

Feature Deletion under Semantic Binding: Tense, Person, and Mood under Verbal Quantifiers

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1 Introduction

This paper – an extended footnote to (Schlenker, 1999) – analyses some phenomena of the temporal and modal domain that have been worrying me for at least ten years. It deals with tense and mood in subordinate constructions, notably under attitudes. The claims defended are the following ones.

1. Person, Mood and Tense are features of the verb that are checked by the features of the correspondent arguments of the verb, which are an individual, a world and a time variable.

2. At LF, the features of variables are interpreted. Variables that have them will be deictics. The features of verbs ('checkees') are never interpreted.

3. Features of semantically bound variables are deleted and therefore not interpreted at LF.

4. Verbs of attitudes, modals and the future auxiliary **will** are variable binders that delete features under agreement.

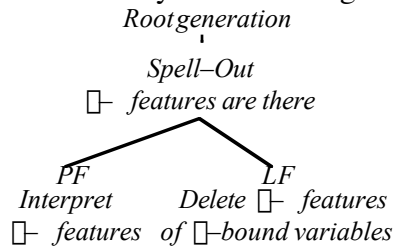
The paper contains a full theory of attitudes that overcomes empirical problems of the classical theory of attitude due to (Kaplan, 1979). Nevertheless it defends Kaplan's celebrated *Prohibition against Monsters*, viz. that the functors of natural language are at best intensional. Though I accept virtually everything that Schlenker says, I disagree with Schlenker on his claim that verbs of attitude are monsters in the sense of Kaplan. I will show that this claim cannot be maintained. There is no space for a detailed discussion of Schlenker's thesis. The instructed reader will easily discern the few points where I slightly modify his theory.

2 Feature Deletion under Semantic Binding

In many languages, finite verbs have the features person and number, tense and mood. Person and number are agreement features for the subject. If a DP has the feature **1st person**, it normally denotes the speaker. Hence this feature is interpretable, if it is a DP feature. As a verb feature, **1st person** has no content. The temporal feature **present** indicates the presence of a time variable that denotes the speech time and the mood feature **indicative** marks the presence of a world variable denoting the actual world.

In general, the following picture seems accurate: while features of arguments may be interpretable, features of heads are not. The main idea pursued in this article is that arguments may lose their features during the derivation. This happens precisely if an argument is a semantically bound variable. The following diagram illustrates the situation.

- (1) Features may be lost during the derivation



Virtually all the facts analysed follow from this fact. The first linguist who has stated clearly that features of semantically bound variables are not interpreted is Irene Heim (Heim, 1994b). Heim’s example is this:

- (2) Only I did my home work.
 SS: [Only I_5] $_8$ did my $_8$ home work.
 LF: [$_{DP}$ **only** I_5] \square_8 t_8 did 8^{1st} ’s home work
 [by QR and feature transmission under binding (see below)]

I_5 is interpreted as a variable with the interpretable feature **1st person**, which restricts the denotation of the variable **5** to the actual speaker. This feature is projected to the **only-DP**, a generalised quantifier that must be QR-ed for type reasons. The moved DP \square -binds the trace t_8 and the variable 8 , where the latter translates the possessive pronoun. The \square -binding of the variable 8 has the effect that the feature **1st person** is not interpreted. In particular, the possessive **my $_8$** does not refer to the speaker. That this consequence is forced upon us should be obvious from the paraphrase of the intended meaning:

- (3) Everyone x such that x is different from me didn’t do x ’s homework.

The two occurrences of x in the **that**-clause correspond to the two variables 8 in the above LF. These variables range over the entire domain of individuals, which would be impossible if they had the interpretable feature **1st**. Other sentences illustrating the same point are discussed in (Heim, 2001). To explain these facts, Heim proposes a principle of feature transmission, which reads as follows:

- (4) Feature transmission under variable binding (Heim, 2001)
 Transmit features of a moved phrase to all variables it binds.

“The principle applies at the PF-branch. It affects the morphological shape of items, but not their interpretation. Only the features present prior to transmission are interpreted.” This formulation seems to entail that we QR the antecedent of a bound variable at S-structure (= Spell-Out). Since I do not want to commit myself to that technical detail, I prefer the formulation that features are *deleted* under semantic binding, as indicated in the notation. So my reformulation of Heim’s principle is this.

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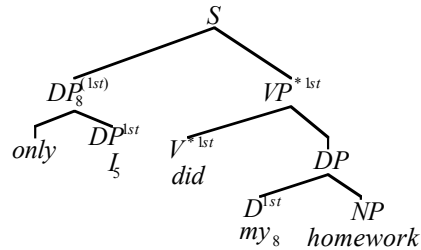
- (5) Feature deletion under semantic binding
Delete the features to all variables that are semantically bound. (LF)

The term *semantic binding* is due to (Heim and Kratzer, 1998: chap. 10). I am using the term synonymously with λ -binding throughout. One advantage of this formulation is that at the branching point all λ -features are present. But at LF only interpretable features are present – as the Minimalist Program wants to have it.¹

A remark to the different kind of features is in order. λ features of a head are never interpreted and hence automatically deleted at LF. I will distinguish them graphically from interpretable features by a prefixed asterisk. λ features of arguments fall into two classes, interpretable and not interpretable ones. The features of arguments will be called *checkers* and the feature of heads *checkees*. More details will follow in section 4.1.

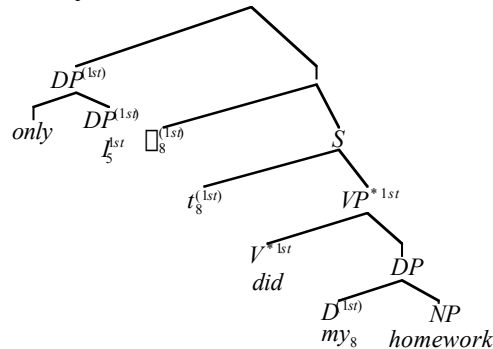
Here is a more detailed analysis of example (2)

- (6) SS:



The feature 1^{st} of the subject is projected to the **only**-DP, where it checks the checkee $*1^{st}$, which is projected from the finite verb. The checking takes place at s-structure (SS).

- (7) LF(by QR):



The LF is generated by QR, i.e. the index **8** of the subject is interpreted as a λ -operator which binds the trace of the subject. QR induces semantic binding and hence deletes the feature 1^{st} of the λ -bound variables. Deletion of a feature λ is indicated as $\boxed{\lambda}$ or as λ .² Checkers λ that are projected in the syntax are notated as $\boxed{\lambda}$, while projected checkees $*\lambda$ are written in the same notation. It follows that the only remaining feature 1^{st} in this LF is that of the subject variable **5**. I will give a precise semantics for the feature in sec-

¹ Chomsky, Noam. 1995. *The Minimalist Program*. Cambridge, MA: MIT Press. Obviously, many publications by Chomsky are relevant and could be cited.

² I am using $\boxed{\lambda}$ in trees for the only reason that my tree program doesn't allow for the notation λ .

tion 5.2.

Semantic binding of personal pronouns is always achieved by QR. Verbs, however, have a time and a world argument as well. The idea I want to pursue here is that the mood feature **ind(icative)** is a feature of the world argument indicating that a world variable refers to the world of the context. Similarly, the temporal feature **pres(ent)** restricts the denotation of a time variable to the time of the context. These features have the checkees ***ind** and ***pres** as morphological pendants of heads.

World and time variables can be bound by verbs or adverbs. Let us consider verbs here. The standard examples of world binders are modals. Let us assume that the last two elements of each verbs are a time and a world, a VP with its subject saturated has the type $i(st)$, a VP with a time argument has the type st and a VP with a world argument has the type t . Let us assume further that infinitives have the checkees ***pres** and ***ind** as default values.

- (8) We must t have a secretary that speaks Amharic.
 SS: $w_0^{ind} t_0^{pres} must^{*ind*pres} w_1^{ind} t_1^{pres} we\ have^{*ind*pres} a\ secretary\ that\ w_1^{ind} t_2^{pres}$
 speaks *ind*pres Amharic.
 LF: $w_0^{ind} t_0^{pres} must^{*ind*pres} \Box w_1^{ind} w_1^{ind} t_1^{pres} we\ have\ a\ secretary\ that\ w_1^{ind} t_2^{pres}$
 speaks Amharic

At SS, the features of the time-world variables simply check the corresponding features of their verbs. Semantically, **must** is a universal quantifier over worlds. Therefore it \Box -binds the world variable of its complement. In the example given, the world variable of the embedded relative clause happens to be the same. Therefore, it is bound by **must** as well. The intended reading might be something as: “In every world w that is not ruled out by our wishes in the world of the context at the time of the context, we have a secretary at the time of the context that speaks Amharic at the time of the context.” For the time being we leave it open how the \Box -binding of the world variable comes about precisely. The important point is that a modal quantifies over worlds and therefore deletes the feature **indicative** of the world variable it binds. I have to mention a formal property of semantic binding, however: semantic binding requires agreement of \Box features.

- (9) a. If a DP \Box semantically binds a DP \Box , then the \Box features of \Box and \Box agree.
 b. Semantic binding of a variable \Box by head \Box requires feature agreement at s-structure.

In other words, a verb in the first person can only bind a DP of first person, a verb in the present can only bind a present variable and so on. This principle will be parameterised, as we will see.

While modals are quantifiers over worlds, the English temporal auxiliary **will** seems to be a quantifier over times.

- (10) a. I will answer every e-mail that arrives. (Abusch, 1998)
 b. *I have answered every e-mail that arrives.

The contrast shows that **will** \Box -binds the time variable of its complement and deletes its **pres** feature, whereas **have** doesn't do this. It follows that the LF of (10a) must be something like the following:

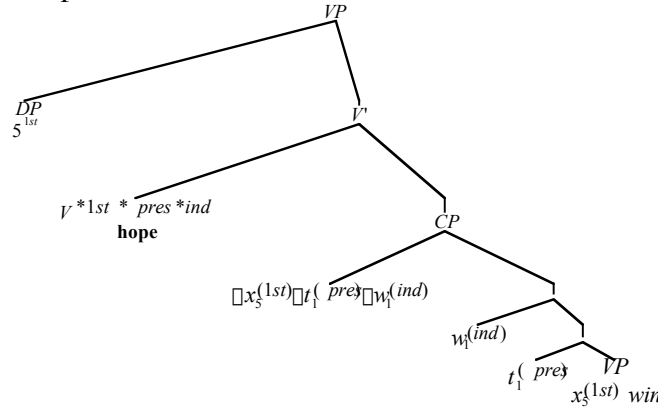
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(11) $w_0^{ind} t_0^{pres}$ will $\Box t_1^{pres} w_1^{ind} t_1^{pres}$ I answer every e-mail that $w_2^{ind} t_1^{pres}$ arrives

On the other hand, the LF for (10b) must be rather different, as we shall see.

The most pervasive verbal quantifiers are verbs of attitudes. For the reasons given in (Lewis, 1979), (Stechow, 1984b), and (Haas-Spohn, 1995), these verbs quantify over individuals, worlds and time. It follows that a verb of attitude can delete the \Box features of the time, the world and the subject variable of the main verb of its complement. Here is an example of such an LF.

(12) I hope that I win



The intended reading is that all my hoping alternatives live in a world at a time where they win. Modals and verbs of attitude are quantifiers. I will follow (Heim, 2001) and call these and related verbs *verbal quantifiers*.

3 Data

This section gives an overview of some of the data the theory wants to cover. I start with pronouns, because these are the central topic motivating Schlenker’s theory.

Consider the first person singular. For (Kaplan, 1979), **I** is always directly referential, it invariably denotes the speaker. We have seen that this cannot always be true. **I** may figure as a bound variable. If **I** occurs under a verb of attitude, it may be bound under agreement with the person feature of the verb, thus giving rise to a *de se* reading. A Kaplan scenario is this:

(13) John thought that I was being attacked (by a bear). (de re)
 John thought, “Arnim is being attacked.”

Here, **I** can only be interpreted *de re*. If we want to express a *de se* thought of the subject, we have to use a third person pronoun and encounter, in fact, an ambiguity between *de se* and *de re*.

(14) John thought he was being attacked. (de se/de re)
 John thought, “I am being attacked.”
 John thought, “The man in the mirror is being attacked.”

If I speak of a *de se/de re* ambiguity, I mean that there are actually two different logical

forms, which will be introduced below. One might dispute this for the reason that *de se* belief is a special case of *de re* belief (belief under the acquaintance relation of identity; cf. (Lewis, 1979)). (Percus and Sauerland, 2002) have given an argument, however, that this will not do in all cases.

(15) Only John thought that he was being attacked by a bear.

The scenario is this: Bill and Mary see themselves in the mirror without recognising themselves and each one sees a bear in the mirror who is going to attack the person he is seeing. Each one thinks: “The bear is going to attack the person I am seeing in the mirror”. John, the third person, sees a bear running toward him and thinks: “The bear is going to attack me”. Under this scenario, (15) is true intuitively, but not under a *de re* analysis.³ So let us assume that there is a special LF representing *de se* readings only.

We encounter the same ambiguity with a first person matrix subject:

(16) I thought that I was being attacked. (*de se/de re*)
 I thought, “I am being attacked.”
 I thought, “The man in the mirror is being attacked.”

The generalisation seem to be that a *de se/de re* ambiguity arises when the matrix subject and the subordinate pronoun agree in their λ -features. This should follow from the binding principles for verbal quantifiers. Kaplan must assume the same LF for the ambiguous sentences, and (Kaplan, 1979: sect. XX) contains some ideas about how to analyse *de re* readings, which could cover *de se* readings as a special case. Following (Zimmermann, 1991), (Stechow, 2001) developed a semantics for *de re/de se*.

A Kaplanian theory would have great difficulties with Amharic, where an embedded first person pronoun can refer to the speaker or it can be interpreted *de se*.

(17) Amharic: (Schlenker, 2001)
 john Jägna nāNN yt-lall
 John hero I-am says-3 sg.m
 Translation: John says that he is a hero.
 Situation: John says, “I am a hero.”

The next example shows that **I** is not quoted.

(18) aləttazzäzäNN alä (Schlenker, 2001) [Amharic, Leslau 1995, p. 779]
I-will-not-obey-**me** he-said
 Translation: He said he would not obey me.
 Situation: He said, “I will not obey you.”

The explanation within a Schlenkerian frame work will be that Amharic verbal quantifiers can bind a first person variable, even it they are not in the first person.

The next set of data concerns logophors. The crucial property of logophoric pronouns is that they must occur in the scope of an appropriate verbal quantifier ((Clements,

³ The *de re* analysis means: Each of John, Mary, and Bill bears a relation of acquaintance toward himself and thinks that the object toward which he bears the relation is being attacked by a bear.

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1975), (Schlenker, 2001)). Semantically, the logophoric pronouns encode the fact that the subject had an “I”-thought, which means that where we find the logophor in indirect discourse, the subject had used “I” in his language (of thought). The following examples from Ewe illustrate these points.

- (19) a. kofi be **ye~**-dzo [Ewe, (Clements, 1975)]
 Kofi say LOG-leave
 Translation: Kofi said he had left.
 Situation: Kofi said, “I left”
- b. kofi be **e**-dzo
 Kofi say he/she left
 Translation: Kofi said he/she had left.
 Situation: Kofi said, “He/she left.”
- (20) Ewe relative clauses [(Clements, 1975)]
- a. *ama ∂ o Nku nyOnuvi hi dze **ye~** gbO dyi
 amaset eye girl WH stay LOG side on
- b. ama ∂ o Nku nyOnuvi hi dze **e** gbO dyi
 amaseteye girl WH stay pro side on
 ‘Ama remembered the girl who (had) stayed with her’
- c. amagbO be **ye~**- ∂ o Nku nyOnuvi hi dze **ye~** gbO
 dyi
 amasay that LOG eye girl WH stay LOG side
 on
 Translation: Ama said she remembered the girl who (had) stayed with her.
 Situation: Ama said: “I remember the girl who stayed with me”

From (Chierchia, 1989) we know that controlled PRO must be interpreted as a de se pronoun. The following example is due to Schlenker, but Chierchia uses similar ones.

- (21) a. Situation: John is so drunk that he has forgotten that he is a candidate in the election. He watches someone on TV and finds that that person is a terrific candidate who should definitely be elected. Unbeknownst to John, the candidate he is watching on TV is John himself.
 True: John hopes that he will be elected.
 False: John hopes [PRO to be elected]
- b. Situation: John hopes: “I will be elected.”
 True: John hopes [PRO to be elected]

The difference between PRO and LOG is that PRO must be locally bound by a verbal quantifier, i.e., a verb of control.

The next set of data concern tense. One of the difficulties of an informal discussion of tenses is that they express relations. This is particularly true of the past tense. When we have a past under a verbal quantifier, it is not the past variable that is bound, but the present variable to which the past variable is related. This subtle fact is a permanent source of confusion.

One of the central tasks of this paper is to derive the SOT facts and contrasts for languages such as English and Russian. In analogy to *de se*, I will use the term *de nunc* for “the time at which I am”.

- (22) a. Smith thinks Mary is sick. (simultaneous *de nunc*)
 Smith thinks, “Mary is sick now.”
 b. Smith thinks Mary was sick. (anterior *de nunc*)
 Smith thinks, “Mary was sick.”
 c. Smith thought Mary was sick. (simultaneous *de nunc*)
 Smith thought, “Mary is sick.”
 d. Smith thought Mary had been sick. (anterior *de nunc*)
 Smith thought, “Mary was sick”.

The SOT rules for English are basically these: (a) When the main tense is present or future, then the subordinate tense is present in the case of *de nunc* simultaneity, past in the case of *de nunc* anteriority and future in the case of *de nunc* posteriority. (b) When the main tense is past, then the subordinate tense is past in the case of *de nunc* simultaneity, pluperfect in the case of *de nunc* anteriority and past future in the case of *de nunc* posteriority.

We will see that the rules follow from the assumption that a verbal quantifier deletes the semantic tense features of the time variable it binds.

Russian is generally referred to as a non-SOT language, a misnomer, because Russian has SOT-rules as well. The difference is that (for the purpose of obtaining “*de se*” readings) Russian always treats subordinate clauses as if the matrix verb were in the present. With respect to the semantics and LF, the two languages do not differ. We will formulate a parameter that accounts for the difference. The parameter will (also) account for other non-SOT languages such as Japanese (cf. (Ogihara, 1989)).

- (23) SOT in Russian (folklore)
 a. Petja skazal, što Miša plačet (simultaneous *de nunc*/double access).
 Petja said that Misha is-crying
 Petja said, “Misha is crying.”
 b. Petja skazal, što Miša plakal (anterior *de nunc*).
 Pejta said that Misha is-crying
 Petja said, “Misha is crying.”

The following examples show that “to see” and “when-clauses” cannot bind the present variable in the relative clause, but the verbal quantifier “to tell” can.

- (24) a. Maša videla čeloveka kotoryj plačet.
 ‘Masha saw a man who is/*was crying.’
 b. *Kogda Maša videla Ivana, on plačet.
 ‘When Masha saw Ivan, he is crying.’
 c. Masha skazala što ona videla čeloveka kotoryj plachet.
 ‘Masha said that she saw a man who was/is crying.’

The following example shows that some Russian verbs behave like their English coun-

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terparts.

- (25) Chasto slučalos', čto Miša plakal / *plačet [Janssen 1996]
often happened, that Misha cried-IFPV / is-crying
'It was often the case that Misha cried / *is crying.'

In terms of optimality theory we may say that examples like these illustrate the emergence of the unmarked: this verb doesn't behave un-normally, Russian verbs of attitude do.

The aspectual adverb **in two days** can mean "at the time which is at a distance of two days from the evaluation time" (Russian **čerez** or Italian **fra/tra**). (Schlenker, 2001) takes the following contrast as an argument that this adverb depends on the context which may be shifted by a verb of attitude:

- (26) a. John told me repeatedly over the years, 'I will finish my work in two days/the day after tomorrow.'
b. #John told me repeatedly over the years that he would finish his work the day after tomorrow.
c. John told me repeatedly over the years that he would finish his work in two days.

Subjunctive modals exhibit a peculiar behaviour. Example (27a) suggests that **ought** is a present form. But it can be embedded under a predicate of attitude in the past. And it can be embedded under the future.

- (27) a. *When John was a schoolboy, he ought to study more. (Abusch, 1993)
b. John ought to study more.
c. John thought that he ought to study more.
d. John will always be a student that ought to study more. (Heim, 1994a)

The speaker of German may convince himself that the German subjunctive modals **müsste**, **könnte**, **sollte** pattern exactly alike.

It has been observed in the literature that the English sentence (28) is ambiguous between the two unambiguous German translations (Stechow, 1995) and (Condoravdi, 2002). In the present approach we are able to formulate a rule for the idiosyncrasy of the English construction.

- (28) a. John might have won.
b. Hans könnte gewonnen haben.
"It is possible that John won"
c. Hans hätte gewinnen können.
"There was the possibility for John to win"

I can't analyse the German Konjunktiv in this paper. I only want to show how we can now derive the observation in (Stechow, 1984a) that a subjunctive in the **than**-clause in (29c) invariably generates a contradiction.

- (29) a. I thought your yacht was longer than it is. (Russell, 1905)

- b. Ich dachte, ihre Yacht sei/wäre (subj.) länger als sie ist (ind.).
- c. #Ich dachte, ihre Yacht sei/wäre (subj.) länger als sie sei/wäre (subj).

4 The Theory

As I said, I will adopt a version of the theory in Schlenker’s dissertation, because among his several proposals this theory is the only one that develops the outlines of a theory of tense, the central interest of this article. Some technical details of his proposal are not entirely clear to me, and I will try to clarify the conceptual issues involved.

4.1 Syntax and Morphology

Like most semanticists, I will assume that lexemes have logical types: e (individuals), i (times), s (worlds) and t (truth values). The types determine the semantic type of the value of the expression. The language will consist of labelled trees, whose terminal nodes are labelled by lexemes, while the non-terminals are labelled by category symbols, logical types and features, which will be introduced. Some features are morphological, others will be purely syntactical and encode binding properties.

At the PF-branch of the grammar, the morphological features determine the pronunciation of the expression. I will assume that all features are still present at s-structure/Spell-Out. At LF, only interpretable features survive; non-interpretable features are deleted, and a very important deletion process is Deletion under Variable Binding, as we have seen. LF is generated from s-structure by scope shifting operations like Quantifier Raising (QR) or Quantifier Lowering (QL)⁴ and other operations like providing the verbal quantifier with the correct λ -binder.

With (Stechow and Sternefeld, 1988) and (Sternefeld, 2000), I will assume that there are two kinds of features, **checkees** and **checkers**. The latter are prefixed by a star.⁵ As to semantics, there is an important difference. Here is a list of the morphological features that play a role in the paper.

(30) Morphological features: **checkers** and **checkees**

Conventional name	Checkee(s)	Checker(s)
i th person, i = 1,2,3	*i th	i th
Present	*pres	pres
(‘anterior’)	*<	<
Past	*<, *pres	<, pres
Pluperfect	*<, *<, *pres	<, <, pres

⁴ May, R. 1977. The Grammar of Quantification, MIT: Ph.D. Dissertation.

⁵ Stechow, Arnim von , and Sternefeld, Wolfgang. 1988. *Bausteine syntaktischen Wissens. Ein Lehrbuch der generativen Grammatik*. Opladen: Westdeutscher Verlag. uses a subcategorisation hyphen, and Sternefeld, Wolfgang. 2000. *Syntax. Eine merkmalsbasierte generative Analyse des Deutschen*: Unpublished Manuscript. puts an asterisk at both sides of the checkee.

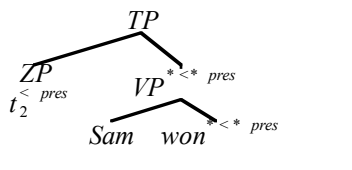
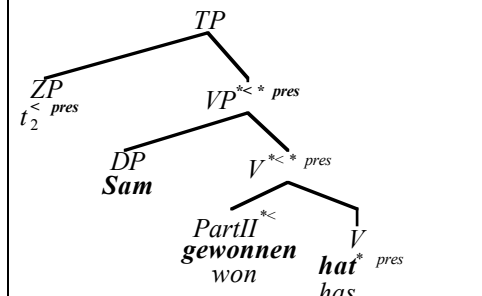
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Indicative	*ind	ind
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With the exception of present, the conventional tenses are decomposed into several features. I will assume that checkees are projected. Feature checking is done under agreement, i.e., when a checkee and a checker are adjacent, they are not projected further.

Most languages I know encode the semantic features **pres**, **<pres** and **<<pres**, but they do it differently. The following trees are Spell-Out representations, i.e., the presupposition of the referential temporal variable is still missing.

- (31) The syntax of **<pres**: Engl./Germ./Russ. preterite morphology, Southern Germ./Yidd. present perfect morphology

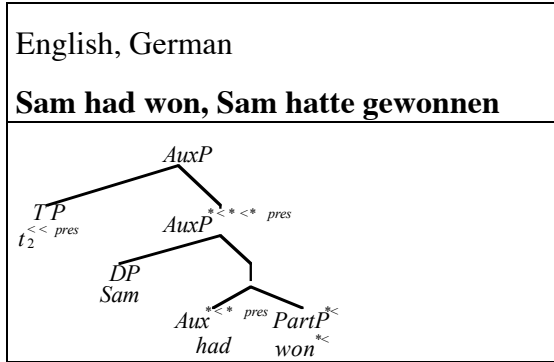
English: Sam won German: Sam gewann Russian: Sam vyigral	German, Southern German, Yiddish ⁶ Sam gewonnen hat
	

In German, two encodings of the semantic tense features ***<**, ***pres** coexist, viz. the preterite morphology and the periphrastic present perfect form. With non-copulative verbs, the present perfect form is highly preferred in spoken language, and Southern German and Yiddish only have this form. In this representation, the auxiliary is semantically empty; it merely serves as a carrier of the feature ***pres**. It is a matter of dispute whether the participle II **gewonnen** ‘won’ has any temporal feature at all. We could equally well say that the auxiliary **hat** carries both ***<** and **pres**. In this paper, I am following (Schlenker, 1999: 126). Note that the English present perfect is not analysed as the German present perfect in that it expresses an extended now.

Having two different morphological outfits for the same meaning is a permanent source of confusion. Morphologically, the first tree has the verb in the preterite, whereas the second tree has it in the present perfect. Many researchers assume that for this reason the two constructions mean something different. I am following Schlenker here in assuming that these two different morphological forms encode the same meaning.

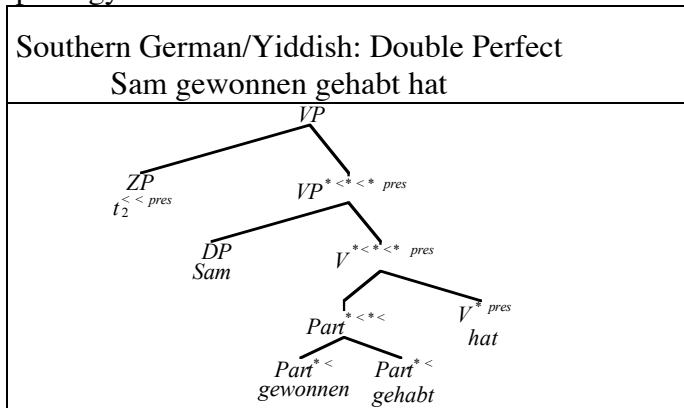
- (32) The syntax of **<<pres** in English and Standard German: pluperfect perfect morphology

⁶ For Yiddish morphology, see Schlenker, Philippe. 1999. Propositional Attitudes and Indexicality: A Cross-Categorical Approach, MIT: Ph.D Dissertation.



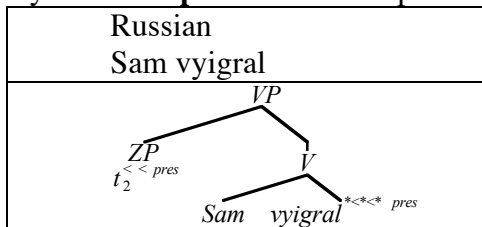
This is what we expect from school grammar. The more complicated morphology is found in Southern German and Yiddish:

- (33) The syntax of $\langle\langle \text{pres} \rangle\rangle$ in Southern German/Yiddish: present double perfect morphology



Russian doesn't have any verb morphology more complicated than the preterite. Therefore, this morphology is checked not only by $\langle \text{pres} \rangle$ but by $\langle\langle \text{pres} \rangle\rangle$ as well.⁷ So the Russian preterite is ambiguous in some sense.

- (34) The syntax of $\langle\langle \text{pres} \rangle\rangle$ in Russian: preterite morphology



Here are some morphological rules deriving the differences between the languages:

- (35) **Spell-Out Rules**

⁷ The $\langle \text{past} \rangle$ reading usually requires the verb to be in the perfective. This is ignored here. Cf. Paslawska, Alla, and Stechow, Arnim von. 2002. Perfect Readings in Russian. Ms. To appear in "The Perfect Book" (Alexiadou, Rathert, v. Stechow eds.).

- a. Finite past verbs
win, *3rd, *<*pres □ /**won**/ (Engl.), /**gewann**/ (Germ.), /**vyigral**/ (Russ.)
- b. Past auxiliaries
have, aux, *<*pres □ /**had**/ (Engl.), /**hatte**/ (Germ.)
- c. Russian pluperfect
win, *<*<*pres □ /**vyigral**/
- c. Past participle
win, partII, *< □ /**won**/ (Engl.), /**gewonnen**/ (Germ./Yidd.)
have, partII, aux, *< □ /**gehabt**/ (Southern Germ./Yidd.)
 Dispreferred in Standard German/English.

These rules encode the typological differences that we find between the languages mentioned. And they connect semantic features with the morphology. They illustrate an important point: there is no one-to-one correspondence between semantic features and morphology. The same semantic feature can be encoded by two different morphologies even within one language, as we have seen for *<*pres in German. And the same morphology may encode different semantic features, as we have illustrated for Russian.

4.2 LF of Tenses

There is still something missing. The temporal variable $t_2^{<pres}$ in (31) cannot be interpreted as it stands. Tenses are relations. Past means that the reference time is before the speech time, and Pluperfect means that the reference time is before a past time. In order to get this, Schlenker introduces the following well-formedness condition.

- (36) Syntax of the <-feature (LF) (Schlenker, 1999: 166)⁸
 A variable of form \square^a , where a is a (possibly empty) set of tense features, is ill-formed unless followed by $[\square < \square^a]$, where \square is any variable.

The apposition to the variable will express a presupposition. I assume that the syntactic condition is met at LF, and I will assume that the apposition may be missing at s-structure. So an official LF for (31) could be this:

- (37) $w^{ind} t_2^{<pres} [t_2 < t_0^{pres}]$ **Sam win** (by (36))

An LF for a pluperfect involves three variables. A pluperfect variable such as $t_7^{<<pres}$ is always related to a past variable, here $t_6^{<pres}$. The latter is related to a present variable, say t_0^{pres} . So modulo alphabetic variance, the sentence (38a) has the LF (38a).

- (38) a. Sam was happy because he₅ had won.
 b. $\square_6 [w^{ind} t_6^{<pres} [t_6 < t_0^{pres}]]$ **Sam happy because** $\square_7 [w^{ind} t_7^{<<pres} [t_7 < t_6^{<pres} [t_6 < t_0^{pres}]]]$
5 win]

Existential closure is done on the text level as in DRT ((Kamp and Reyle, 1993)). A referential temporal variable may serve as antecedent for other referential variables

⁸ In Schlenker's system, the features <a occur with the second occurrence of \square as well, i.e. the restriction is $[\square^{ca} < \square^a]$. This would make the syntax circular, because this variable should satisfy the condition as well, so the LF would be $\square^a [\square^{ca} [\square^{ca} [\square^{ca} \dots] < \square^a] < \square^a]$. Clearly this is not intended. My reformulation avoids this error.

following in the text. We will see that this representation has a precise semantics.

5 Semantics

5.1 Context Theory

The point I want to make in this section is that there is no quantification over contexts in Schlenker's system, despite his claim to the opposite. A further point is that we need no such quantification. It follows that Schlenker's attitude predicates are not monsters.

With (Lewis, 1980) I am assuming that a *context* is a triple $\langle x, t, w \rangle$ consisting of a person x , a world w and a time t . For any context c , a_c is the first component of c , t_c is the second component and w_c is the third component of c . A *character* in the sense of (Kaplan, 1979) is a function from contexts into intensions. Suppose that sentence intensions are functions p from individual-world-time triples into truth-values, i.e. they are "centred world-times". Let $D_{e(i(st))}$ be the domain of these functions. Let C be the set of all Kaplanian contexts. It follows that the domain of sentence characters is the set $D_{e(i(st))}^C$ consisting of all (partial) functions from C into $D_{e(i(st))}$. If predicate of attitudes were monsters, the arguments of attitudes should be elements in $D_{e(i(st))}^C$. This, however, never happens. Every argument of an attitude treated by Schlenker is an element of $D_{e(i(st))}$, i.e., an intension. This disproves his claim that attitudes are monsters. Below, I will say some words about the question of why one might think that attitudes quantify over contexts.

A context c is *appropriate* for an LF \square only if c determines a (partial) variable assignment for the free variables in \square (cf. (Heim and Kratzer, 1998: p. 243))

5.2 Semantics of the features *1st*, *pres*, *<*, and *indicative*

These features are affixes to variables and restrict their interpretation, i.e. they operate on assignments.

- (39) Let \square , \square , \square be variables of type e , i and s respectively. We define:
- First person: $\|\square^{1st}\|^{g_c, c} = g_c(\square)$, if $g(\square) = a_c$. Undefined otherwise.
 - Present: $\|\square^{pres}\|^{g_c, c} = g_c(\square)$, if $g_c(\square) = t_c$. Undefined otherwise.
 - Indicative: $\|\square^{ind}\|^{g_c, c} = g_c(\square)$, if $g_c(\square) = w_c$. Undefined otherwise.

Consider the sentence **I win**. A possible LF is

$$(40) \quad \mathbf{w}_0^{ind} \mathbf{t}_0^{pres} \mathbf{5}^{1st} \mathbf{win}$$

Assume that **win** is of type $e(i(st))$ and $\|\mathbf{win}\| = \lambda x \lambda t \lambda w \lambda s. x \text{ wins in } w \text{ at } t$. The truth of (40) with respect to the context $c = \langle \text{Gerd, now, @} \rangle$ can now be represented as:

$$(41) \quad \|\mathbf{w}_0^{ind} \mathbf{t}_0^{pres} \mathbf{5}^{1st} \mathbf{win}\|^{g_c, c} = 1 \text{ if Gerd wins in @ now, provided } g_c(\mathbf{w}_0) = @, g_c(\mathbf{t}_0) = \text{now and } g_c(\mathbf{5}) = \text{Gerd. If one of the conditions is not given, the utterance has no truth-value.}$$

The semantics for the *<*-feature is slightly more complicated. Recall that this feature

serves for interpreting the past and the pluperfect.

- (42) Suppose we are given a term of the form $\Box^{<a}[\Box < \Box^a]$, where \Box and \Box^a are variables of type i and a is a (possibly empty) set of tense features.
 $\|\Box^{<a}[\Box < \Box^a]\|^{g_c:c}$ is only defined if $\|\Box^a\|^{g_c:c}$ is defined and $g_c(\Box)$ is prior to $\|\Box^a\|^{g_c:c}$.
 If this is fulfilled, $\|\Box^{<a}[\Box < \Box^a]\|^{g_c:c} = g_c(\Box)$.

Here is the evaluation of **Gerd won**, disregarding the world argument.

- (43) $\|\Box t_1 t_1^{<pres}[t_1 < t_0^{pres}]\text{ Gerd win}\|^{g_c:c} = 1$ if there is a t_1 -alternative g' of g_c : $g'(t_1)$ is prior to $g'(t_0^{pres})$, where g' is defined for t_0^{pres} , and Gerd wins at $g'(t_0^{pres})$.
 Since g' is defined for t_0^{pres} , $g'(t_0^{pres}) = t_c$.
 The conditions for falsehood and undefinedness are computed in the same way.

The reader should verify for himself that existential quantification over featured temporal variables makes sense.

5.3 Attitudes

The semantics for attitude predicates follows the insights of (Lewis, 1979). Attitudes are universal quantifiers which take an egocentric proposition as their complement, i.e. they have the type pp with $p = e(i(st))$. For concreteness, we consider the verb **hope**. Other verbs of attitudes are defined similarly.

- (44) **Syntax of attitudes.** (English)
hope^{*1st*ind*pres} is a V of type pp . Let \Box be a CP of type t . Let \Box , \Box and \Box be variables of type e , i and s respectively. Then
 $[_{VP} \text{hope}^{*1st*ind*pres} \Box]$
 is a well-formed S-structure, whose LF is:
 $[_{VP} \text{hope} \Box < \Box, \Box, \Box > \Box^-]$,
 where \Box^- is obtained from \Box by deleting the features of those variables \Box , \Box and \Box that occur freely in \Box .

(I understand Schlenker's notation $\Box < \Box, \Box, \Box >$ as short for $\Box \Box \Box \Box \Box$.) The syntax given in (Schlenker, 1999: 81) is slightly different. Schlenker transmits the features of the arguments of a verb of attitude to the variables it binds. Since these check the checkees of that verb, the result is the same. Here is an example of how a VP under an attitude behaves.

- (45) a. I hope I win.
 b. SS: $[_{VP} \text{hope}^{*ind.*pres.*1st} [_{CP} w^{ind} t^{pres} 5^{3rd} \text{win}^{*ind.*pres.*1st}]]$
 c. LF: $[_{VP} \text{hope} \Box < x, t, w > [_{VP} w t x \text{wins}]]$

The features of the bound individual-, time- and world variables are deleted under agreement. The semantically empty CP disappears.

The meaning of attitudes is defined in two steps. First we assume for each predicate of attitude ATT a background function H_{ATT} that gives us for any index the relevant

set of alternatives.⁹ The meaning of the verb is then a universal quantifier relativized to the alternatives.

(46) **hope-alternatives**

$$H_{\text{hope}}(x,t,w) = \{ \langle x',t',w' \rangle \mid x' \text{ has in } w' \text{ at } t' \text{ every property } x \text{ hopes for himself in } w \text{ at } t \}$$

(47) **Semantics of hope (de se)**

$$\| \text{hope} \| = \lambda P \lambda D_{e(i(st))} \lambda x \lambda D_e \lambda t \lambda D_i \lambda w \lambda D_s \lambda \langle x',t',w' \rangle \lambda H_{\text{hope}}(x,t,w): P(x')(t')(w') = 1.$$

It follows that sentence (45) is true in a context where the speaker hopes for himself to be a winner. Other attitudes are analysed similarly.

$\| \text{hope} \|$ is an intensional functor in the style of (Stechow, 1984b). There is no quantification over contexts. The triples quantified over are of the same logical type as contexts. Presumably, this is a source for terminological confusion. The parameters quantified over play the role of indices of evaluation. The context is never shifted, and it could not be shifted. This consideration refutes Schlenker's claim that attitudes are monsters. Note that the semantics given here is not different from the one found in Schlenker's dissertation. The theory defended here is somewhat more general than Kaplan's, since all pronouns may figure as bound variables. Furthermore, sentential complements are egocentric propositions. Apart from that, it is entirely in the spirit of Kaplan. This remark completes the first part of the paper.

6 Analysis

6.1 Person

The most important task is to explain the different behaviour of the first person in English vs. Amharic. We have to stipulate that the person checkee of an Amharic attitude verb deletes the feature **1st** of the person variable it binds.

(48) **The 1st person parameter** [cf. (Heim, 2001)]

Amharic verbal quantifiers delete (LF) the feature **1st** of the person variable they bind, regardless of what their person checkee is.

Schlenker formulates the rule somewhat differently. Verbal quantifiers provide the variables they bind with subordination features **a** (author), **t** (time) and **w** (world), which simply mark subordination. If a bound subject variable has the feature **a**, then it is spelled out as **/I/**, regardless of what its number is; cf. (Schlenker, 1999: 134). Apart from the technical difference, the analysis comes to the same. The two readings of the

⁹ For this kind of semantic rule, see Kratzer, A. 1978. *Semantik der Rede. Kontexttheorie - Modalwörter - Konditionalsätze*. Kronberg/Ts.: Scriptor. A remark to the terminology: A Kaplanian character $ch(c)(i)$ is a two place function where both c and i are triples consisting of an individual, a time and world. The first argument, c , is a *context* and the second, i , is an *index*. $ch(c)$ is the intension expressed by ch at c , and $ch(c)(i)$ is the intension with respect to c and i . The Prohibition against Monsters says that the character of a functor λ applied to an argument λ can always be determined by the following principle of composition: $\| \lambda(\lambda) \| (c)(i) = \| \lambda \| (c)(\| \lambda \| (c))(i)$, i.e. the computation of a complex character never really depends on the entire embedded character.

Feature Deletion under Semantic Binding

Amharic example (17) are analysed as follows:

- (49) Amharic *John says I am a hero*
 a. ...**John**³ **says**³ $\square\langle x^1 \dots \rangle \dots x^1$ **am**^{4st} **a hero** (de se; 1st pers. parameter)
 John says, "I am a hero."
 b. ...**John**³ **says**³ $\square\langle x^1 \dots \rangle \dots y^1$ **am**^{4st} **a hero** (direct reference)
 John says, "You are a hero."

We obtain a directly referential reading for the embedded **1st person** if the variable carrying that feature is not bound by the verb. The semantic rule (39a) ensures that the variable denotes the actual speaker in this case. The non-contradictory reading of (18) is obtained by binding the subject of the complement and leaving the object free:

- (50) Amharic *John says I don't obey me*
 ...**John**³ **says**³ $\square\langle x^1 \dots \rangle \dots x^1$ **don't obey**³ **y**¹ (de se/direct ref.; Amharic parameter)
 John says, "I don't obey you."

The theory makes the prediction that Amharic and English behave exactly alike if the matrix subject is the first person. This should be tested empirically.

- (51) Prediction: *I thought I was a hero* has the same readings in English and Amharic.
 a. I thought, "I am a hero." (de se)
 b. Seeing myself in the mirror without recognizing myself, I thought, "He is a hero."

There is no locality constraint for the binding of a 1st person by a verb. But lack of space prevents me from discussing cases of long distance binding. Locality comes in with PRO, to which we turn next. PRO is a logophoric pronoun that must be bound by an adjacent verb quantifier:

- (52) The features **log(ophoric)** and **local**
 a. A variable with the feature **log** is bound by a verb of attitude.
 b. A variable with the feature **local** is bound by a structurally adjacent verb of attitude.

The LF for control sentences such as example in (21) is therefore the following:

- (53) ...**John hopes**³ ... $\square\langle x^1 \dots \rangle \dots x^{3log,local}$ /PRO/ **to be elected**

Ordinary logophoric pronouns may then be defined as variables with case, \square -features and the feature **log**. As an example, consider the LF of the Ewe sentence (20c):

- (54) ...**Ama**³ **says**³ $\square\langle x^3 \dots \rangle \dots x^{3log}$ **remembers**³ **the girl who stayed with** x^{3log}

6.2 Sequence of Tenses

The English SOT facts are derived straightforwardly by the assumption that verbal quantifiers delete the feature of the temporal variable they bind under agreement. Here are the LFs of the examples in (22):

- (55) a. ... t_1^{pres} **Smith thinks**^{*pres} \square <... t_2^{pres} ...>... t_2^{pres} **Mary is**^{*pres} **sick**
 b. ... t_1^{pres} **Smith thinks**^{*pres} \square <... t_2^{pres} ...> \square [t_3 ... t_3^{pres} [$t_3^{\text{pres}} < t_2^{\text{pres}}$]] **Mary was**^{*pres} **sick**
 c. ... t_1^{pres} [$t_1 < t_0^{\text{pres}}$] **Smith thought**^{*pres} \square <... t_2^{pres} ...>... t_2^{pres} **Mary was**^{*pres} **sick**
 d. ... t_1^{pres} [$t_1 < t_0^{\text{pres}}$] **Smith thought**^{*pres} \square <... t_3^{pres} ...> \square [t_4 ... t_4^{pres} [$t_4 < t_3^{\text{pres}}$]] **Mary had**^{*pres} **been**^{*pres} **sick**

The best way to get along with the deletion mechanism is to delete the features of the variable bound by the verb first. Only then we construct the proper LF according to the well-formedness principle (36). Consider the subordinate clause in example (d): at SS, the temporal variable of the pluperfect verb is t_4^{pres} . We delete **<pres** under agreement and obtain the variable t_4^{pres} .

Russian, Japanese, and many other languages, treat tense under attitudes in the same way as Amharic treats the 1st person under attitudes:

- (56) **The pres-Parameter.** Russian verbs of attitude delete (LF) the feature **pres** at the temporal variable they bind, regardless what their tense (their temporal checkee) is.

Assuming this parameter for Russian, the facts observed in (23) follow. For convenience, I give the LFs for present and past under past:

- (57) a. Smith dumal čto Maša (pres) bolna. (S. thought that Mary was sick.)
 ... t_1^{pres} [$t_1 < t_0^{\text{pres}}$] **Smith thought**^{*pres} \square <... t_2^{pres} ...>... t_2^{pres} **Mary is**^{*pres} **sick**
 b. S. dumal čto Maša byla (past) bolna. (Smith thought that Mary had been sick.)
 ... t_1^{pres} [$t_1 < t_0^{\text{pres}}$] **Smith thought**^{*pres} \square <... t_3^{pres} ...> \square [t_4 ... t_4^{pres} [$t_4 < t_3^{\text{pres}}$]] **Mary was**^{*pres} **sick**

To derive the Jansen's example (25), we make use of the fact that **slučatsja** „to happen“ is not a verb of attitude and therefore does not delete **pres** of the time variable it binds. These verbs do not undergo the Russian Parameter (“emergence of the unmarked”). Ignoring the adverb of quantification, the sentence has the LF:

- (58) ... [$t_1 < t_0^{\text{pres}}$] **happened**^{*pres} \square < t_2^{pres} ...>... t_2^{pres} **Misha cried**^{*pres}

As semantics for **slučat'**, we can simply assume identity, i.e. the verb expresses the function $\square t. \square w. \square P.P(w)(t) = 1$.

SOT in German is liberal. It can follow either the Russian or the English strategy.

- (59) Wolfgang sagte mir, dass die Gäste schon da sind/seien/were/wären.
 Wolfgang told me that the guests already here are/be (Subj.I)/were(past ind.)/were (Subj.II)

They are all fine. The most thorough discussion of relevant data is found in (Fabricius-Hansen, 2002). It seems then that we have to describe the binding properties of German verbal quantifiers as a disjunction.

6.3 Temporal Auxiliaries

According to (Ogihara, 1989) and many others, **will** is not a tense but a temporal quantifier. In the present approach, this verb is checked by the feature **pres** and it deletes this feature at the time variable it binds. The meaning of **will** is therefore the function $\lambda t.\lambda w.\lambda P.\lambda t'[t' > t \ \& \ P(t)(w) = 1]$.

This account can explain the occurrence of bound past under future:

- (60) I will answer every e-mail that arrived. (Abusch, 1998)
 LF1: $\dots t_0^{pres} \text{ will } \lambda \langle t_1^{pres} \dots \rangle \dots t_1^{pres} x_2^{1st} \text{ answer every e-mail that } \lambda [t_2 \dots t_2^{<pres} [t_2 < t_1^{pres}] \text{ x arrived}]$ (shifted: t_2 possibly after speech time)
 LF2: $w_0^{ind} t_0^{pres} \text{ will } \lambda^{*pres} \lambda \langle t_1^{pres}, w_1^{ind} \rangle [w_1^{ind} t_1^{pres} x_2^{1st} \text{ answer every e-mail that } \lambda [t_2 \cdot w_1^{ind} t_2^{<pres} [t_2 < t_0^{pres}] \text{ x arrived}]$ (deictic: t_0 free; t_2 before speech time)

The corresponding German sentence cannot have the shifted reading: the past tense in the relative clause invariably has deictic interpretation. This means that German **werden** is not a temporal quantifier but merely the carrier of the future feature $*>$.¹⁰ This leads to the following analysis:

- (61) Ich werde $*>^{*pres}$ jede e-mail, die ankam $*<^{*pres}$, beantworten.
 $\dots t_1^{>pres} [t_1 > t_0^{pres}] x_2^{1st} \text{ will } \lambda^{*pres} \text{ answer every e-mail that } \lambda [t_2 \dots t_2^{<pres} [t_2 < t_3^{pres}] \text{ x arrived}]$

The following argument shows that the German perfect auxiliaries **haben/sein** should not be defined as a temporal existential quantifier defined in analogy to English **will**, i.e., **haben** does *not* express the “perfect” operation $\parallel \text{POST} \parallel = \lambda t \lambda P \lambda t' [t' < t \ \& \ P(t')]$.¹¹ Suppose that it had that meaning. Then sentence (62a) should have the LF in (62b):

- (62) a. #Fritz hat $*perf$ ein Ei gegessen, das faul ist $*pres$ (als er es aß).
 b. $\dots t_0^{pres} \text{ POST } \lambda \langle t_1^{pres} \dots \rangle \dots t_1^{pres} \text{ Fritz eaten an egg that } t_0^{pres} \text{ is } \lambda^{*pres} \text{ rotten}$

If you calculate the meaning expressed by the LF, you will find out that the proposition expressed means that Fritz ate an egg that was rotten at the time when he ate it. The result is caused by the fact that **POST** binds the time variable of its complement. However, the sentence cannot have this interpretation. The sentence we use to express this thought is the following:

- (63) Fritz hat $*pres$ ein Ei gegessen $*<$, das faul war $*<$ (als er es aß).
 $\dots t_1^{<pres} [t_1 < t_0^{pres}] \text{ Fritz has } \lambda^{*pres} \text{ eaten } \lambda^{*<} \text{ an egg that } \dots t_1^{<pres} [t_1 < t_0^{pres}] \text{ was } \lambda^{*<pres} \text{ rotten}$

This time, the tense of the main clause is co-indexed with that of the relative clause. An embedded infinitive present may be completely featureless or have the features that can

¹⁰ The semantics for $>$ is the converse of that for $<$, of course.

¹¹ Cf. Klein, Wolfgang. 1994. *Time in Language*. London, New York: Routledge. or Paslowska, Alla, and Stechow, Arnim von. 2002. Perfect Readings in Russian. Ms. To appear in "The Perfect Book" (Alexiadou, Rathert, v. Stechow eds.).

be deleted under agreement, here ***ind *pres**.

(64) ...Fritz wants ^{*pres} $\square \langle t_1^{pres} \dots \rangle \dots t_1^{pres}$ PRO to sleep ^{*pres}

For some reason, neither German nor English have an infinitive future, but they have an infinitive perfect formed by means of the auxiliaries **haben/sein**. These have the feature ***pres**, and the perfect meaning of **haben**-infinitives is due to the fact that these auxiliaries syntactically select a past participle.¹² Consider an example:

(65) a. Fritz muss ^{*pres*ind} gearbeitet ^{*<} haben ^{*pres}.
 b. $w_1^{ind} t_1^{pres}$ must ^{*ind*pres} $\square \langle w_2^{ind}, t_2^{pres} \rangle w_2^{ind} t_3^{<[t_3 < t_2]}$ Fritz have ^{*pres} worked ^{*<}

The difference between English and German temporal auxiliaries may be summarised as follows, where the “Present Perfect Puzzle”, which arises with the finite form of **have** in English, is ignored.¹³

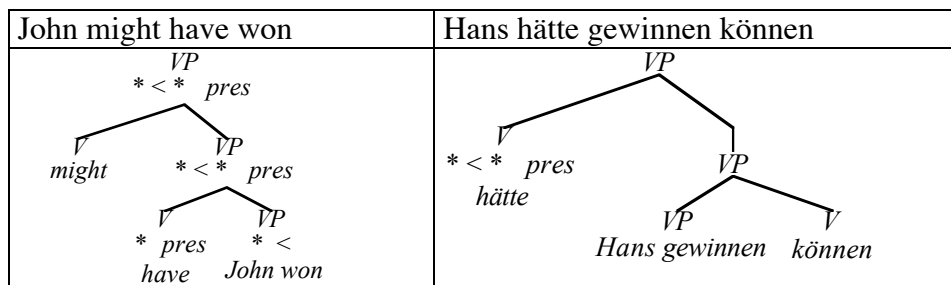
(66) English **will** may be a temporal quantifier and therefore a time binder. The perfect auxiliaries **haben/have** are pure tense markers carrying the feature ***pres**.

I conclude this section with a remark on the ambiguity of the English modals with respect to the temporal auxiliary, which has been mentioned in (28). The example was the sentence **John might have won**, The mystery to be explained is why the sentence can express the same proposition as the German sentence (28c), i.e., **Hans hätte gewinnen können**. The following syntactic stipulation for English might do the job:

(67) **might, could, should, ought** either have the feature ***pres** or no feature at all.

Here is a comparison of the two constructions at s-structure, where subject raising is neglected.

(68)



Since **might** is feature less, the features ***<*pres** may be projected to the top VP and be checked by a time variable there. The German construction is different because the embedded modal is feature less¹⁴. The past features come from the subjunctive auxiliary.¹⁵

¹² This is *ad hoc*. A better theory would be that these are feature less. I haven't worked out this, however.

¹³ Cf. Klein, Wolfgang. 1992. The Present Perfect Puzzle. *Language* 68:525 - 551.

¹⁴ Never mind that it is the so called “Ersatzinfinitiv” which is regarded as a suppletion of the perfect participle. The account given takes the morphology seriously.

¹⁵ There is more to this construction, since it is related to counterfactuality. I am assuming the traditional view that the Conditional II expresses the simple past. For a different account, see Ippolito, Michela. forthcoming. Presuppositions and Implicatures in Counterfactuals. *Natural Language Semantics*.

6.4 Temporal Adverbs and Clauses

One of the most promising areas of application for the theory is the domain of temporal adverbs. Every classical theory I know makes the wrong predictions on the truth conditions of Ogihara's sentence:

(69) John worked on every Sunday. (Ogihara, 1995)

Traditional theories entail that either every Sunday is in the past or every Sunday contains a past time. The adverb, however, speaks about every Sunday in a contextually determined past time. Building on ideas in (Pratt and Francez, 2001) and (Stechow, 2002), I propose that temporal (frame adverbs) are generated in the position of the verb's time argument and that since the adverbs are temporal quantifiers in the general case, they have to be QR-ed for type reasons. Here is the formal analysis.

(70) a. Let **Sunday** be of type $i(it)$. $\| \mathbf{Sunday} \| = \lambda t \lambda D_i. \lambda t' \lambda D_i. t' \text{ is a Sunday in } t$.¹⁶
 b. **on** is of type $i((it)t)$. $\| \mathbf{on} \| = \lambda t \lambda D_i. \lambda P \lambda D_i. \lambda t' [t' \text{ is on } t \ \& \ P(t') = 1]$

At s-structure, the PP **on every Sunday** is generated at the time argument position. The features $\langle \mathbf{pres} \rangle$ are located at the "object" time variable of **Sunday**. They are projected to the PP and checked by the verb.

(71) $[_{TP} [_{PP} \mathbf{on} [_{DP} \mathbf{every\ Sunday} \ t_1^{\langle \mathbf{pres} \rangle}]^{\langle \mathbf{pres} \rangle}]^{\langle \mathbf{pres} \rangle} [_{VP} \mathbf{John\ worked}^{\langle \mathbf{pres} \rangle}]]$

Given that the PP is of type $(it)t$, we have to QR it. The quantifier **every Sunday** $t_1^{\langle \mathbf{pres} \rangle}$ has to be QR-ed as well. This twofold LF movement creates the following LF:

(72) $[\mathbf{every\ Sunday} \ t_1^{\langle \mathbf{pres} \rangle}] \lambda_2 [_{PP} \mathbf{on} \ t_2^{\langle \mathbf{pres} \rangle}] \lambda_3 w_0^{\mathbf{ind}} \ t_3^{\langle \mathbf{pres} \rangle} \mathbf{John\ worked}^{\langle \mathbf{pres} \rangle}$

This delivers the correct interpretation. In more complex temporal adverbs, the temporal variable that checks the tense features of verb may be embedded much deeper. I refer the reader to (Stechow, 2002), where rather complex cases are analysed.

Temporal adverbial clauses are generated as the time argument of the verb as well. The main clause and the relative clause contained in it both contain a bound temporal variable which makes these two tenses non-deictic.

(73) Chaque fois que Pierre change d'emploi, il se querelle avec des gens qui étaient ses meilleurs amis un mois avant. (Schlenker p.c.)
 'Each time that Pierre changes jobs, he quarrels with some people who were his best friends one month before.'

The sentence describes a habit of Pierre. A precise analysis is extremely tedious, as parallel examples in (Stechow, 2002) show. What we want is something along the following lines:

(74) $\lambda t_1 [t_0^{\mathbf{pres}} \lambda t_1 \ \& \ \lambda t_2 [(t_2 \lambda t_1 \ \& \ \mathbf{Pierre\ changes\ jobs\ at} \ t_2) \lambda \mathbf{Pierre\ quarrels\ at} \ t_2 \ \text{with people that } \lambda t_3 \ \text{were his friends at } t_3^{\langle [t_3 < t_2]}]]]]$

¹⁶ The value of the function is 1, if the condition is fulfilled, 0 otherwise. For this convention, see Heim, Irene, and Kratzer, Angelika. 1998. *Semantics in Generative Grammar*. Oxford: Blackwell.

The information $\exists t_1 [t_0^{\text{pres}} \leq t_1 \dots]$ is expressed by a silent habituality operator HAB, which locates the speech time t_0^{pres} in a large interval that instantiates the habit described by the sentence (cf. (Paslawska and Stechow, 2002) and (Scheiner, 2002)). The s-structure underlying the LF could be something like this:

(75) $[_{\text{DP}} \text{each } [_{\text{NP}} \text{time of } [\text{HAB}(t^{\text{pres}})] \text{ when Pierre changes}]^{(\text{pres})}]^{(\text{pres})} \text{ Pierre quarrels}^{*\text{pres}}$

The entire adverbial DP is QR-ed and can thus λ -bind the present contained in the past of the relative clause. In a second step, the existential quantifier $\text{HAB}(t^{\text{pres}})$ is QR-ed to the initial position of the sentence. This generates (74).

Sentence (76), which is discussed in (Schlenker, 1999: p. 164), has to be analysed in analogy to its German counterpart, where **only** is translated as “not earlier than”.

- (76) a. Only now is the Concorde in Paris.
 b. Germ. Die Concorde ist erst jetzt in Paris.
 “There is no time t earlier than t_c such that the Concorde is in Paris at t .”

This quantifier binds the tense of verb at LF. The details are given in (Stechow, 2002 (to appear)).

Finally, look at Schlenker’s examples (26), which involve the temporal adverb of distance **in two days**. We assume the following semantics and syntax.

- (77) $\| \text{in 2 days from} \| = \lambda t. \lambda t'. \lambda P. P(t') = 1 \ \& \ \text{distance}(t', t) = 2 \text{ days} \ \& \ t' > t$. The object of the prepositional has the feature **log** or it has the feature **pres** at LF.

The disjunctive condition is a stipulation that accounts for the distribution of the adverb. A welcome consequence of the semantics is that the adverbial must be embedded under a future:

- (78) a. *It is raining in two days.
 $\lambda t_3 [_{\text{PP}} t_3^{\text{pres}} \text{ in 2 days from } t_2^{\text{pres}}] \lambda t_1^{\text{pres}} t_1^{\text{pres}} \text{ is-raining}$
 b. ^{OK}It will rain in two days.
 $\dots t_1^{\text{pres.M}} \text{ will } \lambda \langle t_2^{\text{pres}} \dots \rangle [_{\text{PP}} t_2^{\text{pres}} \text{ in 2 days from } t_1^{\text{pres}}]^{*\text{pres}} \lambda t_3 \dots t_3 \text{ rain}$

The first LF is contradictory, but the future repairs it. Note that it is the subject variable of the adverbial that checks the tense of the verb, not the object variable.

In order to account for the facts in (26), we must make two standard assumptions: (a) **the day after tomorrow** is interpreted directly referentially, i.e., the adverb expresses the function $\lambda P \lambda t [t \text{ is on the day after the day containing } t_c \ \& \ P(t) = 1]$, with respect to a context c ; (b) **would** is the past form of **will**. This move explains why (26b) cannot report (26a): the adverb denotes a particular day and therefore cannot co-vary with the adverb **repeatedly**. (26c) will do the job, however. The embedded clause has a structure which is similar to that of (78b); the temporal subject of the adverbial is bound by **would** and co-varies with the verbal quantifier **told**.

6.5 German Subjunctive as a Logophoric Mood-Time

Subjunctive morphology is checked by a world variable with the feature **log**. World variables with that feature must be bound by a verbum dicendi vel sentiendi. This de-

rives the facts reported in (29).

- (79) a. Ich dachte, ihre Yacht sei/wäre (subj.) länger als sie ist (ind.). [cf. (35)]
 $w_1^{ind} t_1^{<pres} \text{ I thought } \square \langle w_2^{log,ind} t_2 \rangle w_2^{log,ind} t_2 \text{ your yacht was }^{*subj} \text{ longer than } w_1^{ind} t_3 \text{ it is }^{*ind}$
 b. #Ich dachte, ihre Yacht sei/wäre (subj.) länger als sie sei/wäre (subj).
 $w_1^{ind} t_1^{<pres} \text{ I thought } \square \langle w_2 t_2 \rangle w_2^{log,ind} t_2 \text{ your yacht was }^{*subj} \text{ longer than } w_2^{log,ind} t_2 \text{ it was }^{*subj}$

An indicative world variable can be bound by a predicate of attitude as well, but it need not. Thus the construction with an indicative **than**-clause may be contradictory, but it need not.

7 Conclusion

The theory sketched here is incomplete in many respects, but rather successful in treating phenomena that present almost insurmountable obstacles to other approaches known to me. In particular, I believe that the temporal phenomena considered are analysed in an appealing way. I would like to stress again that the approach defended here is nothing but a particular version of Schlenker's thesis, but that the emphasis on the principle of feature deletion under binding is mine. It follows that Schlenker's account is not really at variance with Kaplan's theory. Of course, there is an important difference, namely the interpretation of attitude quantifiers over properties of individuals. This step, however, was made in (Lewis, 1979) already.

A lot remains to be done. For instance, the locality principles for binding by verbs must be worked out and explained. (Percus, 2000) thinks that the abstracts embedded under a predicate are formed by operator movement in analogy to the formation of relative clauses. A-bar movement should be unbounded in principle. Binding by verbs is a local process, however. A verb of attitude or a modal binds the world and time variable of the directly subordinate predicate. To obtain the locality, (Heim, 2001) base-generates verbal quantifiers as "world"-arguments of a verb and QR-s them in the syntax. The outcome is an extremely elegant syntax and semantics, which however requires some unusual syntactic operations, and a semantics in Lewis' style, which is not well known to linguists. Heim's theory is a serious alternative.

In each case, I believe that the approach defended here opens a new perspective on the syntax and semantics of the features person, tense and mood. And it shows that an understanding of the syntax and semantics of agreement is philosophically important.

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