determiner in such DPs has been argued to behave as an identity function. I establish structural similarities between these weak definites and the ones described above, and propose that the same kind of analysis as the one I developed in the previous section applies for these DPs as well.

Szabolcsi (1986) discusses comparative superlatives that do not behave as other definites and pattern with indefinites as far as some extraction and preposition stranding facts are concerned. In (32), preposition stranding is licensed in the indefinite and the relative superlative, but not in the definite.
(32)  a. Who did you take a picture of?
b. *Who did you take the/every picture of?
c. Who did you take the best picture of?

Szabolcsi points out that the sentence in (32)c does not have the absolute reading according to which there is someone with various pictures of themselves of whom the best one was taken by the addressee and the question is about the identity of that person. The only reading (32)c has is the one according to which in a set of pictures of different people that the addressee took one is the best and the question is about the identity of the person on that picture. What is important here is the role of the definite determiner: it is not so much about a concrete picture that was taken by the addressee, but rather about the best one out of the various ones that the addressee took. Szabolcsi (1986) writes, “At the level of picture-taking we do not have any definite “best picture”. The comparison that makes this object “the best” arises at a different level. ...[A]t the crucial level the object of take is, or counts as, an indefinite” (p. 2).

In order to demonstrate that these constructions are non-definite, despite their appearance and that they actually pattern with indefinites, she provides examples like (33)-(34) to show that superlatives under a comparative interpretation (suggested by the presence of focus) are licensed in existential constructions, just like indefinites:

(33)  a. *Yesterday there was the largest box of chocolate on the table.
b. There was the largest box of chocolate on the table YESTERDAY.
There was the best picture of some student hanging on the wall.

With reference to Hungarian data where overt focus movement is required, she argues that, just like wh-movement, focus movement (covert in English) creates a configuration that can be used to determine the frame of comparison: the focused item moves covertly and the gap position is substituted with other relevant elements creating the frame of comparison. In a sentence like (32)c, the gap position created by wh-movement is used to create a set of pictures of other people and the superlative then is supposed to apply to that set, picking out the best of them. In (33)b, the gap position allows us to consider a set of days (other than yesterday, when there was a box of the table). With respect to (32)c Szabolcsi writes, “The existence of the comparative reading is contingent on wh-movement – the possibility of wh-movement in (32)c is contingent on the indefiniteness of the object, and hence the existence of the comparative reading, however” (p. 12.).

Szabolcsi (1986) thus shows that the direct object in (32)c must behave as indefinite and that focus or wh-movement of a definite DP like yesterday or who creates a sort of indefiniteness effect in the position they normally occupy leading to the overall indefinite interpretation of the object position.

Sharvit (2015) also explores comparative superlatives like the tallest boy I talked to whose behavior she calls non-definite. Building on Szabocsi (1986) and Heim (1999), she proposes that the definite determiner may delete only when the DP contains -est (the superlative morpheme). When the definite determiner deletes, it becomes an equivalent of an indefinite determiner. -est must always move for reasons of interpretation. If -est moves across the definite determiner, the latter must delete. The contrast between an absolutive
and a comparative interpretation of the superlative is determined by whether -est has moved across the leading to its deletion.

An in-depth investigation of this proposal lies beyond the scope of this discussion and for more details I refer the reader directly to Sharvit (2015). Here, I would only like to point out that if the contribution of the definite determiner inside a comparative superlative is that of an indefinite, then the analysis proposed above for indefinites should in principle be applicable to comparative superlatives. In other words, the object DP in example (3)a, repeated below in (35)a can have its determiner deleted due to the presence of -est and must have it deleted under the comparative superlative interpretation.

(35)  a.  Inspect the youngest patient who has a high temperature first, Mary did.  (simultaneous)

       b.  Inspect the patient who has a high temperature first, Mary did.

 (*simultaneous)

The availability of the option of deleting the and turning it into an equivalent of a should license the simultaneous Present-under-Past in examples like (35)a if such an interpretation is licensed for indefinites.

Finally, building on Bhatt (2002, 2006), Sharvit (2015) proposes that the only NPs pattern with the A-est NPs because they are phonemic realizations of one and the same morpheme. This proposal also serves as indirect support for my proposal that the availability of the simultaneous Present-under-Past in indefinite objects as well as in the
two kinds of weak definites discussed above should be accounted for in terms of one and
the same mechanism.

Definites containing relational nouns followed by an of-phrase have also been
argued to be weak. Poesio (1994) shows that, unlike the familiar “strong” definites, such
weak ones can be used in existential constructions:

(36) a. *There is the student in the garden.
b. There is the student of a linguist in the garden.

Poesio (1994: 283) discusses the sentence in (37), which has the meaning paraphrased in
(37)b:

(37) a. John got these data from the student of a linguist.
b. There is a linguist, and there is a student of that linguist, such that
John got the data from that student.

Poesio’s (1994) proposal is an early version of the view that “strong” definites
contain a deictic element that refers to an entity. He proposes that definites are weak when
when the deictic element is “anchored” (i.e. resolved by something other than the
assignment function (e.g. existential closure, unselective quantification, etc.)).

He argues that a DP like the student is strong with the deictic component being
resolved by the assignment function. In a DP like the student of a linguist, student can have
a relational interpretation (being of type \(< e, et >\) as proposed in Barker (1991)). In that case, the deictic component can be saturated by the argument provided by the of-phrase. This, according to Poesio (1994) neutralizes the presuppositional nature of the “strong” determiner the allowing it to provide the weak, indefinite-like interpretation described in (37)b.

Building on McNally (1998), who shows (for English) that existential constructions require the DP (the pivot nominal) to have a property denoting interpretation (see also McNally (to appear)), I propose that definite objects accompanied by “weak” possessive objects discussed by Poesio (1994) as having an indefinite-like interpretation can have a predicative interpretation. This allows me to claim that weak possessive DPs can interact with a transitive verb along the lines suggested above for indefinites or weak definites.

As far as the temporal interpretation is concerned, this entails that the availability of the simultaneous Present in the a-versions of (4) and (5), repeated below, should also follow.

(38) Everyone expected that the committee members would not limit themselves to discussing the work of the students in the audience. And so…

a. Discuss the work of some students who are absent, they also did after the first break. (*simultaneous)

b. Discuss the work is relevant, they did after the first break.

(*simultaneous)
(39)  a. Greet the parents of a student who is embarrassed, Mrs. Smith did.

(*) simultaneous

b. Greet the parents who are embarrassed, Mrs. Smith did. (*sim)

As before, the b-versions of these sentences contain “strong” definite DP objects that do not license the simultaneous Present-under-Past.
CHAPTER 8
BINDING BY A QUANTIFIER AS A LICENSOR OF THE SIMULTANEOUS PRESENT-UNDER-PAST

In examples like (14) from Chapter 4, repeated below, we see another case of definite objects that allow for the simultaneous Present-under-Past:

(1)  a. Meet the guy who is in love with her mother, every girl did five years ago. (*simultaneous)
    b. Meet the guy who is in love with her mother, Mary did five years ago. (*simultaneous)
    c. Meet the guy who is in love with Bill’s mother, Mary did five years ago. (*simultaneous)

Observe that on the surface the definite in (1)a does not look like a “weak” definite in the sense that the NP guy who is in love with her mother need not necessarily pick out a singleton set. What makes it different from the indefinite objects in (1)b,c, which do not license the simultaneous Present-under-Past, is the presence of a pronoun that is bound by a matrix quantifier. Observe also that if the pronoun is anaphoric on a non-quantificational antecedent, as illustrated in (1)b, the simultaneous interpretation still does not arise.

In what follows, I present my proposal that accounts for the data in (1)a and discuss its constrast with (1)b,c. However, before I present the account, I lay out the theoretical background that I will use in my analysis. I begin with a discussion of the approach to
binding that is used in the framework of Direct Compositionality. It involves viewing pronouns as expressions of type $<e,e>$ and their special modes of composition with predicates. I show that this mode of composition involves argument identification as one of its components. Since argument identification was the mechanism that allowed embedded tenses to anchor to the temporal argument of the matrix predicate and eventually license the simultaneous Present-under-Past in fronting constructions, I propose that argument identification under quantificational binding in sentences like (1)a, also licences anchoring embedded tenses to the temporal arguments of verbs leading to the simultaneous Present-under-Past.

I adopt Kratzer’s (2004) treatment of quantifiers as expressions that can introduce existential quantification over situations in their restrictor. Building on Schwarz’s (2009) discussion of quantifiers in situation semantics, I adapt Kratzer’s treatment to quantifiers in situation semantics to my treatment of tenses.

Equipped with these tools, I generate the LF and derive the truth conditions of (1)a. Then I discuss the problem of the contrast between (1)a and (1)b. The treatment proposed for (1)a should be extendable to cases like (1)b (and, potentially, to (1)c). Yet, the lack of the simultaneous Present-under-Past in (1)b,c suggests that this does not happen. I do not provide a justified solution for this problem, but outline a possible answer that has to do with economy considerations leaving a more detailed investigation of future research.
8.1. Two approaches to pronominal binding

According to the textbook approach to quantification and binding (e.g. Heim & Kratzer (1998)), in order to bind a pronoun a quantifier must undergo QR leaving a trace in its base position and creating a λ-abstract that binds the index on the trace and on the pronoun that must be bound. Under this perspective, the the non-fronted version of (1)a provided in (2)a is predicted to have the LF in (2)b. (For the purposes of the exposition in this subsection, I do not introduce times into the semantics of predicates. Here, NPs are expressions of type <e, t> and transitive verbs are of type <e, et>.)

(2) a. Every girl \(_{1}\) met the guy who was in love with her \(_{1}\) mother.

b. 
\[
S^2
\quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quan...
This DP composes with the verb by Function Application. The verb is of type 
\(<e,et>\) and the DP saturates its internal argument. The VP, which results from this 
composition is an expression of type \(<e,t>\).

A different way of looking at a derivation like this is suggested in the framework 
of Direct Compositionality (e.g. Jacobson (1999)). In this tradition, pronouns are 
interpreted as identity functions of type \(<e,e>\) and verbs have their familiar types (\(<e,t>\) for intransitive and \(<e,et>\) for transitive ones). A sentence like *He smokes* is an 
expression of type \(<e,t>\) just like the verb *smokes* (it is assumed that the context of a 
particular utterance of the sentence saturates the unsaturated individual argument position 
to make it an expression of type \(t\)). In order to compositionally derive *He smokes* of type 
\(<e,t>\) from *smokes* (\(<e,t>\)) and *he* (\(<e,e>\)) the familiar rule of Function 
Application will not do. A different rule of composition is needed. The appropriate one is 
the rule of Function Composition discussed in Chapters 2 and 6 and defined again in (4).

(4) Function Composition (FC)

If \(X\) is a (binary branching) node with daughters \(Z\) of type \(<a,\beta>\) and \(Y\) 
of type \(<\beta,\gamma>\), then \([X] = [\lambda f_a . \left[ Y \right]([Z](f))]\)

By FC, *He smokes* denotes \([\lambda x_e . \left[ \text{smokes}_{<e,t>} \right]([\text{he}_{<e,e>]}(x))]\), which is a 
fraction of type \(<e,t>\). As was said in Chapter 2, an important component of FC is that 
it allows an unsaturated argument of an expression to percolate up the derivation tree.
Observe that before he combines with smokes, its unsaturated individual argument is saturated by a variable, which makes the result an expression of type e and a suitable argument for the verb to apply to by FA. However, after the verb applies to that argument and outputs an expression of type t, a \( \lambda \)-abstract that binds the variable that originally saturated the argument position of the pronoun is added into the meaning of the resulting expression.

I provided this simple illustration just to give a taste of the mechanics of Direct Compositionally to the reader who might not be familiar with it and to show how pronouns can work when they are understood as identity functions. Our main goal here is comparison of two approaches to the derivation of the bound interpretation of her in (2)a.

Jacobson (1999) treats bound variables also as expressions of type \(<e,e>\). In her system, binding does not arise from movement. It becomes possible because of different modes of semantic composition between constituents that contain bound variables and their “binders”.

The definite in (2)a is now an expression of type \(<e,e>\). Normally, definite DPs like the father of John are expression of type e. However, the DP in (2)a contains a variable which is of type \(<e,e>\). We already saw how FC allowed an unsaturated argument of an expression to “percolate up the derivation tree” so that the expression could combine with its sister by FA. This is exactly what happens in the derivation of the definite the guy who is in love with her mother, where her is understood to be a bound variable. When the pronoun enters the derivation, its unsaturated argument is allowed to be “passed up” all the way up to the level of the DP. The definite thus becomes an expression of type \(<e,e>\) with the semantics in (5):
(5) \[\text{[the guy who is in love with her mother]}_{\langle e, e \rangle} =
\]
\[
= [\lambda x. \, y(\text{guy}(y) \& \text{in}_x\text{love}_x\text{with}_x'\text{smother}(y))]
\]

When this definite combines with the verb *meet*, which is of type \(<e, et>\), the external argument of the verb and the unsaturated argument of the DP are identified in the resulting expression and the definite is fed to the verb as its internal argument. The resulting expression *meet the guy who is in love with her mother* is of type \(<e, t>\).

The mode of composition that makes this possible requires a type shifter called \(z\), which applies to the verb. According to Jacobson (1999: 132), \(z\) applies to an expression \(\alpha\) of type \(<a, <e, b>>\) and maps \(\alpha\) to a function of type \(<<e, a>, <e, b>>\) “in such a way that the original \(e\) argument slot “binds” the newly created argument position”. Jacobson continues, “if \(x\) stands in the \(z\)-love’-relation to some function \(f\) (from individuals to individuals [i.e. of type \(<e, e>>\)) then \(x\) stands in the \(z\)-love’-relation to \(f(x)\).” If we treat \(z\) as a type-shifter that accompanies linguistic expressions, then the semantics of an expression type-shifted by \(z\) can be defined in the following way (6):

(6) If \(\alpha\) is an expression of type \(<a, <e, b>>\), the expression \([z[\alpha]]\) is of type
\[
<\langle e, a>, <e, b>>\] and \([z[\alpha]]\] = \([\lambda G_{<e, a>}. \lambda x. \, [\alpha](G(x))(x)]\).

The very same idea can be presented as a rule of semantic composition that I will call \(Z\):
(7) If $\alpha$ is an expression of type $<a,<e,b>>$ and $\beta$ is an expression of type $<e,a>$, then $Z(\alpha,\beta) = [\lambda x \cdot \alpha(\beta)(x)]$.

Getting back to our example, the verb meet is of type $<e,et>$ and the DP the guy who is in love with her mother is of type $<e,e>$. If they compose by $Z$, the resulting expression meet the guy who is in love with her mother has the following interpretation: $[\lambda x \cdot x$ meets the guy who is in love with $x$’s mother]. The unsaturated argument on the definite has been identified with the external argument of the verb and the definite saturated the verb’s internal argument.

8.2. Argument identification licenses the simultaneous Present

In all the cases where the simultaneous Present-under-Past was licensed inside a fronted constituent, the mode of composition between the verb and its complement could be said to involve some kind of argument identification.

In Chapter 5, “weak” DP objects were treated as predicates that composed with the verb by Restrict. In its simple version that did not account for times in the semantics of predicates (see (24) in Chapter 5), Restrict composed expressions of type $<e,et>$ and of type $<e,t>$ allowing the latter to modify the internal argument of the former. I proposed that whenever temporal arguments are also taken into account, Restrict allows for an identification of the temporal arguments of two constituents in addition to their individual arguments (see (25) in Chapter 5). Thus, when an expression of type $<e,it>$ composed with
an expression of type \( <e, <e, it> > \), the former could function as a modifier of the internal individual argument and the temporal argument of the latter. This modification was achieved by an identification of the individual and temporal arguments of the two expressions. The result was still of type \( <e, <e, it> > \) and the unsaturated internal individual argument was then closed by an application of Existential Closure, whereas the temporal argument was saturated by tense. This is how argument identification involved in Restrict licensed the simultaneous interpretation. The same analysis was extented to “weak” definite objects in Chapter 7.

When I discussed Musan’s (1995) examples of “weak” DPs in existential constructions, where they also received a dependent temporal interpretation, I said that as predicates “weak” DPs composed with the main verbs by Predicate Modification (see the discussion in section 5.1.2 of Chapter 5 and the definition in (17)). Two expressions of type \( <e, it> \) composed to yield another expression of type \( <e, it> \). Predicate Modification identifies the arguments of two expressions leading to their simultaneous interpretation.

The simultaneous interpretation of Present-under-Past in complement CPs discussed in Chapter 6 also obtained because of the mode of composition between the CP and the verb that involved argument identification. Restrict that was used to identify the content individual arguments on the CP and the attitude verb was understood to also allow the indentification of the temporal argument of the verb with the unsaturated temporal argument of the CP which served as the anchor of an embedded \( de re \) tense.

The “strong” DPs I looked at above do not license the simultaneous Present-under-Past. I said that they either do not have unsaturated arguments that they identify with the verb (as was in the case of “strong” objects or fronted DPs in Chapter 5), or even when
they do (as was in the cases of fronted CPs in Chapter 6) they composed not with a verb, but with a constituent that does not have an unsaturated temporal argument (see example (75) in Chapter 6).

I also assumed that a DP could have a “weak”, dependent interpretation only if it is not fronted. Following Diesing (1992), I assumed that fronted DPs were always strong. One of the characteristics of a “strong” DP was the presence of an independent temporal operator in its specifier. Thus, “strong” DPs were always “temporally independent”.

Thus in the examples explored so far argument identification was the licensor of the simultaneous Present-under-Past. It allowed an embedded tense to to anchor to the temporal argument of a matrix verb. Whenever argument identification occurred between two constituents and the identification of temporal arguments was available, the simultaneous Present-under-Past arose. I treat argument identification as an operation, a mode of semantic composition. It can be an operation by itself as is demonstrated by Predicate Modification or Restrict, which consist of nothing more than argument identification. But argument identification can also be a component in rules of semantic composition that involve other operations. This is the case with rule Z or a very similar rule (77) in Chapter 6, in which argument identification is accompanied by Function Application.

In the cases explored in this chapter, argument identification is part of more complicated rules of semantic composition. Constituents that I will discuss will compose with their complements by rules that will involve argument identification and Function Application. Application of those rules will give rise to the simultaneous Present-under-Past in fronting constructions.
8.3. Kratzer (2004): “strong” DP objects with bound situation arguments

Kratzer (2004) explores example (8) under the reading according to which every student is paired with a separate list of jobs and is understood to have finished every job on that list.

(8) Every student finished every job.

Schwarz (2009) provides a detailed discussion of how the correct truth conditions for (8) can be generated in the framework of situation semantics. As was said in Chapter 5, he suggests that “strong” determiners take an extra situation argument that saturates the situation argument of the NP restrictor of every. At LF, this extra situation argument is represented with a variable over situations. This variable can be free or bound. A DP like every job has the following structure:

(9) \([DP [D\_every\_s\_1 [NP job]]]\]

The lexical entry for the determiner every can be as follows:\(^\text{32}\):

(10) \([every]^{g}=[\lambda s_1.\lambda P_{<e,\_st>}.\lambda Q_{<e,\_st>}.\lambda s'.\_s'.\_\forall x(P(x)(s_1)=1 \rightarrow Q(x)(s')=1))]\]

---

\(^{32}\) The lexical entries provided here are simplified versions of the lexical entry actually proposed by Schwarz (2009). For more accurate lexical entries and discussion, see his Chapter 3.
However, in order to capture the abovementioned reading of (8), the two requirements in (11) must be satisfied:

(11) a. for each student, there must be a separate situation in which she finished every job (i.e. a co-variation between students and events of finishing every job);

b. for each student, the list of jobs all of which have been finished must also be different (so a co-variation between students and lists of jobs is also needed).

In order to capture the first requirement, determiner every must be able to introduce an existential quantifier that saturates the situation argument in its nuclear scope. The relevant lexical entry for every is given in (12):\(^{33}\):

\[
[\text{every}_\exists] = [\lambda s_1 . \lambda P_{<e, st>} . \lambda Q_{<e, st>} . \forall x(P(x)(s_1) = 1 \rightarrow \exists s'(Q(x)(s') = 1))]
\]

This lexical entry allows sentences like (13) to be true in a scenario where different contextually relevant students arrived at different times.

\(^{33}\) See Schwarz (2009: 114-119) for a detailed discussion of a more accurate version of (12).
(13) Every student arrived.

The LF and truth conditions predicted for (13) are given in (14) and (15), respectively:

(14) \[ \text{TP} \ [\text{DP} \text{ Every-st student}] \ [\text{VP} \text{ arrived}] \]

(15) \[ \llbracket (13) \rrbracket^g = 1 \text{ iff } \forall x (x \text{ is a student in } g(2) \rightarrow \exists s'(x \text{ arrived in } s')) \]

In order to satisfy the second requirement and introduce co-variation between students and “lists” of jobs, Schwarz (2009) identifies the independent situation argument inside every job with the situation argument taken by the verb finished using Büring’s (2004) operator \( \Sigma_n \) defined syncategorematically in (16):

(16) \[ \llbracket \Sigma_n \text{ XP} \rrbracket^g = [\lambda x . \lambda s . \llbracket \text{XP} \rrbracket^g[\Sigma_n \rightarrow S](x)(s)], \text{ where } \llbracket \text{XP} \rrbracket \in D_{e, st} \]

The LF that is thus predicted for (8) is given in (17):

(17) \[ \text{TP} \ [\text{DP} \text{ Every-1-st student}]] \ [\text{VP} \Sigma_1 \ [\text{VP} \text{ finished } \text{[every-1-st job]}}]] \]

The truth conditions predicted for (17) are given in (18):

(18) \[ \llbracket (17) \rrbracket^g = 1 \text{ iff } \forall x (\text{student}(x)(g(2)) \rightarrow \exists s' \forall y (\text{job}(y)(s') \rightarrow \text{finished}(y)(x)(s'))) \]
8.4. Deriving the simultaneous interpretation

I repeat example (1)a as (19).

(19) Meet the guy who is in love with her mother, every girl did five years ago.

The denotation of the object DP in (19) is not independent because the DP contains a bound pronoun. According to Jacobson’s approach to binding, I treat the definite object DP in (19) as containing an unsaturated argument that is identified with one of the arguments of the verb that takes the DP as complement.

I propose that the object DP in (19), which contains a pronoun of type `<e,e>` and identifies its unsaturated individual argument with the verb, can also contain a bound temporal variable in its specifier of type `<i,i>` that would introduce an unsaturated temporal argument into the semantics of the DP. The presence of a pronoun bound by a matrix quantifier licenses argument identification between the DP and the verb. The DP identifies its unsaturated individual argument with the external argument position of the verb. This gives rise to the simultaneous Present-under-Past in fronting constructions.

The object DP in (19) can thus have the LF in (20) and the interpretation in (21). (Recall that in my proposal the independent temporal argument is in the specifier.)

(20) \[
\text{[DP t}_{<,i>} \text{[} \text{[NP guy [TP who } \lambda 2 \lambda t_0 \emptyset_0 \text{ [VP t}_2 \text{ is in love with her } \text{[} \text{mother } \text{]]]]]}}
\]
When the DP composes with the verb *meet* of type $<e, <e, it>>$, it identifies both of its unsaturated arguments with the corresponding arguments of the verb and saturates its internal argument. The rule of composition is similar to Rule Z, but now it allows for an identification of the temporal argument in addition to the individual argument. I call it $Z'$

If $\alpha$ is an expression of type $<a, <e, <i, b>>$ and $\beta$ is an expression of type $<e, <i, a>$, then $Z'(\llbracket \alpha \rrbracket, \llbracket \beta \rrbracket) = [\lambda x . \lambda t_0 . \lambda t_1 . \llbracket \alpha \rrbracket(\llbracket \beta \rrbracket(x)(t)(x)(t(t))).$

The VP in (23) has the structure in (24) and interpretation given in (25):

(23) meet the guy who is in love with her $<e, e>$ mother

(24) 

(25) $t_1$ is in love with her $<e, e>$ mother
This is the VP that is fronted in (19). The embedded simultaneous tense is anchored to the temporal argument of the verb and surfaces with default present tense morphology.

To derive the LF of the whole sentence, we need to provide the lexical entry for every. Since we expect that each girl met the guy who was in love with her mother at a different time, we need a temporal analogue for every from (12). I propose the lexical entry in (26):

\[
[\text{every}] = [\lambda P_{<e,lt>}. \lambda t . \lambda Q_{<e,lt>}. \forall x (P(t)(x) = 1 \rightarrow \exists t'(Q(x)(t') = 1))]
\]

At LF, every must raise for type reasons. Consider sentence (13), repeated here as (27). Since we are now taking tense into account, every must bind the lower index on tense and produce the LF in (28). The predicted truth conditions are given in (29).

---

34 In (25), the presupposition that t overlaps t comes from the lexical entry (41) in Chapter 5. Since its contribution is vacuous, I will ignore it in the remainder of this chapter.
(27) Every student arrived.

(28) 

(29) \[[27]\\(c) = 1 \forall x (x \text{ is a student at } c) \rightarrow \\
\exists t (x \text{ arrived at } t), \text{ defined iff } t < c\]

I propose that \(\text{every}_3\) occurs inside the subject of (19). (30) shows the LF predicted for (19):
At LF the fronted VP is in its base position. The temporal argument of the matrix verb is saturated by the time denoted by the matrix tense. The embedded simultaneous tense is thus anchored to the past time provided by the matrix tense. The simultaneous interpretation arises. The truth conditions predicted for (19) are given in (31):

\[(31) \quad \llbracket (30) \rrbracket^g,c(c(\text{time})) = 1 \text{ iff } \forall x (x \text{ is a girl at } c(\text{time}) \rightarrow \\
\exists t'(x \text{ meets } \forall y (y \text{ is a guy at } t' \& y \text{ is in love with } x's \text{ mother at } t')), \text{ defined iff } t' < c(\text{time}) \]

At surface structure, the VP in (19) is fronted and the embedded simultaneous tense is outside the c-command domain of the matrix past tense. Therefore, it surfaces with default present tense morphology.

Example (32) is a more challenging case. It illustrates a sentence in which a similar effect arises inside an object DP headed by every that does not contain any bound pronouns, but can be viewed as containing a temporal variable bound by every student.

\[(32) \quad \text{Turn in every paper that is due, every student did.} \]

The structure of the object DP every paper that is due would then be as follows:

\[(33) \quad [\text{DP } t_{1,t} > [\text{DP } \text{every } [\text{NP paper } [\text{TP } \lambda_1 \lambda t_2 \emptyset_2 t_1 \text{ is due}]])]] \]
The interpretation of this DP is not temporally independent any more because it has an unsaturated temporal argument. When this DP composes with the verb turn in, it identifies its unsaturated temporal argument position with the temporal argument position of turn in to result in the VP turn in every job that is due with the following semantics.

\[
(34) \quad [[\text{turn in every paper that is due}]]^S = \\
[\lambda x . \lambda t . \forall y (y \text{ is a paper at } t \text{ that is due at } t \rightarrow x \text{ turns in } y \text{ at } t)]
\]

Despite the seeming similarity with example (19), example (32) cannot be accounted for along the lines suggested for (19). Getting the interpretation like the one in (34) for the fronted VP requires an identification of the temporal argument that saturates the restrictor of every, i.e. paper that is due, with the temporal argument that saturates its nuclear scope, which contains the verb turn in.

In situation semantics discussed above, this problem is faced in sentence (8). It is solved in terms of the operator $\Sigma_n$ defined in (16). That operator allows the position of a restrictor situation inside a direct object which is taken by a free variable to count as if it was unsaturated and identified with the temporal argument of the main predicate (see the LF for (8) given in (17) and the truth conditions predicted in (18)).

In the framework developed here, argument identification was part of semantic composition between the verb and its object. One way to assign the fronted VP in (32) the interpretation suggested in (34) is to allow the determiner every have the following lexical entry:
(35) \[ \text{[every}_T] = \lambda P_{<e,lt>} . \lambda T_{<i,i>} . \lambda Q_{<e,lt>} . \lambda t . \forall x (P(x)(T(t)) = 1 \rightarrow Q(x)(t) = 1) \]

Interpreted as shown in (35), every\(_T\) can do the job of identifying the temporal arguments that saturate its restrictor and nuclear scope leading to the interpretation of the fronted VP suggested in (34). The LF predicted for (34) would then be as shown in (36):

(36)

The truth conditions predicted for (36) are given in (37):

(37) \[ [[(36)]^{g,c}(c(\text{time})) = 1 \text{ iff } \forall x (x \text{ is a student at c(\text{time})} \rightarrow \exists t (\forall y (y \text{ is a paper at } t \& y \text{ is due at } t) \rightarrow \text{t}_2 \text{ is due})] \]

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x turned in y at t),

defined iff t < c(time)

As before, the present tense morphology is licenced in the embedded tense by default because it is not c-commanded by the matrix Past.

Another way to get the truth conditions in (37) is to provide every with a more familiar interpretation in (38) but treat the object DP every paper that is due as still containing a variable of type <i,i> in its specifier as illustrated in (33).

(38) \[ [\text{every}] = [\lambda P_{<e,it>} . \lambda t'. \lambda Q_{<e,it>} . \lambda t . \forall x (P(x)(t') = 1 \rightarrow Q(x)(t) = 1)] \]

If the unsaturated argument from the variable of type <i,i> is allowed to percolate to the DP level as was suggested for the definite DP in (20) (see the interpretation in (21) above), then the object DP every paper that is due in (32) will be an expression of type <i,<<e,it>,it>>. The mode of composition of this DP with the verb turn in should allow for the following operation:

(39) \[ [[\text{turn in every paper that is due}]] = \\
\[ [\lambda x . \lambda t . [ [[\text{every paper that is due}}](t) ([\lambda y. [[\text{turn in}}](x)(y))](t)] ] \]

What the operation in (39) does is it makes sure that the temporal argument of the object DP is saturated by the same time that the temporal argument of the matrix verb. The interpretation in (39) is equivalent to the one in (34).
Under either of the two described approaches to derive the semantics of the fronted VP provided in (34), the simultaneous interpretation is predicted for the embedded tense because its temporal anchor is identified with the temporal argument of the matrix verb. I leave a more detailed investigation of examples like (32) for future research.

8.5. The problem of the lack the simultaneous Present-under-Past in non-quantificational configurations

In this section, I discuss the contrast between (1)a, on the one hand, and (1)b,c, on the other. These examples are repeated in (40)a,b,c, respectively:

(40) a. Meet the guy who is in love with her mother, every girl did five years ago. (*simultaneous)  

b. Meet the guy who is in love with her mother, Mary did five years ago. (*simultaneous)  

c. Meet the guy who is in love with Bill’s mother, Mary did five years ago. (*simultaneous)  

We see that the simultaneous Present-under-Past is not available inside (40)b,c. Given the assumptions I made above, this means that the identification of the temporal anchor of the embedded tense with the temporal argument of the matrix verb is not possible.
in (40)b,c. For the formalisms that I have introduced or discussed so far, this is not expected.

In the previous subsection, I described the $\Sigma$-operator as the technology that Schwarz (2009) uses to identify the situation variable inside a “strong” DP object with the situation argument of the verb. This operator has a relatively free distribution. There seems to be no reason why it would not be available inside in the fronted VP of a sentence like (40)b. In that case, the VP would have the following schematic structure:

$$(41) \quad [VP \Sigma_2 [VP \text{meet [the-s$_2$ guy who is in love-s$_2$ with her]]}]$$

From the perspective of tense semantics, the same point can also be made. If a bound temporal pronoun could be used in the structure of the object DP in (40)a (as shown in (33)), why wouldn’t it be licensed in a sentence like (40)b making the simultaneous Present-under-Past possible? I do not see any grammatical principle that would disallow the formation of such a “dependent” object DP in (40)b, but license it (40)a.

There seems to be some kind of preference to interpret “strong” DPs independently, unless the dependent interpretation is unavoidable. This behaviour of “strong” DP objects in fronted constructions is not specific to their temporal interpretation. It can also be observed in the fact that they obviate connectitivity for condition C. Consider the examples in (42):

$$(42) \quad \begin{align*}
\text{a. } & \ast \text{Burn a picture/pictures that John$_1$ had taken, he$_1$ said a girl did.} \\
\text{b. } & \text{Burn every picture that John$_1$ had taken, he$_1$ said a girl did.}
\end{align*}$$
Assuming that fronted VPs undergo obligatory reconstruction at LF, it is expected that the Condition C effect in (42)a is triggered. However, it is not expected that it is obviated in (42)b. Under the common assumption that universal quantifiers cannot scope outside a complement CP, we do not expect the universal quantifier in (42)b to scope above the c-commanding pronoun $he_i$ at LF. (Observe that the scope of the universal in (42)b is still narrow with respect to the indefinite.) It is not clear why the condition C effect in (42)b is not triggered. If there is a preference to provide the quantificational object in (42)b with an independent interpretation before the fronted VP reconstructs and then reconstruct the VP with the DP object as a constituent that has already been interpreted, then there might be a way to make it invisible for Condition C$^{35}$.

When a universal DP object contains a bound pronoun the Condition C effect is triggered):

\[
\text{(43)} \quad \text{*Burn every picture that John}_1 \text{ had given to her}_2, \text{ he}_1 \text{ said every girl}_2 \text{ did.}
\]

The example in (43) is similar to the cases explored in Fox (1999) and Sauerland (1998). However, they explored DP-fronting constructions in which the reconstruction site of a fronted DP depends on the position of the quantifier that binds the pronoun inside the DP.

$^{35}$ See Kusliy (forthcoming) for a discussion of this problem in light of the recent literature on the subject and an attempted solution.
DP. In the VP-fronting examples that I am considering here, VP reconstruction is obligatory and, arguably, so is the reconstruction of the DP object inside the VP.

Getting back to the examples in (40), I propose the following descriptive generalization.

(44) A “strong” DP object receives a “dependent” interpretation under which its semantics is dependent on DP external arguments only in those cases where a quantifier binds into the DP or binding is required for the correct interpretation.

I do not have a ready account for the generalization in (44) and have to leave it for future reasearch. However, I would like to offer a speculation about what can be going on.

In fronting constuctions, there is a preference for anaphora via co-reference to anaphora via binding between a pronoun inside the fronted constituent and the antecedent in the matrix clause.

The literature going back to Reinhart (1983) has argued that a bound interpretation of a pronominal element is more economical than a co-referential one and is, therefore, preferred unless there is a semantic necessity to interpret an anaphoric configuration via co-reference, which would generate an interpretation that would not be equivalent to the bound one (as is the case with “strict” ellipsis).


37 But see Roelofsen (2010) who discusses Dahl’s puzzle for an important revision of Reinhart’s argument.
I speculate that economy considerations could also be the reason why the “dependent” interpretation of “strong” DP objects in fronting constructions is dispreferred to the independent one. It is more economical to interpret as much as possible inside a fronted constituent before it reconstructs, because this would decrease the burden on the memory required for reconstruction.

The presence of a “bound” element inside the DP object in (40)a makes its dependent interpretation required. It has to identify its unsaturated individual argument with the external argument of the verb. From this perspective, the requirement of argument identification licensed by the bound interpretation of a pronoun, also licenses the identification of the temporal argument inside a “strong” DP object with the temporal argument of the verb. This would explain the availability of the simultaneous Present-under-Past in (40)a.

When there is no requirement of binding into the fronted constituent, anaphora via co-reference is preferred. In (40)b, repeated here as (45), the anaphora between her and Mary can be established via co-reference.

(45) Meet the guy who is in love with her, Mary did five years ago. (*simultaneous)

In that case, her will not be treated as a bound pronoun. It will refer to the individual Mary and will thus be co-referential with the proper name Mary. This would allow us to treat the object DP as an expression of type e (not <e,e>) and identify its denotation (the concrete individual) before the VP reconstructs.
Importantly, the presence of a temporal quantifier in the matrix clause that can bind into the direct object can also license the simultaneous interpretation:

(46) Smile at every person who is behind her, Mary did every time she stood in a long line at the supermarket. (**simultaneous**)

Here, I assume that the temporal quantifier *every time she stood in line at a supermarket* binds the temporal variable inside the definite object DP licensing the simultaneous Present-under-Past. The simultaneous interpretation is not available in the absence of a temporal quantifier as illustrated in (47):

(47) Smile at every person who is behind her, Mary did when she stood in a long line at the supermarket. (**simultaneous**)

The sentence in (47) has the double-access interpretation, according to which at a time in the past, Mary smiled at the person who is behind her now (at the utterance time).

From the perspective of economy mentioned above, examples like (47) also suggest that the temporal interpretation of “strong” object DPs is also preferred to be established via co-reference. There is an option for a fronting configuration like (47) to express simultaneity under Past: this option is to use a referential past tense morpheme inside the fronting construction, as illustrated in (48):

(48) Smile at every person who was behind her, Mary did when she
stood in a long line at the supermarket.

In (48), the independent interpretation of the “strong” object DP is now possible because the independent embedded past tense allows for a co-referential interpretation with matrix past tense. The schematic LF predicted for (48) could look as shown in (with the fronted VP in base position).

(49) LF: [\lambda 0 \text{Past}_1^0 \text{Mary smiled at } [\text{DP Op-Past}_2 \text{[}\text{every } [\text{NP person [TP}_2 \text{who } \lambda 2 \lambda 3 \text{[TP}_1 \emptyset^2_4 \text{[VP}_1 t_2 \text{was behind her}]]]}]]]

Given a contextually salient assigning function g, the denotation of the embedded Past, g(4), is established by its anchor g(2) provided by Op-Past: g(4) must overlap g(2). The time denoted by the matrix past tense is g(1). The simultaneous interpretation arises when g(2) = g(1), i.e. when the matrix Past and Op-Past are co-referential. For the fronting construction (48), this would be the preferred option\(^{38}\).

\(^{38}\) There are other readings that can be available here. According to one of them Mary could smile at different people at different times. This interpretation can still be generated in terms of an independently interpreted object DP, which would then introduce an existential quantifier inside its nuclear scope (see Kusumoto 2005: 342). I do not discuss such readings here, but the system I propose is compatible with the possibility that every can introduce an existential quantifier over times, not only for its nuclear scope, but also for its restrictor. In that case the position of an independent time argument would be occupied a variable of type \(<i,i>\) that would be bound be the existential quantifier introduced by every.
8.6. The temporal interpretation of fronted CPs with bound elements

As was shown in Chapter 4, CP-fronting constructions can also license the simultaneous Present-under-Past, if they contain a quantifier over individuals or times and a fronted CP with an element that is anaphoric to that quantifier. Recall the relevant examples repeated below:

(50) That her \_1 kids are home alone, every mother \_1 thought (when the boss made everyone stay late at work).  
    (∗simultaneous)

(51) That her \_1 students miss her \_1, every professor \_1 thought during the winter break.  
    (∗simultaneous)

In the previous subsection, I proposed that DP objects that contain a pronoun bound by a matrix quantifier and are thus dependent in their interpretation on a DP external element can also be temporally dependent. I treated such DPs as functions that take a time argument and identify it with the time argument of the matrix verb when the DP composes with the verb. Here, I propose that fronted CPs behave similarly.

In Chapter 6, I adopted the view according to which CPs front inside a DP-layer and are thus DPs headed by a silent definite determiner \(THE_{CP}\). Thus, a fronted DP was a definite description of a content individual. I proposed that the silent determiner is “strong” and that the specifier of such a DP contains a temporal operator that saturates the temporal argument of the CP. The presence of a bound variable inside such a DP licenses its dependent temporal interpretation. The temporal argument in the specifier can be occupied
by a bound variable over times (of type $<i,i>$). The DP can thus have an unsaturated temporal argument and identify it with the temporal argument of the verb giving rise to the simultaneous interpretation.

I assume that fronted CPs that contain bound elements reconstruct at LF. Unlike CPs in base position, which were treated in Chapter 6 as predicates of content individuals that modify the content argument position of attitude verbs, fronted CPs with a bound pronoun that reconstruct into their base position do not modify the content argument of the attitude verb. They saturate the internal argument position of the attitude verb. As illustrated in (52), their non-predicative nature is supported by their incompatibility with capture-type verbs$^{39}$.

$^{39}$ Moulton (2009, 2013) claims that fronted CPs do not reconstruct for scope (and are base-generated in the fronted position). One piece of evidence that he provides in support of his claim comes from topicalized or subject CPs trapped in a reconstruction paradox configuration (Lebeaux (1990)). Some relevant examples are as follows:

(i)    a. That he$_1$ might be too old to work for Mrs. Brown$_2$, I don’t think she$_2$ would want any man$_1$ to believe.

    b. That he$_1$ might actually be too OLD for Mary$_2$ seemed to her$_2$ not to enter any man$_1$’s mind.

In these sentences, if the CP were to reconstruct for pronominal binding, a Condition C effect between the matrix pronoun and a co-indexed embedded R-expression would be predicted (and it is triggered in their non-fronted versions). Moulton argues that this effect does not obtain in the above sentences. He writes that the use of focus may de-accentuate the R-expression, which could be a reason behind the acceptability of these sentences, but he also provides relevant examples without focus.
Another piece of evidence comes from the so-called null complement anaphora, which I illustrate with one example from Moulton (2013):

(ii) … but that he₁ was in real danger, no banker₁ had any clue.

Moulton argues that since adjectives like clue do not tolerate referential complements (*I had no clue that), the fronted CP (which, as we saw, must leave a referential type trace, if it moves) cannot have moved from a low position to its surface position (because the noun clue would be incompatible with a referential type trace).

Moulton proposes an account according to which fronted CPs are base-generated in their high position (and the pronouns they contain are able to covary with a matrix quantifier due to mechanisms other than reconstruction).

As suggestive and thought-provoking as this argumentation is, I find it hard to adopt Moulton’s (2013) proposal for at least three reasons. The first of them is that the judgments Moulton provides for those sentences conflict with the judgments reported for similar sentences in the literature as well as the ones I was able to collect. Thus, Takahashi (2010: 367) reports a Condition C effect in (iii) (his ex. (71a)):

(iii) *That a student from hisᵢ class cheated on Johnᵢ’s exams seems to himᵢ to have not been given serious consideration by [any professor]ᵢ.

The second reason has to do with the complexity of examples like (i)a. The native speakers I consulted found them quite complicated and hard to process. They did find them acceptable under the proposed indexation, just as they did the version of (i)a in (iv)a, which contains only finite clauses. The problem, however, is that they also found acceptable their fronted VP versions illustrated in (iv)b:

(iv) a. That he₁ might be too old to work for Mrs. Brown₂, I don’t think she₂ thought any man₁
(52)  *That her₁ favorite team would win, (I think that) every fan₁ hoped.

Getting back to example (50), I derive its simultaneous truth conditions in the following way.

The TP *her kids are home alone* is understood to contain locally a bound simultaneous (zero) tense (*∅₂*) and the pronoun *her* of type <e,e> with the unsaturated individual argument that percolates up the tree. This TP is predicted to have the following structure:

b. Believe that he₁ might be too old to work for Mrs. Brown₂, I don’t think she₂ thought any man₁ did.

If Moulton’s (2013) analysis is on the right track, then the acceptability of (iv)a is a welcome fact. However, the acceptability of (iv)b would then lead us to accepting that fronted VPs can also avoid reconstruction, which seems to be much more than one would want to claim. So, maybe less complex examples could be more convincing, but, as I said, there are people who judge them as triggering a Condition C violation.

Finally, Moulton’s (2013) analysis of all such cases (including those predicates selecting for null complement anaphors) crucially depends on the idea of attitude verbs having *res*-arguments. As was discussed before, the *res*-argument approach as part of the *res*-movement analysis is theoretically and empirically problematic (but see Deal (2018)).
In (53), VP\(^1\) and all nodes that dominate it contain an extra unsaturated argument of type \(e\). It comes from the pronoun *her*, the unsaturated individual argument of which is being "passed up" the syntactic tree. The rest of this TP is structured in a way that was discussed in Chapter 6 for TPs inside complement CPs.

The interpretation predicted for TP\(^5\) is provided below:

\[
(54) \quad \text{[[her kids are home alone]}^g_c = [\lambda y . \lambda G_{<i,i,si>>} . \lambda t . \lambda w' . \lambda t' . y's kids in w' are home alone in w' at } G(t)(t')(w')]
\]

Recall from Chapter 6 that according to Kratzer’s (2006) proposal adopted here the complementizer composes introduces quantification over worlds and times as well as an argument position for a content individual. The lexical entry for the complementizer was given in example (35) in Chapter 6 and is repeated here as (55).
(55) \[ \lambda P_{\text{st}} . \lambda x . \forall w', t' \ (\text{compatible}(x_c)(w')(t') \rightarrow P(w')(t') = 1) \]

The complementizer composes with TP\(^5\) to produce the CP with the interpretation given in (56):

(56) \[ [\text{that her kids are home alone}]_{\text{CP}} = [\lambda y . \lambda G <i,<i,si>> . \lambda t . \lambda x . \forall w', t' (\text{compatible}(x_c)(w')(t') \rightarrow y's \text{ kids in w' are home alone in w' at } G(t)(t')(w'))]^{40} \]

The interpretation in (56) is derived in a way that is similar to the derivation of (36) in Chapter 6. The composition between the complementizer and TP\(^5\) cannot proceed straightforwardly by Function Application. As shown in (53) and (54), TP\(^5\) is an expression of type \(<e,<<i,si>>,<<s,it>>>>\) and the complementizer takes an argument of propositional type. I propose that the mode of composition between the complementizer and TP\(^5\) allows for a temporary saturation of three arguments of the function denoted by TP\(^5\) in order to allow the result to be taken as argument by the function denoted by the complementizer, after which the three temporarily saturated positions become unsaturated again. Thus, the function denoted by TP\(^5\) is fed a dummy entity argument as well as a

\[ \]

\[ ^{40} \text{As before, I concentrate only on the temporal component and omit the required concept generator over individuals that would have to attach to her, since it is bound by a matrix quantifier and is predicted to have a de re interpretation.} \]

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dummy concept generator and a time. The result is a proposition (i.e. a function of type \(<s, it>\)). The complementizer applies to this function and maps it to a function of type \(<e, t>\). The three argument positions occupied by the dummy arguments are made unsaturated again to result in a function of type: \(<e, <\langle i, si \rangle, \langle i, et \rangle>>\). The interpretation illustrated in (57) is equivalent to the interpretation in (56).

(57) \([\text{that her kids are home alone}]^{e, c} = [\lambda y. \lambda G. \lambda t. [\text{that}]([\text{TP}^5](y)(G)(t))]\]

Next, the silent definite determiner \(THE_{CP}\), which heads the DP-shell of a moved CP, is merged. Its lexical entry was given in (72) of Chapter 6. I repeat it here:

(58) \([\text{THE}_{CP}] = [\lambda P <\langle i, i, si \rangle, \langle i, et \rangle> . \lambda t . \lambda G <\langle i, i, si \rangle > . \text{tx}(P(G)(t)(x) = 1)]\]

When \(THE_{CP}\) composes with the CP in (56) to produce a definite description over content individuals, the CP’s content argument and its temporal arguments are saturated: the content argument is saturated by the individual introduced by the iota-operator and the temporal argument position is saturated by the time argument taken by \(THE_{CP}\) after it applies to the CP. The unsaturated temporal CG argument remains unsaturated and the unsaturated individual argument coming from \(her\) is “passed up”. The structure of the resulting definite description is given in (59) and its interpretation is given in (60):
(59)  \[
\begin{align*}
\text{DP}_{\langle \langle x, i, u \rangle \rangle, \langle (x, i) \rangle \rangle}
\end{align*}
\]

\[
\begin{align*}
\text{THE}_{\langle \langle x, i, u \rangle \rangle}
\end{align*}
\]

\[
\begin{align*}
\text{CP}_{\langle \langle x, i, u \rangle \rangle, \langle (x, i) \rangle \rangle}
\end{align*}
\]

\[
\begin{align*}
\text{that}
\end{align*}
\]

\[
\begin{align*}
\text{TP}^1_{\langle \langle x, i, u \rangle \rangle}
\end{align*}
\]

\[
\begin{align*}
\lambda G_{\langle \langle x, i, u \rangle \rangle}
\end{align*}
\]

\[
\begin{align*}
\lambda z
\end{align*}
\]

\[
\begin{align*}
\text{TP}^1_{\langle (x, i) \rangle}
\end{align*}
\]

\[
\begin{align*}
\lambda w_4
\end{align*}
\]

\[
\begin{align*}
\lambda t_4
\end{align*}
\]

\[
\begin{align*}
\lambda \delta
\end{align*}
\]

\[
\begin{align*}
\text{VP}_{\langle \langle x, i, u \rangle \rangle}
\end{align*}
\]

\[
\begin{align*}
\text{her}_{\langle x, i, u \rangle}
\end{align*}
\]

\[
\begin{align*}
\text{kids}_{\langle x, i, u \rangle}
\end{align*}
\]

\[
\begin{align*}
\text{are home alone}_{\langle x, i, u \rangle}
\end{align*}
\]

(60)  

\[
[\text{DP}] = [\lambda x . \lambda t . \lambda G . \text{ty}(\forall w', t'(\text{compatible}(y)(w')(t')) \rightarrow x's \text{ kids in } w' \text{ are home alone in } w' \text{ at } G(t)(t')(w'))]
\]

Since the independent temporal argument position inside this DP is now taken up by a variable of type \(<i,i>\), its unsaturated argument is also “passed up” and the DP is thus a function that takes a time argument in addition to the individual and CG arguments.

When the DP reconstructs to its base position at LF, it composes with the verb by saturating its content individual argument and identifying its individual argument, its temporal argument and its CG argument with the corresponding arguments of the verb. The identification of the unsaturated individual argument with the external argument of the verb is part of the binding mechanism discussed above in relation to rules Z and Z'.
Next, Existential Closure of over the content argument applies. The lexical entry for *think* is repeated below from (39) in Chapter 6. The structure of the resulting VP is given below:

\[
[\text{think}] = [\lambda w . \lambda x . \lambda G . \lambda y . \lambda t . y \text{ thinks } x \text{ in } w \text{ at } t \text{ and } G \text{ is a temporal concept generator for } y \text{ at } t \text{ in } w]
\]

The interpretation of VP\(^3\) is as shown in (64):

\[
[\text{VP}^3]^g = [\lambda x . \lambda t . \exists G (G \text{ is a temporal CG for } x \text{ at } t \text{ in } g(6) \& x \text{ thinks } ty(\forall w', t' (\text{compatible}(y)(w')(t') \rightarrow x\text{'s kids in } w' \text{ are home alone in } w' \text{ at } G(t)(t')(w')))) \text{ in } g(6) \text{ at } t)]
\]
The rest of the derivation of sentence (50), repeated below as (64), proceeds in the following way: the individual argument is saturated by the trace that was left by the raised quantifier every mother; and the temporal argument of the verb is saturated by tense.

The raised quantifier contains every₂ is defined in (65) (repeated from (26)). The LF predicted for (64) is given in (66) (the fronted CP is in base position due to reconstruction for binding).

\[
\begin{align*}
(64) & \quad \text{That her₁ kids are home alone, every mother₁ thought (when the boss made everyone stay late at work).} \\
(65) & \quad [\lambda P_{<e, it>} . \lambda t . \lambda Q_{<e, it>} . \forall x(P(t)(x)=1 \rightarrow \exists t'(Q(x)(t')=1))] 
\end{align*}
\]
The truth conditions predicted for (66) are given in (67):

(67) $[[((66))]^{c}(w)(c(\text{time})) = 1 \iff \forall x (x \text{ is a mother in } w \text{ at } c(\text{time}) \rightarrow$

$\exists t \exists G (G \text{ is a temporal CG for } x \text{ in } w \text{ at } t \& x \text{ thought}$

$ty(\forall w',t'(\text{compatible}(y)(w')(t') \rightarrow x'\text{'s kids are home alone in}$

$w' \text{ at } G(t)(t')(w')) \text{ in } w \text{ at } t), \text{ defined iff } t < c(\text{time})$

These are the truth conditions for the simultaneous reading. The temporal \textit{res} and
the time of thinking are simultaneous because they are identical. By Intensional
Isomorphism, this suggests that the temporal concept to which the temporal res is mapped by the concept generator is simultaneous with the attitude holder’s “now”. This is the requirement of the simultaneous interpretation.

Since at surface structure the CP is fronted and the embedded simultaneous tense is outside the scope of the matrix Past, the simultaneous Present surfaces with default present tense morphology.
9.1. Fronting and Feature transmission

The examples of the simultaneous Present-under-Past discussed in this dissertation have been viewed as instances of embedded “empty” simultaneous tense that does not bear any morphology transmitted from the matrix past tense. I proposed that in fronting constructions where an embedded “empty” tense delivers the simultaneous interpretation, but is not c-commanded by a past tense operator at surface structure, the “empty” tense can surface with default present tense morphology. The overall picture I outlined suggests that the processes of Feature Transmission between a matrix and an embedded tense discussed in Chapter 2 in terms of Kratzer (1998) do not apply in those examples where the simultaneous Present-under-Past is available. The simultaneous Present-under-Past in fronting constructions is thus viewed as another way by which the “empty” tense that underlies the SOT Past-under-Past can manifest itself in English.

It is probably safe to say that feature transmission is not a very well understood process. In this chapter, I discuss the evidence that the new data from fronting constructions provide for theories that attempt to explain the phenomenon of Sequence of Tense. In particular, I explore how the new data support some theories and bring challenges to others. In light of this discussion, I provide a revised list of desiderata for a theory of feature transmission in the domain of tense in English and outline a theory that is compatible with the formalism developed in this study.
However, I begin with a discussion of Past-under-Past in fronting constructions. I provide evidence in support of the claim that feature transmission in the temporal domain applies only at surface structure. This evidence primarily comes from fronting constructions in which Past-under-Past does not have the SOT interpretation.

9.1.1. No “vacuous” Past-under-Past in fronting constructions

An important component of the theory of Feature Transmission that I presented in Chapter 2 building on Kratzer (1998) is that it applies at “PF”. A tense feature transmitted from a matrix Past to an embedded zero tense is not visible at LF. It determines the morphology of the embedded tense without affecting its interpretation. I showed how this view explained the SOT facts as well as the contrast in the availability of a simultaneous Present embedded under a matrix Future, but not under a matrix Past.

My own discussion of the simultaneous Present-under-Past in fronting constructions was also built on Kratzer’s (1998) perspective. The general mechanism I assumed appealed to surface structure. It was given in Chapter 5 and is repeated below:

(1) The temporal morphology of the empty tense
   a. The morphology of the empty tense is determined at surface structure.
   b. If an embedded empty tense is c-commanded by a Past tense (or an Op-Past) at surface structure and is not anchored to the context time, it surfaces with the past tense morphology.
   c. In all other cases, it surfaces with default present tense morphology.
A prediction that follows from that discussion is that there can be no “vacuous” Past-under-Past inside a fronted constituent. It is predicted that a past tense inside a fronted constituent cannot be underlyingly an “empty” tense that delivers the simultaneous interpretation at LF. It must be a “real” Past and, therefore, it must backshift from its anchor.

To test this prediction, it is not enough to look at simple Past-under-Past sentences like (2), because the simultaneous interpretation that these sentences allow for does not have to arise from an embedded empty tense that bears “vacuous” past tense morphology.

(2)    Meet a guy who was hungry, John did. (∗ simultaneous)

The simultaneous interpretation of this sentence can arise from a co-referential interpretation of the matrix tense and the embedded operator or tense, if the indefinite DP in (2) is understood to have a “strong” interpretation. Two following LFs are then predicted for (2):

(3)    [TP λ0 [TP do+Past01 [VP John [VP meet [DP Op-Past5 [D′ astrong [guy who λ3λ4 [TP ∅4 t3 was hungry]]]]]]]]

(4)    [TP λ0 [TP do+Past01 [VP John [VP meet [DP Op-Pres5 [D′ astrong [guy who λ3λ4 [TP Past5 t3 was hungry]]]]]]]]
In (3), the temporal operator \( Op-Past5 \) in the specifier of the object DP is understood to be co-referential with the matrix past tense. The embedded simultaneous empty tense (which is c-commanded by \( Op-Past5 \) at surface structure and, therefore, bears the past tense morphology) denotes the same time that is provided by \( Op-Past5 \). In (4), the temporal operator, \( Op-Pres \), denotes the context time, to which the embedded past tense is anchored. It denotes a time in the past of the context time and this time, \( g(5) \), is again viewed as simultaneous with the time denoted by the matrix tense.

The simultaneous truth-conditions predicted for (2) construed as (3) are given in (5), where \( g(1) \) and \( g(5) \) are understood to overlap:

\[
(5) \left\langle \dfrac{((3))}{g,c}(c(t)) \right\rangle = 1 \text{ iff } \exists x(x \text{ is a guy at } g(5) \& x \text{ is hungry at } g(5) \& \text{ John met } x \text{ at } g(1)),
\]
\[
\text{defined iff } g(1) < c(t); g(5) < c(t)
\]

The simultaneous truth-conditions predicted for (2) construed as (4) are given in (6). Again, \( g(5) \) and \( g(1) \) are understood to overlap:

\[
(6) \left\langle \dfrac{((4))}{g,c}(c(t)) \right\rangle = 1 \text{ iff } \exists x(x \text{ is a guy at } c(t) \& x \text{ is hungry at } g(5) \& \text{ John met } x \text{ at } g(1)),
\]
\[
\text{defined iff } g(1) < c(t); g(5) < c(t)
\]
The only difference is that according to (6) the person that John met at $g(1)$ must be a guy at $c(t)$, whereas according to (5) he must be a guy at $g(5)$. Being hungry has to overlap $g(5)$ in both cases.

A more revealing example comes from a case where the simultaneous reading of a Past-under-Past is possible only under a “vacuous” interpretation of the embedded Past. Recall the Breakfast example discussed in Chapter 2 and repeated below:

(7) A week ago, John decided that in ten days at breakfast he would tell his mother that they were having their last meal together. (*simultaneous)

The majority of the native speakers I asked to consider the fronted VP version of (7), found it hard to get the simultaneous interpretation. For them, the most embedded Past could only have a back-shifted interpretation:

(8) Tell his mother (in ten days) at breakfast that they were having their last meal together, John decided (a week ago) that he would. (*simultaneous)

Importantly, the most embedded Past in (8) can denote a time that is perceived by the speaker as being in the future of $c(t)$. In other words, the most embedded Past in (8) does not have to backshift from $c(t)$ and can have a relative interpretation. What is crucial here is that this Past must back-shift. The time of the meal must precede the time of telling. The simultaneous reading is gone.
The simultaneous interpretation reappears most clearly in the Present-under-Past VP-fronting configuration in (9):

(9) Tell his mother that they are having their last meal together, John decided that he would. \(\checkmark\) simultaneous

To see the same effect in a different environment, consider Alxatib & Sharvit’s (2017) example provided here as (10):

(10) a. John works for a guy who sells bibles.
    b. His father did too <work for a guy who sold bibles>.

The availability of the simultaneous interpretation of (10)b is viewed as evidence in support of the availability of a simultaneous zero tense in a relative clause. Now consider (11):

(11) a. Work for a guy who sold bibles, John did.
    b. His son does too.

The “strict” reading of the elided VP in (11)b is readily available. Under this reading, (11)b is equivalent to (12):

(12) His son works for a guy who sold bibles.
However, it is much harder (if at all possible) to get the simultaneous interpretation for (11)b, which would make it equivalent to (13):

(13) His son works for a guy who sells bibles.

This would not have been a problem, if the embedded Past in (11)a could have an SOT interpretation, i.e. be an instance of an “empty” tense that surfaces with “vacuous” past tense morphology.

I view these examples as evidence in support of the claim that SOT is a process that occurs at surface structure, not at LF.

I should mention that some native speakers reported that, for them, sentences like (14) could be true in a situation, where John is understood to say something like “We have no money”:

(14) Tell his mother that they had no money, John decided (last week) that he would (in ten days).

At first glance, this suggests that the past tense inside the fronted VP can sometimes allow for the “vacuous” interpretation. However, I believe that this need not be the case. One explanation I see that could potentially reconcile the reported interpretation for (14) with the facts discussed for (8) and (11) has to do with a special kind of the de re interpretation that (14) can have.
According to this interpretation, John and his mother did not have money already last week, but John’s mother did not know about it. When John made the decision to tell his mother about their financial circumstances, he expected no significant income in the foreseeable future. For this reason, he was going to tell his mother something like “We have no money” referring to the period of time that includes the preceding ten days.

From this perspective, the embedded CP that they had no money would be inside a DP with an independent past tense operator (Op-Past) to which a simultaneous empty tense would be anchored:

(15)

With respect to the relevant assignment function g, the time denoted by the temporal operator inside DP is g(9). G(9) precedes c(time). According to my hypothesis, the speakers who allow sentence (14) to describe a situation in which John says to his mother
something like *We have no money* should allow $g(9)$ to overlap not only the time at which John made the decision, but also the future time at which he is telling her mother about their financial situation. In other words, $g(9)$ is understood to be mapped to a temporal concept that overlaps John’s subjective “now” at the time when he made his decision and extends far enough into the future in John’s attitude alternatives to also overlap the time at which he believes his talk with his mother will take place.

One difficulty that I see with this perspective is that from the standpoint of the speaker the relevant time $g(9)$ should be viewed as overlapping the utterance time. For this reason, a use of the present tense in the most embedded clause with a more familiar double-access interpretation would seem to be preferable:

(16) Tell his mother that they have_{double-access} no money, John decided (last week) that he would (in ten days).

However, investigating this hypothesis further and determining whether the described version of a *de re* past indeed obtains for those speakers lead to unclear judgments that could not be conclusive. Thus, I provisionally conclude that “vacuous” Past is not licensed in fronting constructions.\textsuperscript{41}

\textsuperscript{41}Interestingly, if this analysis is on the right track, then there is an important difference between SOT and cases when person features are not interpreted on pronouns. These are well-known cases like (i), which has a “strict” and a “sloppy” interpretation.

(i) Only I submitted my homework on time.
9.1.2. Simultaneous Present under *would*

Before I move to the discussion of some competing theories of SOT, I would like to focus on the interaction between SOT and the auxiliary *would* (Future-in-the-Past).

In the Breakfast example, the semantic contribution of *would* provides convincing evidence that “vacuous” Past-under-Past exists in English. However, it has also been

According to the “sloppy” interpretation, no one else submitted their (and not the speaker’s) homework on time. Such sentences are explored in Heim (1991, 2008), Kratzer (1998, 2009), Rullman (2003), Schlenker (2003, 2005), Von Stechow (2003). A widespread consensus is that the first-person feature on the possessive pronoun is not interpreted and the pronoun itself is interpreted as a bound variable.

I observe that unlike tenses, personal pronouns with “uninterpreted” features can occur inside fronted constituents as evidenced by example (ii), which still allows for the “strict” and, more importantly, the “sloppy” interpretation.

(ii) Submit my homework on time, only I did.

If the “uninterpreted” first-person feature on the possessive pronoun is indeed transmitted, then the transmission cannot occur at surface structure or “PF”. However, there is an alternative analysis of the phenomenon of “uninterpreted first-person features”, provided in Cable (2005). According to that proposal person features (unlike gender features) are not presuppositional. The “bound” interpretation of a first-person pronoun arises when the person parameter of the pronoun’s interpretation is bound. Cable (2005) proposes that first-person binders have the potential of binding this parameter on their bindees. He derives the “strict” and the “sloppy” LFs for sentences like (i) without appealing to any PF-processes.
observed in the literature that a present tense embedded under Future-in-the-Past does not have to have an indexical interpretation.

To my knowledge, Anand & Hacquard (2007) were the first to observe and theoretically discuss examples like (17) where the simultaneous interpretation is licensed for the embedded present tense\(^{42}\):

\[(17) \quad \text{After the battle of Bunker Hill, Washington said that he would promote a soldier who has fewer than five wounds in order to bolster morale.}\]

This sentence has a reading (17) that does not require there to be any wounded soldiers at speech time\(^{43}\).

Wurmbrand (2014) provides another example:

\[(18) \quad \text{Last week, the weatherman hoped that he would announce on Christmas Eve that it is snowing.}\]

In both cases, the embedded Present is understood to anchor to the time provided by *would*. If it were an instance of the zero tense, it would have to surface with the borrowed

\(^{42}\) They also observe that if the object of *promote* is definite, the simultaneous interpretation does not arise.

\(^{43}\) Some speakers I consulted could get the simultaneous interpretation only if the attitude holder was a living man: *Obama said he would promote a soldier who has fewer than five wounds*. Here, again, no one needs to be wounded at c\(\text{(time)}\) in order for the sentence to be true.
past tense morphology coming from the matrix clause past tense (or from \textit{would} if the latter was analyzed as an amalgam of a past tense and the verb stem \textit{woll}).

The native speakers I asked also report that the non-fronted version of the Breakfast example with the most embedded present tense can also allow for the simultaneous interpretation\textsuperscript{44}:

(19) A week ago, John decided that in ten days at breakfast he would tell his mother that they \textit{are} having their last meal together.

According to my informants, sentence (19) has a reading under which it is equivalent to the original Breakfast example, repeated in (20), which has Past tense in the most embedded clause.

(20) A week ago, John decided that in ten days at breakfast he would tell his mother that they \textit{were} having their last meal together.

Observe that in (17), (18), and (19), the embedded present tense is able to get the simultaneous interpretation in the absence of any c-commanding present tense. This is possible only in cases where \textit{would} intervenes between an embedded Present and a c-commanding Past. I take these facts to be evidence that \textit{would} plays a special role in SOT. In terms of Kratzer’s (1998) theory of feature transmission, \textit{would} (or, rather, the verb stem

\textsuperscript{44} But see Altshuler (2016: 142) who reports otherwise.
woll) appears to be able to allow for feature transmission and, at the same time, it can optionally block it. When feature transmission is allowed by woll, the embedded zero tense surfaces with past tense morphology as in (20), when it is blocked, the embedded zero tense surfaces with present tense morphology as in (19).

I observe that the underlying idea of my proposal according to which the “empty” tense surfaces with default present tense morphology whenever feature transmission is unavailable fits well with the observed facts about woll.

9.1.3. Simultaneous Present-under-Past and some current theories of SOT

As is well-known, Feature Transmission is not the only mechanism that has been proposed in the literature as an explanation of SOT facts. Among other famous proposals, there are those that appeal to feature deletion at LF. Other approaches appeal to the nature of stative predicates that allow the states they denoted to extend beyond the temporal boundaries in which these states are asserted to occur. Finally, there are those that discuss SOT in terms of a syntactic mechanisms of agreement45.

According to deletion accounts (Ogihara 1989, 1996; Von Stechow 2003a,b) an embedded tense can be optionally deleted if the same tense occurs in the matrix clause. Thus, a Past-under-Past configuration like (21) gets the simultaneous interpretation: the

45 This list of three kinds of explanation is short and by no means exhaustive. I concentrate on these three because I believe them to be the most relevant for the data from fronting constructions.
past tense feature on the embedded tense in deleted leading to the simultaneous interpretation of the embedded clause.

(21) John said that Mary was hungry.

Accounts like Gennari (2003), Altshuler & Schwarzschild (2013a,b) state that a Past-under-Past has a back-shifted interpretation, but allows for an optional simultaneous reading if the state denoted by the embedded predicate is understood to extend enough into the future and overlap the local evaluation time. Altshuler & Schwarzschild suggest that semantically a past stative matrix sentence can be understood to describe a state that overlaps the utterance time. However, in that case the use of Present tense is pragmatically preferable. In embedded clauses, there is no competition between Present-under-Past and Past-under-Past because Present-under-Past reports like (22) never allow for the simultaneous interpretation.

(22) John said that Mary is hungry.

Therefore, Past-under-Past reports like (21) allow for the simultaneous interpretation in which the state described by the embedded clause is allowed to extend up until and including the local “now”. One attractive feature of such accounts is that they do not require any extra mechanisms like deletion or feature transmission.

Zeijlstra (2012) and Kauf & Zeijlstra (2018) propose a syntactic explanation of SOT. Building on Stowell’s (1993) proposal that visible temporal morphology is not
interpreted and depends on invisible temporal operators that are interpreted at LF, these
theorists propose that a temporal morpheme bears an unvalued temporal feature that
becomes valued in a syntactic process of Upward Agree by an invisible temporal operator.
A semantic temporal operator always occurs in the left periphery of a matrix clause, and
optionally occurs in the left periphery of an embedded clause. The SOT interpretation of a
sentence like (21) arises in the latter case: the embedded past tense morpheme bears an
uninterpreted temporal feature, but the embedded clause lacks an independent temporal
operator. In such a configuration, the uninterpreted feature on the embedded tense is valued
by the interpreted temporal feature of the matrix tense. The time indicated by the embedded
tense is the time provided by the matrix temporal operator. This leads to the simultaneous
interpretation of (21).

I believe that the new data from fronting constructions explored in this dissertation
do not provide direct support for deletion accounts. In a sentence like (23), the embedded
present tense morphology is not predicted to be deleted, because the embedded temporal
morphology is present and the matrix morphology is past.

(23)  Meet a guy who is hungry, Sally did.

Extra assumptions seem to be necessary to account for (23) in terms of an account
that appeal to deletion at LF.

Similarly, data from fronting constructions do not seem to provide direct support
for competition-based accounts. The Present-under-Past configuration in (23) can be
synonymous with the Past-under-Past configuration in (24):
(24)  Meet a guy who was hungry, Sally did.

On the surface, the only difference between (23) and (24) is the embedded tense. The two constructions seem to co-exist leading to equivalent readings. This is not in direct correspondence with the predictions of competition-based accounts. It seems that in order to account for (23) and (24), competition-based accounts would have to sacrifice at least some of their elegance and simplicity.

A syntactic account of SOT in terms of Upward Agree seems to face some problems with sentences like (19) where an embedded relative present tense is licensed under would in the absence of any present tense operator in the LF. Moreover, as argued by Bjorkman (2015), the idea that SOT is a syntactic process faces further issues with locality and its insensitivity to intervention. She points out that in a simple simultaneous Past-under-Past report like (21) agreement between the embedded and the matrix past would have to occur across a finite clause boundary, i.e. across a phase in the terminology of Chomsky (2001). If syntactic processes are local, then the embedded CP in (21) should be sent to spell-out before the matrix clause is merged. Similarly, interveners like the progressive aspect to not block SOT. Bjorkman (2015) provides the following example in which the embedded Past seems to be able acquire the simultaneous, SOT interpretation.

(25)  The students were claiming that they understood the problem.
She argues that the fact that past tense morphology does not appear on *claiming* (leading to something like *claiming-ed*) is a problem. If SOT is a syntactic process, then it should be blocked by the presence of such an intervener as the progressive aspect on the matrix verb in (25). However, SOT is established across the progressive, just like it is established across *woll* in (20) or across negation in (26):

\[(26) \quad \text{John didn’t think that Mary was hungry.}\]

From this I conclude, that a perspective on SOT as a syntactic process is also problematic.

Examples like (26) also seem to be a problem for Kratzer’s (1998) theory of Feature Transmission. Recall from example (46) in Chapter 2 that Tense Lowering, by which the past tense feature is transferred from the matrix tense onto the matrix verb, is an important part of the overall mechanism. However, we do not observe Tense Lowering in (26). Thus, the question of how Feature Transmission is realized in this sentence remains open.

Grønn & Von Stechow (2010: 130-131), who develop a sophisticated theory of (top-bottom) percolation of temporal features, propose that non-finite verb forms (also participles and adjectives) “do not need the features for licensing the morphology”, even though they participate in feature transmission. Grønn & Von Stechow’s (2010) idea that a constituent can carry a temporal feature without this being reflected in its morphology seems to be crucially important.
9.1.4. Desiderata for a theory of feature transmission

I believe that the above discussion, the new data explored in that dissertation and previously known facts suggest that a theory that explains the factors that license the choice of temporal morphology in English should be able to account for the following observations:

Observation 1. One and the same LF can have different morphological realizations at surface structure.

Under the assumption that fronted predicates undergo full reconstruction at LF I showed in Chapter 5 how sentences like (27) and (28) can be viewed as having the same LF in which the embedded tense is understood to be an empty tense that is anchored to the temporal argument of the verb. This LF is represented schematically in (29):

(27) Meet a guy who is hungry, John did.
(28) John met a guy who was hungry.
(29) \[ LF: [\lambda 0 \text{Past}^0_1 \text{John meet a guy who } \lambda 2 \lambda 3 \varnothing^3_3 \text{ t}_{2} \text{ be hungry}] \]

This observation suggests that the temporal morphology of a lexical item is not always decided in the position at which the lexical item enters the derivation or the position at which the lexical item is interpreted.
Observation 2. Temporal morphology on a lexical item need not be interpreted.

This fact is well-known and is the hallmark of SOT: a Past-under-Past can be interpreted as a simultaneous tense without back-shifting from its anchor.

Under the assumption that specification in terms of features is what determines the morphology of a pronominal element (e.g. Heim (2008)), this observation leads to the conclusion that temporal morphology can be licensed by interpreted as well as uninterpreted temporal features. In (28), the past tense feature that determines the morphology of the most embedded tense does not have to be interpreted in order to license the simultaneous interpretation and in a sentence like (20) it must be uninterpreted to license the simultaneous interpretation. In matrix past sentences, the features that determine temporal morphology are interpreted.

Observation 3. Processes that determine the temporal morphology of a lexical item can be non-local.

This is another well-known fact. The temporal morphology on an embedded SOT Past is determined by the matrix Past tense. In terms of a theory of feature transmission, the past tense feature that determines the morphology of the embedded tense in (28) can be viewed as having been sent down from the higher matrix past. This feature is not interpreted.
Observation 4. The presence of a temporal feature on a lexical item is not always reflected in its morphology.

Silent temporal operators introduced in many theories of tense including the one proposed in this study are understood to carry temporal features. As was said above, adjectives and non-finite verbal forms, as well as participles, participate in SOT processes. If SOT is understood in terms of feature transmission, then all these lexical elements must be able to carry temporal features without reflecting this in their morphology. This observation and the relevant arguments are provided in Grønn & Von Stechow (2010).

Observation 5. Transmission of uninterpreted temporal features is sometimes blocked.

This observation comes from the contrast between (19) and (20) in the morphology of the most embedded tense that has no impact on interpretation (the sentences can be viewed as equivalent). As was suggested in section 9.1.2, wollen acts as an optional “plug” for feature transmission not allowing the past tense feature from the matrix tense to percolate on the most embedded tense.

9.1.5. An outline of a theory of transmission of temporal features
In light of the above discussion, and building on Kratzer (1998, 2009), Heim (2008), Grønn & Von Stechow (2010), and Cable (2015), I propose the following theory of feature transmission for SOT.

There is only one temporal feature [past]. It is carried by the past tense or the temporal operator \( \text{Op-Past} \), defined in Chapter 5. The “empty” tense is not associated with any temporal feature when it is merged. In an embedded position, the “empty” tense can acquire the past tense feature as a result of the process of feature transmission described below. In that case, it surfaces with past tense morphology. If the “empty” tense has not acquired the past tense feature, it surfaces with default morphology known as the present tense morphology.

I propose only one rule for feature transmission.

(30) Transmission of temporal features

If \( T^0 \) heads TP and bears [past], then for each XP c-commanded by \( T^0 \) [past] is transmitted to \( X^0 \), iff \( [T^0] \) is an argument of \( [XP] \) in the derivation of \( [TP] \).

Feature transmission applies at the level of syntactic projection that feeds PF. I call it Surface Structure (SS). It is a structure in which the LF components are linearized in the order they are pronounced and not in the way they are interpreted.

I further assume that the morphology of lexical items that take temporal arguments can be sensitive or inert to the presence of a temporal feature. Adjectives, non-finite verbal forms, participles and nouns can bear a temporal feature, but their morphology is
Insensitive to it. The morphology of finite verbs and the copula is sensitive to the presence of a temporal feature. If a verb bears [past], then it surfaces with past tense morphology. If a verb does not bear a temporal feature, then it surfaces with default present tense morphology.

As a first illustration, consider the simplex sentence in (31) with the Surface Structure in (32):

(31)  John arrived.

(32)  SS:

\[
\begin{array}{c}
\lambda_0 \quad T^1 \\
\quad \quad T^0 \\
\quad \quad \quad \text{Past}_1^0 \\
\quad \quad \quad \text{arrived} \\
\quad \quad \quad \text{John} \\
\quad \quad \quad V^1 \\
\quad \quad \quad \quad V^0 \\
\quad \quad \quad \quad \quad \text{[past]} \\
\quad \quad \quad \quad \quad \text{[past]} \\
\end{array}
\]

In (32), the past tense enters the derivation with a past tense feature. This feature is transmitted to $V^0$ by (30), because $V^0$ is c-commanded by $T^0$ and $\llbracket TP^1 \rrbracket^g = 1$ iff $\llbracket V^0 \rrbracket^g(\text{John})(\llbracket T^0 \rrbracket^g)$. Therefore, the verb surfaces with the past tense morphology.

A sentence like (33) is predicted to have the SS is (34):
Building on Partee (1986), I assume that the copula has the following semantics:

\[
\llbracket \text{be} \rrbracket = [\lambda P_{e,\text{it}} \cdot \lambda x . \lambda t . P(x)(t) = 1]
\]

The copula has a time argument that is saturated by the past tense. At the same time, its semantics is such that it makes sure that the temporal argument on the function denoted by its complement predicate is also saturated by the denotation of the past tense. For this reason, the past tense feature in (34) is transmitted to the copula as well as to the adjective. Since the morphology of the adjective is not dependent on the temporal feature it bears, its presence is invisible. The morphology of the copula, on the other hand, is feature sensitive. The transmitted \([\text{past}]\) is thus reflected in the past tense morphology of the copula.

In a simple sentence like (36), the main TP is headed by the “empty” tense, which does not transmit any features.
(36) John is hungry.

The default present tense morphology is thus triggered on the copula in (36).

An example with an SOT Past-under-Past provided in (37) is predicted to have an occurrence of the “empty” tense in the embedded clause. The surface structure of this sentence is not different from its LF and is provided in (38). The simultaneous truth conditions predicted for this sentence are given in (39).

(37) John met a guy who was hungry.

(38) SS:
(39) \[ (38) \]^{g,c,(time)} = 1 \text{ iff } \exists x (x \text{ is a guy at } g(1) \& x \text{ is hungry at } g(1) \& \text{John met } x \text{ at } g(1)), \text{ defined iff } g(1) < c(\text{time})

At SS, the past tense feature is transmitted to the embedded tense from the matrix tense because the embedded tense heads an XP, namely TP\(^2\), that is saturated by the denotation of the matrix tense. From the embedded tense the past tense feature is transmitted to Cop\(^0\) and hungry in the way that was discussed in relation to example (33).

The SS of the VP-fronting configuration in (40) is given in (41):

(40) Meet a guy who is hungry, John did.

(41) SS:
Since Feature Transmission applies at SS, no feature is transmitted to any constituent inside VP², which is outside the c-command scope of the matrix past tense. The past tense feature is transmitted only to the trace of VP¹, but this is innocuous because the trace is not pronounced.

A sentence like (42) is not predicted involve Feature Transmission from the matrix tense to the embedded T⁰, because the object DP contains an independent temporal operator.

(42)   John met the guy who was hungry.

Under the simultaneous interpretation of (42), two Surface Structures are predicted for this sentence depending on the temporal operator in the specifier of the object DP. These structures also represent the LFs of these sentences:
The truth conditions predicted for (43) are given in (44):

\[(43)\]  
\[\text{SS} \]

\[\begin{array}{l}
\lambda_0 \quad \text{TP}^5 \\
\text{TP}^1 \quad \text{TP}^2 \\
T_0 \quad \text{VP}^2 \\
\text{Past}_i \quad \text{John} \quad \text{VP}^3 \\
\text{met} \quad \text{DP}_c \\
\text{the} \quad \text{NP} \\
\text{guy} \quad \text{TP}^3 \\
\lambda_2 \quad \text{TP}^2 \\
\lambda_3 \quad \text{TP}^1 \\
\text{Past}_j \quad \text{CopP}^2 \\
\text{t}_2 \quad \text{CopP}^3 \\
\text{hungry} \quad \text{was} \\
\text{Cop}^0 \quad \text{who} \\
\end{array}\]

\[(44)\]  
\[\llbracket(43)\rrbracket_{g, c}(\text{time}) = 1 \text{ iff at } g(1), \text{ John met } \lambda x(x \text{ is a guy at } c(\text{time}) \& x \text{ is hungry at } g(4)),\]

defined iff \(g(1) < c(\text{time}), g(4) < c(\text{time}),\) there is only one guy at \(c(\text{time})\) who was hungry at \(g(4)\)
The truth conditions predicted for (45) are given in (46):

\[(46) \quad \llbracket (45) \rrbracket^v_c (\text{time}) = 1 \text{ iff at } g(1), \text{ John met } x(x \text{ is a guy at } g(5) \& x \text{ is hungry at } g(5)) ,\]

defined iff \(g(1) < c(\text{time})\), \(g(5) < c(\text{time})\), there is only one hungry guy at \(g(5)\)
Since in both cases the interpretation of the embedded tense is independent of the interpretation of the matrix tense, the function denoted by the embedded TP is not saturated by the time provided by the main tense and the past tense feature is not transmitted to the embedded $T^0$.

The proposed mechanism of feature transmission predicts the lack of feature transmission from the matrix tense to the embedded tense in sentences like (47), for which one SS (and LF) predicted for the simultaneous interpretation is given in (48):

(47) John submitted every paper that was due.

(48) SS
Recall the semantics for *every* given in (38) in Chapter 8 and repeated here in (49):

\[
[\text{every}] = [\lambda P_{<e,it>} \cdot \lambda t' \cdot \lambda Q_{<e,it>} \cdot \lambda t \cdot \forall x (P(x)(t')=1 \rightarrow Q(x)(t)=1)]
\]

The determiner *every* denotes a function that takes two temporal arguments: the first one is provided by the temporal operator in the Spec,DP (*Op-Past*$_4$) in (38), the second one argument is provided by the main tense and saturates the restrictor of *every*. The following truth conditions are predicted for (47):

\[
[(48)]^{\text{gc}} (c(\text{time})) = 1 \text{ iff } \forall x (x \text{ is a paper at } g(4) \& x \text{ is due at } g(4) \rightarrow \text{John submitted } x \text{ at } g(1), \text{ defined iff } g(1) < c(\text{time});
\]
\[g(4) < c(\text{time})\]

Even though the object DP in (38) is an expression of type $<e,it>,it>$ and denotes a function takes the time denoted by the matrix tense as its argument and, consequently, the past tense feature is transmitted from the matrix tense to its head *every*, that feature is not transmitted further down the tree because the functions denoted by the copula and the predicate *due* are not saturated by the time denoted by the matrix past. These functions are saturated by the embedded tense, which heads TP$^2$. TP$^2$ is saturated by the time provided by *Op-Past*$_4$. For this reason, the past tense feature is transmitted to the copula (as well as to *paper* and *due*) from *Op-Past*$_4$. 

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Since the determiner *every* denotes a function that takes two temporal arguments, one provided by the matrix tense and the other one provided by *Op-Past4*, two past tense features end up on *every*. This is innocuous because *every* does not have temporal morphology at all.

The proposed system directly predicts the default present tense morphology on the most embedded predicate in (51):

(51) John decided that he would tell his mother that they have are having their last meal together.

Since the function denoted by the most embedded TP is not saturated by the time provided by the matrix tense, the transmission of the past tense feature is not predicted. However, the verb stem *woll*, which underlies *would* in (51), denotes a function whose temporal argument is saturated by a tense that carries the past tense feature. The SS predicted for (51) is given in a simplified form (where the variables over temporal concept generators, worlds and their temporal centers, are suppressed) in (52):
However, since sentence (51) can be synonymous with (53) there must be a way to license Feature Transmission in (53).

(53)  John decided that he would tell his mother that the have were having their last meal together.

The data do not seem to be sufficient for an empirically justified account of the contrast between (51) and (53). According to the mechanism of feature transmission

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proposed in (30), transmitted features always originate on $T^0$. Under this perspective, one could think of *woll* as optionally being merged in $T^0$. This would lead to a configuration in which the time introduced by *woll* originates from $T^0$ and since this is the time that anchors the most embedded tense in (53), Feature Transmission can be licensed. The corresponding SS is provided in (54):

\[(54) \quad \text{SS}\]

In (54), *woll* is in $T^0$ and the time it outputs can be viewed as saturating the temporal arguments of $VP^3$ and $TP^2$. The latter fact is the reason why [past] is transmitted from *woll* to the embedded zero tense. From there, it is transmitted to the relevant predicates in $VP^1$. 

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(Alternatively, the past tense feature that determines the temporal morphology inside VP\textsuperscript{1} could be viewed as transmitted directly from \textit{woll} and not from $\emptyset$\textsuperscript{3}s.)

The SS in (54) is not without its problems. One of them is the presence of \textit{woll} in $T^0$ and lack of tense. Another potential issue is that even if \textit{woll} is merged in $T^0$, it is not the case that $[\text{TP}^2]$ takes $[\text{woll}]$ as argument in the derivation of $[\text{TP}^3]$. Yet another potential issue is the lack of the temporal anchor in the left periphery of TP\textsuperscript{3}. Here, this temporal binder is not necessary because TP\textsuperscript{3} itself is of type $<i, t>$.

I believe that it is not impossible to resolve these issues. We could think of $T^0$ in which \textit{woll} occurs in (54) as being of type $i$. Imagine a version of \textit{woll}, call it \textit{woll}_T, which can denote a time in the future of its anchor. A $T^0$ that contains \textit{woll}_T would then be of type $i$ and license Feature Transmission in the way suggested in (54). Basically, \textit{woll}_T would be similar to tense and have the following lexical entry:

\begin{equation}
[\text{woll}_T]\iota^g = g(i), \text{ defined iff } g(i) > g(j)
\end{equation}

This lexical entry would also assume the presence of a $\lambda$-binder in the left periphery of the TP headed by \textit{woll}_T binding the anchor argument on \textit{woll}_T. I will not lay out a full exposition here and instead must leave it for future research.

**9.1.6. Two alternative approaches to Feature Transmission**

In the previous section, I proposed a theory of Feature Transmission that shows how SOT can be captured in terms of the overall approach that I proposed and developed
in this study. One important problem that this approach to Feature Transmission is that the rule in (30) appeals to both the SS structure of a given sentence as well as the calculation of its meaning. The proposed mechanism thus requires simultaneous access to pronunciation and interpretation. I acknowledge this shortcoming, but think that relatively modest changes to the overall approach can make the theory of Feature Transmission much more attractive. Here, I discuss two alternative ways by which the theory of Feature Transmission could be made more realistic and provide a short comparative discussion of these approaches and the one I proposed here.

The first one was proposed by Kyle Johnson (p.c.). One way to outline this approach (which is maximally close to my proposal) is as follows: English has Past and zero tense. These tenses are interpreted as suggested by the common approach discussed in Chapter 2: the present tense is inherently indexical, the past tense is inherently relative, and zero tense is interpreted as a simultaneous tense. There are operators Op-Pres and Op-Past, which function as suggested in this study. There are present and past tense features ([pres] and [past]): [pres] is carried by Op-Pres, [past] is carried by the past tense and Op-Past. Zero tense does not carry a temporal feature.

Feature Transmission occurs at SS. It applies according to the following rule:

(56) A node $Y^0$ that carries [past] or [present] transmits it to every $X^0$ that (i) requires a temporal feature, (ii) is c-commanded by $Y^0$, and (iii) is not c-commanded by an intervening $Z^0$ that also carries a temporal feature.
Finite verbal forms and the copula require a temporal feature, whereas non-finite verbal forms, participles, adjectives and nouns do not require a temporal feature.

Under this perspective, the morphology of an embedded zero tense that occurs inside a “strong” DP is determined by the temporal feature that is transmitted from the temporal operator in the specifier of the DP. For a sentence like (47) discussed above and repeated here as (57), the two equivalent LFs/SSs are predicted and given in (58)-(59) (see the truth conditions in (50)).

(57) John submitted every paper that was due.

(58) \[\lambda_0 \text{Past}^0 \lambda_1 \text{John submitted} [\text{DP Op-Past}_2 [D_\text{' every} [\text{NP paper that} \lambda_4 \lambda_3 \emptyset^3 \lambda_4 \text{was due}]]]]

(59) \[\lambda_0 \text{Past}^0 \lambda_1 \text{John submitted} [\text{DP Op-Pres} [D_\text{' every} [\text{NP paper that} \lambda_4 \lambda_2 \text{Past}^2 \lambda_4 \text{was due}]]]]

In (58), embedded zero tense gets [past] from the temporal operator \textit{Op-Past}_2 and the temporal feature from the matrix past tense is only transmitted onto the main verb. The past tense feature from the matrix Past is not transmitted below the main verb because \textit{Op-Past}_2 is an intervener that carries a temporal feature (i.e. does not require one) and transmits it to the nodes it c-commands in accordance with the rule in (56).

In (59), the past tense feature is only transmitted from the main tense on to the main verb and from the embedded tense onto the copula.

The empty tense inside a “weak” DP object under a matrix Past occurs in sentences like (40) and (42), repeated below:
(60) Meet a guy who is hungry, John did.

(61) John met a guy who was hungry.

As was said before, sentences like (60) and (61) can have one and the same LF:

(62) \[ LF: [\lambda_0 \text{Past}^0_1 \text{John} [\exists [\text{met} [\text{DPweak} \text{a guy} [\lambda_2 \lambda_3 \emptyset^3_3 t_2 \text{is/was hungry}]]]]] \]

In that case, the difference between (60) and (61) is only morphological and arises from the fact that Feature Transmission at SS between the matrix Past and the embedded empty tense is not predicted for (60), which has to surface with the default present tense morphology. The empty tense in (61) gets [past] from the matrix T^0 and surfaces with the past tense morphology.

Under the indexical interpretation of the embedded present in (60), the predicted LF is given in (63) and the truth conditions are given in (64):

(63) \[ [\lambda_0 \text{Past}^0_1 \text{John} \text{submitted} [\text{DP Op-Pres} [\text{D'} \text{every} [\text{NP paper} [\lambda_4 \lambda_3 \emptyset^3_3 t_4 \text{is due}]]]]] \]

(64) \[ [(63)]^{g,c}(\text{c(time)}) = 1 \text{ iff } \forall x (x \text{ is a paper at c(time)} \& \text{ is due at c(time)} \rightarrow \text{John submitted x at g(1), defined iff g(1) < c(time)} \]
Feature Transmission applies between the matrix Past and the matrix verb and also between Op-Pres, \( \emptyset \), and the copula.

One obvious advantage of this proposal, besides the fact that it does not appeal to surface structure and meaning simultaneous, is its simplicity: feature transmission applies by a relatively simple rule in a straightforward way. One characteristic feature of this approach that makes it somewhat more complicated is the that present tense morphology can be the result of Feature Transmission (when \([\text{pres}]\) is transmitted from a c-commanding operator onto the empty tense) or the result of a default rule (when the empty tense surfaces with the default present tense morphology in the absence of a c-commanding operator that could transmit a temporal feature onto it).

As a result, \([\text{pres}]\) is carried only by Op-Pres, whereas the present tense morphology in a matrix sentence like (65) is an instance of the default present tense morphology.

(65) John is hungry.

We thus have cases of present tense morphology interpreted indexically in which the morphology is triggered by that the presence of \([\text{pres}]\) (as in (60)) and cases where the same indexical present tense morphology is triggered by the default rule (as in (65)). In the approach that I outlined above, the present tense morphology is triggered only as a default rule.

Another potential minor complication is that there are two temporal features \([\text{pres}]\) and \([\text{past}]\). In the approach I proposed, there is only one temporal feature \((\text{[past]})) \).
The second approach to Feature Transmission builds on Grønn & Von Stechow (2010) who propose that temporal features are transmitted at LF. One characteristic of their theory is that predicates are of type $<i,et>$ and their temporal argument as well as its lambda binder is visible at LF. A sentence like (66) can be viewed as having the LF in (67) and truth conditions in (68).

(66)  John smiled.

(67) 

\[
\begin{array}{c}
\lambda 0 \\
T^1_P \\
\lambda 2 \\
VP^0_T \\
Past^0  \\
\lambda 2 \\
VP^2_T \\
\lambda 0 \\
TP^1_T \\
\lambda 0 \\
TP^2_T \\
\lambda 0 \\
\end{array}
\]

(68) $\llbracket (67) \rrbracket^{g,c}(c(\text{time})) = 1$ iff John smiled at $g(1)$, defined iff $g(1) < c(\text{time})$

In such a structure, the past tense feature can be transmitted from $T^0$ onto $\lambda 2$ via a rule like Kratzer’s (1998) Predication (see (46)b in Chapter 2) and from $\lambda 2$ to $t_2$ via Feature Transmission under Binding. Once [past] is on the sister of smiled, there is more than one way to make sure its presence is reflected by the verb. The rule I proposed in (30) implements the same reasoning in a system where there is no syntactic equivalent of $\lambda 2$ in (67).

One advantage of Grønn & Von Stechow’s (2010) approach is that Feature Transmission is defined only in terms of structural dependencies between nodes without
appeal to their interpretation (as is done in (30)). Requiring their mechanism of Feature Transmission to apply at SS would make a number of important correct predictions. Another advantage is that the contrast between (51) and (53) can be accounted for without appealing to \textit{woll}. In a structure like (54), the sister of \textit{woll} would always contain a temporal binder visible at LF which would allow for Predication to apply, no matter whether \textit{woll} has a quantificational or a non-quantificational interpretation. The past tense feature would then be transmitted to all predicates that are saturated by the time that \textit{woll} outputs.

One complication associated with this approach is the mechanism that introduces the overt binder of the temporal argument of \textit{smiled} in (67). According to Grønn & Von Stechow’s (2010), there is a special temporal pronoun (similar to \textit{he*} introduced by Percus & Sauerland (2003) and discussed in Chapter 2). This pronoun is merged as an argument of \textit{smiled} and fronts creating a \(\lambda\)-binder and leaving a bound trace. After that, it deletes.

Despite the fact that these two approaches to Feature Transmission are more complicated than my proposal in some respects, they are simpler and, perhaps, more intuitive and theoretically preferable in others. A revision of the proposal made in this dissertation in a way that would incorporate one of these approaches can potentially make the overall treatment more attractive. However, I leave this for a future occasion.

9.2. Temporal \textit{de re} vs. temporal \textit{de se} in the interpretation of attitude reports
In Chapter 6, I discussed the simultaneous Present-under-Past in terms of the temporal *de re* analysis. I provided empirical evidence that motivated the *de re* approach with the example repeated here as (1).

(1) a. Think that her husband is scared, Mary did at the time of the crime, but
   
b. Now, she doesn’t.

According to the argument given in Chapter 6, in order for (1)b to have the back-shifted interpretation (which is available), the simultaneous Present-under-Past in (1)a must have a *de re* analysis.

However, an argument in support of the temporal *de re* analysis does not by itself exclude the possibility of the *de se* analysis, which would not predict the back-shifted interpretation of (1)b, but would predict its simultaneous interpretation. In Chapter 6, I captured the simultaneous interpretation of (1)b in terms of the “bound” *de re* analysis (see (59) and (60) in Chapter 6), but nothing excluded the possibility of a *de se* interpretation.

In section 9.2.1, of this chapter, I argue that there is no evidence for a specifically temporal *de se* LF for finite subordinate clauses. That is, given independent constraints governing temporal *de re* readings (the ULC and Intensional Isomorphism), the observed temporal interpretations of embedded finite clauses can all be captured via temporal *de re* LFs. However, in section 9.2.2, I provide evidence from non-finite embedded clauses that shows that pure *de se* readings exist at least for these structures. I show these readings can only be captured with strictly temporal *de se* LFs.
9.2.1. Temporal *de se* as a redundant mechanism in finite CP-complements

In Chapter 2, I discussed the evidence that was commonly used in support of the temporal *de se* approach to attitude reports. It mostly had to do with attempts to avoid attributing inconsistent beliefs to an attitude holder. I also said that temporal *de re* attitude reports are more restricted than attitude reports in which an embedded DP is interpreted *de re*. Two constraints proposed by Abusch (1994), namely, the ULC and Intensional Isomorphism, are active when an embedded tense undergoes a *de re* treatment. I believe that the more restricted nature of the temporal *de re* reports is crucial for understanding the nature of the so-called *de se* effects in the temporal domain.

In the domain of entities, what makes *de se* attitude reports about individuals different from their *de re* versions is the difference in the perspective that the attitude holder takes on herself in a *de se* report, on the one hand, and in a *de re* report, on the other. As was discussed in Chapter 2 with reference to Lewis’s (1979) theory of centered worlds, a *de se* belief obtains when a believer attributes certain properties to the center of each possible world that she takes to be indistinguishable from the actual world (or each world that she self-attributes the property of being the center of). A *de re* belief does not require attribution of any properties to the center of each of the relevant worlds.

This difference allows Percus & Sauerland (2003) (P&S) to find an example of an attitude report that is false under the *de re* construal, but true under a *de se* one. This gives them reason to claim that a *de se* attitude report has a separate LF. Recall example (72) from Chapter 2 evaluated against the situation in (73), repeated below as (2) and (3):
(2) Only John thinks he will win the election.

(3) Situation: A group of drunken election candidates watching campaign speeches on television do not recognize themselves in the broadcast. John, the only confident one, thinks, “I’ll win", but does not recognize himself in the broadcast. Bill and Sam, both depressive, think “I’ll lose" but are impressed by the speeches that happen to be their own and are sure “that candidate" will win. Peter, also depressive, happens to be impressed not by his own speech but by John’s.

Sentence (2) is true in situation (3) because there is a difference between John’s *de re* and *de se* perspective on himself. John is not the person who is the only one with a *de re* perspective on John according to which John will win (Peter is the person who fits this description). However, John is the only one who has a *de se* perspective on himself as the future winner.

In temporal *de re* attitude reports, the difference in perspective that would allow the temporal concept to be related to the temporal center in a different way than the embedded tense is related to the matrix tense is disallowed by Intensional Isomorphism. Assuming that the relation of ordering between times can be viewed as the equivalent of perspective in the temporal domain, this relation between the matrix and the embedded tense, on the one hand, and between the attitude holder’s “now” and the temporal concept, on the other, must be the same. It is thus impossible to argue for the necessity of a temporal *de se* LF in terms of an argument that would be similar to the one proposed by P&S.
To illustrate, consider a “temporal analogue” of example (2) given in (4) in relation to the situation described in (5):

(4) Only John thinks it’s raining.

(5) It is five o’clock. John thinks, “It is currently raining”. Neither Bill nor Tom think \((de\ se)\) that it is currently raining. They are both think, “It is not currently raining”. However, both Bill and Tom mistakenly believe that it is seven o’clock. And, they both entertain the attitude, “It rained at five o'clock”.

Imagine the following argument in favor of a \(de\ se\) LF for (4):

- Sentence (4) has a reading that makes it true in situation (5);
- only John entertains a temporal \(de\ se\) attitude that it is raining (only John thinks \(de\ se\) that it is raining; Bill and Tom think \(de\ se\) that it is not raining);
- however, both Bill and Tom have temporal \(de\ re\) attitudes towards 5PM that it is raining at that time;
- in that case, more than one person entertains a \(de\ re\) attitude towards 5 o’clock;
- sentence (4) can be true in (5) can be true only under a temporal \(de\ se\) interpretation.

I believe that this argument runs into the following problem. Bill and Tom mistakenly believe that is 7 o’clock, do not think that it is raining at their subjective “now”,

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but believe it rained at five (i.e. two hours earlier). This means that they must be past-oriented towards the time at which it rained in their belief alternatives: that time must precede their local “now’s”. If we assume an Abusch-style theory of temporal de re, then (by Intensional Isomorphism) their past-orientedness requires the actual time to which Bill and Tom have their de re attitude to precede the actual time at which they entertain their attitude. Since the actual time at which they entertain their attitude is 5 o’clock, the time to which they have their de re attitude must precede 5 o’clock and, therefore, cannot be equal to 5. This is inconsistent with the claim that Bill and Tom believe de re that it was raining at 5. The argument that (4) is true under a de se LF, but not under a de re LF, is thus based on statements that cannot be true at the same time: at 5 o’clock, Bill and Tom cannot be past-oriented w.r.t. the time at which they think it rained and have a de re attitude towards 5 o’clock believing that it rained then. Therefore, it cannot serve as proof that (4) requires a temporal de se LF in order to be true in situation (5).

To put it differently, Intensional Isomorphism makes sentence (4) true in situation (5) even with a de re LF. According to Intensional Isomorphism, the temporal res overlaps the attitude time only if the concept for the temporal res overlaps the attitude holder’s “now”. Consequently, a sentence like John thinks it is raining with a temporal de re LF is true because John self-locates himself at a time where it is raining. However, since Bill and Tom believe that it rained earlier and that it does not rain at the time they locate themselves in, their attitude can never be described by a sentence Bill and Tom believe that it is raining with a temporal de re LF. Because of Intensional Isomorphism, a de re LF for this sentence would require them to self-locate at a time where it is raining. Since they do not self-locate
themselves in such a time, this sentence will always be false under a \textit{de re} LF. Therefore, a temporal \textit{de re} LF for (4) ends up being true.

It can be concluded that due to Intensional Isomorphism, temporal \textit{de re} reports disallow perspectival discrepancies. It is not possible to find a situation in which a report like (4) would be true only under a \textit{de se} interpretation.

Let us now go back to the attitude report that was used to argue in favor of the temporal \textit{de se} and see how a temporal \textit{de re} account can correctly predict its truth conditions:

(6) At five o’clock, John thought that it was seven o’clock.

The deictic approach to tense that was famously argued by Abusch (1994) to fail in the case of (6) should not be conflated with the temporal \textit{de re} approach. Under the deictic treatment, the embedded Past gets the indexical interpretation and the time it denotes is not mapped to a temporal concept. Under the temporal \textit{de re} approach, it is mapped to a temporal concept that ends up being perceived by the attitude holder.

It was already noted in Ogihara (1996: 147) that a temporal \textit{de re} approach can deliver the same interpretation that obtains under the \textit{de se} construal of a sentence like (6). It is indeed so. Consider the following \textit{de re} LF that can be predicted for (6) and the truth-conditions given in (8):
(7) LF:

(8) $[[7]]^{g,c}(w)\langle c(\text{time})\rangle = 1 \text{ iff } \exists x \exists G(\text{John believes } x \text{ in } w \text{ at } g(1) \& G$ is a temporal concept generator for John in $w$ at $g(1)$ &

$\forall w't'(\text{compatible}(x)(w')(t') \rightarrow \text{it is seven o’clock in } w'$ at $G(g(1))(w')(t'))$, defined iff $g(1) < c(\text{time})$

The time provided by the embedded tense is the same as the time provided by the matrix tense, namely, $g(1)$. By Intensional Isomorphism, the temporal concept perceived by the attitude holder is then the same as the attitude holder’s “now”. So, the temporal
property that is attributed to the temporal concept in each of the attitude holder’s alternatives is also predicted to hold of the attitude holder’s “now”, making the temporal de re LF in (7) logically equivalent to the temporal de se LF that could be generated for sentence (6).

The fact that five o’clock in the actual world is mapped to that concept that happens to be seven o’clock in John’s doxastic alternatives and makes his local “now” equal to seven o’clock has no threat for John’s logical consistency since he is attributing a temporal property to the temporal concept, not the actual five o’clock. We thus get a satisfactory treatment of (6) in terms of the temporal de re analysis.

For this reason, I conclude that temporal de se as a theoretical tool is redundant for the English data under discussion (i.e. for finite CP complements). My proposed analysis of tense in complement CPs (above and below) thus builds on temporal de re.

9.2.2. Temporal de se as a required mechanism in non-finite complement clauses

The above criticism does not suggest that an interpretation in terms of temporal de se is always redundant. One case in which it is not only applicable, but is also required is non-finite complements of attitude verbs. Consider (9):

(9) John believed Mary to be in New York.
This sentence has the simultaneous interpretation, according to which at a time in the past John thought, “Mary is in New York”. In other words, he thought of Mary’s being in New York as of something contemporaneous with the time he located himself in.

Importantly, the temporal de re analysis seems to be inapplicable to (9) even though the simultaneous interpretation under a matrix Past is in principle possible (see Chapter 2). This becomes clear from examples like (10):

(10) a. Two days ago, John believed Mary to be in New York, but…
    b. Now he doesn’t.

Sentence (10)b cannot be understood to mean that John doesn’t believe that Mary was in New York two days ago. However, a reading according to which John doesn’t think at the utterance time, “Mary is in New York” is readily available. This makes (10)b significantly different from example (1)b, in which the finite clausal complement of an attitude verb allows for the back-shifted interpretation.

Since temporal de se is a mechanism that generates the simultaneous interpretation, I treat examples like (9) in terms of temporal de se. I follow Abusch (2004) and Wurmbrand (2014) who suggest that the CP complement in a sentence like (9) contains a tense projection and that the tense in such constructions always indicates the temporal center of the relevant attitude alternative. This is the hallmark of temporal de se. The schematic LF predicted for (9) is given in (11):

(11) \[ LF: \lambda w \lambda t_0 \text{Past}^0_1 \text{John believed-} w \lambda w_3 \lambda t_2 T_2 \text{Mary to be in NY-} w_3 \]
In (11), $T_2$ stands for the locally bound non-finite tense. It is bound by $\lambda t_2$ which is the binder associated with the attitude holder’s “now”. The embedded non-finite clause is of type $<s,it>$. The verb believe should thus be able to compose with a property denoting complement. The relevant lexical entry is given in (12).

$$(12) \quad [\text{believe}_{de\,se}]=[\lambda w.\lambda P_{<s,it>}.\lambda x.\lambda t. \forall w't' \in \text{DOX}_t(x)(w)(t): P(w')(t')=1]$$

*De se* truth conditions are thus predicted for (9) construed as (11):

$$(13) \quad [(11)]^*_{f}(w)(c(\text{time})) = 1 \text{ iff } \forall w't' \in \text{DOX}_t(\text{John})(w)(g(1)):\n\text{Mary is in New York in } w' \text{ at } t', \text{ defined iff } g(1) < c(\text{time})$$

### 9.3. Back to the Upper Limit Constraint

In this section, I discuss the nature of Abusch’s Upper Limit Constraint (ULC) in light of some recent criticism and counterexamples.

#### 9.3.1. Forward-shifted readings of Present-under-Past and Past-under-Past attitude reports
In the above discussion of Present-under-Past attitude reports, I followed the common view and assumed that such reports do not allow for the forward-shifted interpretation. However, Altshuler & Schwarzschild (2013b) provide an example suggesting that in some sentences the forward-shifted reading of Present-under-Past in complement CPs can be available after all. Consider the following dialogue that presumably takes place at a baggage counter in an airport:

(14)  a. Customer: I believe you have my bags.
       b. Employee: Who said I have your bags?
       c. Customer: The stewardess told me you have my bags.
       d. Employee: When did she tell you that?
       e. Customer: On the flight.

The central assertion here is (14)c, which is a Present-under-Past attitude report. The context makes a forward-shifted reading the only salient one. And despite its being unavailable in the double-access examples we saw earlier, it seems to be quite natural here. Example (14)c was proposed as a counterexample to the Upper Limit Constraint, according to which an embedded tense cannot denote a time in the future of the time denoted by the matrix tense.

More counterexamples to the ULC come from Past-under-Past configurations. Klecha (2014, 2016) reports that verbs like hope and pray allow their complements to describe an eventuality in the future of the time of hoping or praying. The relevant examples are given in (15):
Both sentences in (15) have a reading according to which the embedded eventuality is understood to be in the future with respect to the time of hoping or praying, i.e. in the future of the local evaluation time provided by the matrix verb. According to Klecha, the modal base of the embedding verb (Kratzer (1981)) determines the time to which reference can be made in the embedded clause. Verbs like believe, think or say have a doxastic modal base which is not future-oriented, whereas verbs like pray or hope, besides a doxastic modal base, can also have a circumstantial one, which allows their preajacents to refer to times in the future of their local evaluation time (Condoravdi (2003)).

According to Klecha, the embedded Past in (15) is an underlying relative Present that has undergone SOT and, therefore, surfaces with Past tense morphology. In the terminology I adopted above, this would mean that the embedded clauses in (15) contain a relative Present but surfaces with Past tense morphology borrowed from the matrix clause. The forward-shifted reading arises from Klecha’s treatment of embedded Present (or zero tense), which he argues to be a non-past tense that is able to denote a time that follows its temporal anchor if the modal base of the embedding verb licenses such temporal reference.

Another example of an attitude report that is claimed to be a counterexample to the ULC is a Past-under-Past belief report is provided by Altshuler (2016) and is given in (16):
days. She responds: “He’s painting our car yellow at this very moment. He should be done by tomorrow.”

b. 3 days later, Al goes over to Frank’s house and says: “Where’s the car?”

c. Frank: Whaddya want with my car?

d. Al: I wanna see it. Jackie told me you painted it yellow.

Here, we see a Past-under-Past with an attitude verb like tell, which, according to Klecha (2016), should have a doxastic modal base and disallow for a forward-shifted interpretation. This is, again, a problem for the traditional understanding of embedded tense, especially given that the judgments for the sentences that do not allow for a forward-shifted interpretation are also robust.\(^{46}\)

\section*{9.3.2. Can the ULC survive the criticism?}

As was demonstrated earlier, Abusch (1994) gives reason to understand the ULC in two ways: either as a restriction on the reference of an embedded (de re) tense or a restriction on the perspective or temporal orientation that an attitude holder can be

\(^{46}\) I would like to note that the native speakers I asked found (16)d quite degraded. However, I will still assume that it is not impossible because, just like (14)c in the airport example, the sentence in (16)d points at a problem with the ULC and since speakers I consulted found (14)c quite natural the issue with the availability of a forward-shifted interpretation remains no matter whether (16)d is accepted or not.
understood to have in a Present-under-Past or a Past-under-Past attitude report. Examples from Klecha (2014, 2016), Altshuler & Schwarzaschild (2013b) (A&S), and Altshuler (2016) challenge both perspectives.

As I already said, Klecha (2014) observes that in (15)a, repeated below, the attitude holder can be understood to have a future orientation:

(15) a. Martina hoped Carissa got pregnant.

Klecha treats the embedded Past as an instance of an underlying relative Present that has undergone SOT (a zero tense with borrowed Past tense morphology). He allows an embedded (but not a matrix) Present to refer to times in the future of its anchor (i.e. function as a non-past tense), but such a future reference obtains only when the embedding attitude verb licenses it (has a circumstantial modal base). I find Klecha’s arguments convincing and refer the reader to his paper for details. What I want to point out here is that some version the ULC is still active even in Klecha’s examples.

Consider the example in (17):

(17) That Carissa got pregnant, Martina hoped.

Native speakers I asked told me that they could not get a forward-shifted interpretation in (17). They could only get a back-shifted interpretation. This restriction seems to be in the spirit of the ULC, which would prohibit a *de re* Past inside the CP to denote a time in the future of the time denoted by the matrix Past. It is not immediately clear why the forward-
shifted interpretation is not available in (17) if the verb *hope* licenses temporal reference to a time that is in the future of the attitude holder’s “now”.

Exploring this example in more detail goes beyond the limits of the current discussion. What I hope this has shown is that the ULC cannot be totally dismissed in light of Klecha’s arguments.

Examples proposed by A&S and Altshuler (2016) are cases of a forward-shifted interpretation of an indexical Present-under-Past and a Past-under-Past that cannot be accounted for in terms of a relative SOT Present-under-Past. I repeat them here without their surrounding discourse:

(14)   c. The stewardess told me you have my bags.
(16)   d. Jackie told me you painted it yellow.

In (14)c, the stewardess could only be future-oriented when she expressed her attitude. In (16)d, the original attitude expressed by Jackie did not even require that the painting of the car ever culminates successfully (this is known as the Imperfective Paradox: Bennet & Partee (1978), Dowty (1979), Landman (1992)). Since the context in (16)d could be minimally changed so that the original attitude was a forward-shifted one, these examples can be said to be in direct contradiction with what we saw earlier: non-fronting Present-under-Past configurations only licensed the double-access reading and no forward-shifted interpretation was available for Past-under-Past attitude reports. Thus, these sentences are not just counterexamples to the claims made earlier in the literature, they reveal a deeper
problem: why can tense in a complement CP sometimes denote a time later than the time denoted by the matrix tense and sometimes not?

Gennari’s (1999) discussion of double-access sentences contains important insights into what might be going on. She points out that in double-access sentences the speaker’s perspective overrides that of the attitude holder. The attitude holder is attributed a stronger belief that she originally had. In attributing a stronger belief to the attitude holder, the speaker employs pragmatic thinking: (i) if the attitude holder is not taken to still hold the belief, the double-access report is infelicitous; (ii) if the embedded eventuality cannot be taken to last up until and including the utterance time, the report is again infelicitous.

As suggestive as this might be, A&S’s and Altshuler’s (2016) examples contain much more than could be explained under this perspective. In (16)d, the speaker does not just conclude that, under normal circumstances, the embedded eventuality continues up until and including the utterance time, but also that it culminates. So what we see in (16)d is that the reported eventuality is contentfully different from the one that was present in the original attitude.

In light of this difference from the more familiar reports in which no such drastic transformations of the content of the original attitude as well as of the temporal orientation of the speaker are allowed, it is quite plausible that these examples are instances of a different kind of reports and should be explored differently. This is the kind of strategy that applied to attitude reports with a past stative verb in the matrix clause in Gennari (1999).

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47 Gennari (1999) points out that this relates only to double-access reports with stative attitude predicates like believe.
and Alshuler et al. (2015). Gennari suggests that they are implicit reports in the spirit of Stalnaker (1984)\(^{48}\). Altshuler et al. (2015) treat them in terms of cessation and parentheticality. In both treatments, the presence of pragmatic reasoning is required.

I believe that the two examples from A&S and Altshuler (2016) can also be analyzed as instances of a different kind of attitude reports. In other words, such sentences are not actually attitude reports, but assertions that come with an indication of being the result of an inference that the speaker has made from the information she received from the individual denoted by the matrix subject\(^{49}\).

What we seem to arrive at is that this special kind of attitude reports conveys that, originally, the attitude holder could have had an attitude towards a proposition that is different from the one denoted by the complement clause and asserted by the speaker, who inferred the latter proposition from the former. In order to provide a compositional treatment of such reports, I introduce an operator that I call *Conditional Belief Operator* or \(OP_{CB}\). I propose that it occurs in the LF of a sentence like (14)c in the position schematically suggested in (18):

\[^{48}\text{Gennari (1999: 98-99) writes, “I propose that an implicit report [...] is felicitous, if there is an inference attainable in the common ground that allows the speaker to infer the attributed content. [...] This is the crucial difference that distinguishes reports of implicit attitude from de re reports.”}\]

\[^{49}\text{In their discussion of infelicitous double-access sentences with a stative matrix verb, Altshuler et al. (2015: 22) reference Simons (2007) and write, “The complement carries the main point of the utterance while the matrix clause gets demoted to parenthetical status and plays the evidential function, indicating the source of evidence for the proffered content.”}\]
(18) The stewardess told me (that) $OP_{CB}$ [TP you have my bags]

The semantic contribution of $OP_{CB}$ is such that (18) is true in $w_0$ at $t_0$ only if the
content of the embedded TP (you have my bags) is asserted (i.e. the proposition described
by that TP maps $w_0$ and $t_0$ to truth) and it is also presupposed that

(i) that there is a proposition $q$ and the stewardess told me that $q$ (i.e. $q$ obtains
in the worlds and times that are compatible with what the stewardess told
me in $w_0$ at the time prodiced by the matrix past tense);

(ii) if the stewardess told the truth, then the content of the embedded TP obtains
in $w_0$ at $t_0$ (i.e. if $q$ obtained in the actual world at the time of the attitude,
then the addressee has the speaker’s bags in $w_0$ at $t_0$).

In terms of the formalism I have developed in this dissertation, the embedded TP
you have my bags is of type $<<i, i, si>>, <i, s, it>>$ and has the structure in (19):
In order for this TP to be asserted at in the actual world $w_0$ at time $t_0$, its temporal arguments must be saturated by $t_0$ and its world argument must be saturated by $w_0$. Recall that in that case any temporal concept generator maps a temporal res to itself. For this reason, $OP_{CB}$ must be able to provide its TP argument with the corresponding arguments.

In order to state the abovementioned presuppositions, $OP_{CB}$ must, firstly, introduce a proposition that describes the content of the actual attitude possessed by the attitude holder. Secondly, it must be required that if the proposition obtains in the actual world at the attitude time (i.e. if the attitude holder was right), then it is pragmatically entailed that the proposition that represents the assertive content.

Given that attitude verbs take content arguments, the proposition introduced by $OP_{CP}$ must truly reflect the content that the attitude holder is related to by the function denoted by the attitude verb. This means that after $OP_{CB}$ applies to the TP, it must also
apply to the complementizer, the attitude verb, the attitude holder and time of attitude, relating them in the way described in the following lexical entry:

\[(OF_{CB})^{g,c} = [\lambda w . \lambda t_0 . \lambda p_{<i,<i,si>,<i,<s,it>>>} . \lambda c_{<s,>et}> . \lambda v_{<e,<i,<i,si>,<e,>it>>>} . \lambda y . \lambda t : \]

\[\exists q_{<s,>it>}(\exists x_c(c(q)(x_c) = 1 & \exists G_1(v(x_c)(G_1)(y)(t) = 1 & q(w)(t) = 1 \leftrightarrow \exists G_2(p(G_2)(t_0)(w)(t_0) = 1))) . \]

\[\exists G(p(G)(t_0)(w)(t_0) = 1)\]

In (21), I provide an annotated version of the same lexical entry:

In (20), \(\leftrightarrow\) stands for “pragmatically entails”, which means entails under the normal assumptions about the world and how it develops. The following LF is predicted for (14)c:
The truth conditions predicted for (14)c construed as (22) are given below:

\[
[(22)]^{C_c}(c(\text{time}))(w) = 1 \quad \text{iff} \quad \exists G (G \text{ is a temporal CG } \& \ c(\text{hearer}) \text{ has c(speaker)'s bags at } G(c(\text{time}))(c(\text{time}))(w));
\]
defined iff g(1) < c(\text{time}) \&

\[
\exists q_{<,tr} \exists x (x \text{ is a content individual } \& \forall w',t'(\text{compatible}(x)(w')(t') \rightarrow q(w')(t') = 1) \quad \text{iff} \quad \exists G_1 (G_1 \text{ is a temporal CG for the stewardess at g(1) in w } \& \text{ the stewardess in w told x to c(speaker) in w at g(1)})
\]
\[ q(w)(g(1)) = 1 \] pragmatically entails that \( \exists G_2(c(\text{hearer}) \text{ has} \ c(\text{speaker})'s \text{bags in} \ w \text{ at} \ G_2(c(\text{time}))(c(\text{time}))(w)) \]

The temporal CG for the stewardess that is introduced in (23) does not make any semantic contribution because the content individual that is the object of the stewardess’s attitude is not introduced by a clause with a \textit{de re} tense with which the temporal concept generator could compose. However, its presence is required by the semantics of the attitude verb, which has an unsaturated position for the temporal concept generator. In a report like (14)c, this position is simply closed by an existential quantifier introduced by \( OP_{CB} \).

I assume that the perspective proposed here for example (14)c also extends to (16)d without deriving the truth conditions of (16)d. I believe that the approach outlined above is compatible with the ULC. The ULC applies to “real” attitude reports and not to hidden assertions that express conditional beliefs. The contrast between those examples of Present-under-Past that obey the ULC and those that do not could thus be clarified.

The double-access interpretation becomes an interesting borderline case where the attitude holder’s perspective is already overridden by the speaker and they can be viewed as sentences that contain \( OP_{CB} \), but the time denoted by the embedded Present can still stretch enough into the past to overlap the time of the matrix tense and create a configuration in which none of Abusch’s constraints are violated (the ULC or Intensional Isomorphism). Therefore, double-access attitude reports can also be analyzed without an occurrence of an operator like \( OP_{CB} \), if this technical trick with stretching the denotation of the embedded tense is allowed.
With these preliminary arguments in defense of the ULC, I conclude that it is not impossible for the ULC to remain part of a *de re* account of embedded tense. I realize that the outlined perspective on attitude reports that involve conditional belief is very abstract and requires further investigation. I leave such an investigation for future research.


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