

## Tense and mood under attitudes and factive predicates

Jennifer Rau

jennifer.rau@uni-tuebingen.de

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This article addresses tense and mood in complement clauses selected by factive predicates. Attitudes select for arguments carrying bound tense and mood. Supported by data from English and German, it is shown that in contrast with attitudes, factive predicates select for arguments carrying indexical tense and indexical mood. They denote extensions of propositions which corresponds to actual single situations.

### 1 Introduction

In the 1990s, Ogihara (1996), Stechow (1995), Abusch (1997) and Kratzer (1998) (among others) worked out the idea that tenses under attitudes in contrast with tenses in extensional contexts are not interpreted tenses but bound variables. In this picture, besides indexical (deictic) tenses, we get an uninterpreted tense.<sup>1</sup> This idea follows the insight that tense under attitudes denotes the holder's subjective time (perspective time) which neither corresponds to the utterance time nor to the believing time. The complement clause denotes an intension of a property of times, and the time variable is bound by the attitude (which may provide a lexical binder due to its lexical semantics).

The insight behind the assumption that tense under attitudes is not interpreted bases on mistaken time scenarios (see Stechow, 1995): Imagine someone is travelling by train. He does not know which time it is. The train is approaching a station. Since he knows the landscape, the passenger may believe that the train is approaching Stuttgart. He may think 'We are arriving Stuttgart now.' Since he does not know what time it is, his belief is not a belief about a particular time. It is a belief about his subjective now. If he was explicitly mistaken about the time (for instance if he thought at 4.45 pm that it was 3.45 pm), he would believe about the time 4.45 pm that it is 3.45 pm at that time. Obviously, this is not the case. For this reason, the subjective time and the ('real') believing time are not related. Under this view, there are no true simultaneous readings in intensional contexts, but *de se* readings which means that the embedded tense corresponds to the holder's subjective now (in contrast to backshifted readings where it corresponds to the history of the holder's subjective now). Simultaneity, in v. Stechow's (2005) words, is only a 'façon de parler' for the more precise term *de se*.

## 2 Tense in intensional contexts

### 2.1 English data

As is well-known, English requires feature agreement of the tense features in the matrix and the complement clause. If the matrix is past tense, the embedded tense will carry a past feature as well.<sup>2</sup>

- (1) Peter believed that Anna was sick. (*de se*)

What Peter thought was not ‘Anna was sick’ but ‘Anna is sick (now)’. This is captured if we assume that the embedded tense is bound by the attitude and is not interpreted. The embedded tense only looks like a past tense but in fact, it is not. It is semantically empty, a temporal PRO. I will refer to this by ‘zero tense’, adopting the term from Kratzer (1998). Hence, there are three tenses in English (adopted from Kratzer, 1998):

- (2) The inventory of English (input) tenses [= Kratzer (1998)]
- |                |  |
|----------------|--|
| present        | [[present]] <sup>g,c</sup> is only defined if c provides an interval t that includes t <sub>θ</sub> (the utterance time). If defined, then [[present]] <sup>g,c</sup> = t. |
| past           | [[past]] <sup>g,c</sup> is only defined if c provides an interval t that precedes t <sub>θ</sub> . If defined, then [[past]] <sup>g,c</sup> = t.                           |
| ∅ <sub>n</sub> | [[∅ <sub>n</sub> ]] <sup>g,c</sup> = g(n)  |

What about the (morphological) past feature in *de se* past-under-past sentences? We either have to formulate a feature-deletion rule (like Ogihara, 1996) or assume like Kratzer (1998) that the embedded (featureless) zero tense picks up the feature from its antecedent, the matrix TP. The binder index is inserted by *believe* and binds the embedded zero tense. At PF, there is a connection between the matrix and the embedded tense. At LF, it is the attitude which connects matrix and embedded time.

- (3) [<sub>TP</sub> past 1 [t<sub>I</sub> [Peter believe that 1 [<sub>TP</sub> ∅<sub>I</sub> [Anna be sick]]]]] [cf. Kratzer (1998)]

Within feature agreement, we usually get *de se* readings of tense, i. e. the subjective now is part of the holder’s belief. Present-under-present sentences as well as past-und-past sentences have a *de se* reading.

- (4) Peter believes that his colleague is brilliant. (*de se*)  
 (5) Peter believed that his colleague was brilliant. (*de se*)

For temporal *de se* readings in English, the tense features in the matrix and the embedded clause have to agree. Recall that this means that attitudes take intensionalized properties of times as their arguments.

One outstanding and well-studied phenomenon is so-called double access (DA) readings in English (see Abusch, 1997). In present-under-past sentences, there is a feature mismatch between the matrix and the embedded tense.

- (6) Peter believed that Anna is sick. (DA reading)

If the zero tense picks up the feature from its antecedent (the matrix TP), it should be past tense. Since this is not what we see in (6), the embedded tense cannot be a zero tense. (Or, to put it another way with a feature-deletion rule: Since there is no mismatch, we are not allowed to delete the embedded tense at LF.) There are different ways out of this dilemma. Abusch (1997) proposes that the embedded tense is interpreted *de re*, i. e. the holder has a *de re* belief about the present tense. Her analysis is based on the well-established analysis of *de se/de re* interpretation of pronouns under attitudes. Accordingly, we may put it past to the holder to have a belief about the present tense although his believing time is situated in the past. Necessarily, the believing time and the sickness have to overlap. In Ogihara (1996) (and similarly Kratzer (1998)), it is a *de re* belief about a present state. The embedded tense is interpreted (like other indexical tenses), thus the complement no longer is of type  $\langle i, st \rangle$  but of type  $\langle s, t \rangle$ , a proposition. In order to allow this possibility, Kratzer (1998) assumes that there is an eventuality *res* argument which (after a type shift) allows both propositions and intensional properties of times to meet the semantic selectional requirements of the attitude. For the purpose of this paper, it is merely important to see the interpretatory difference between a *de se* tense and a DA reading under attitudes and how they become manifest superficially. Feature agreement corresponds to a bound reading while a feature mismatch necessitates to interpret the embedded tense and find a different way of connecting it to the selectional requirements of embedding predicate.

## 2.2 German data

Let us now see how the German data fits in. Most importantly, present-under-past in German does not yield a DA reading. Different from English, the present tense is the unmarked tense under attitudes, regardless the matrix tense:

- (7) Peter glaubte, dass Anna krank ist. (present-under-past,  
 Peter believe<sub>PAST</sub> that Anna sick is<sub>PRESENT</sub>. de se)  
 'Peter believed that Anna was sick.'
- (8) Peter glaubt, dass Anna krank ist. (pres-under-pres,  
 Peter believe<sub>PRESENT</sub> that Anna sick is<sub>PRESENT</sub>. de se)  
 'Peter believes that Anna was sick.'

How can we account for this? Present tense may correspond to the holder's subjective now, i. e. the perspective time. Secondly, it may be a featureless tense which is homophonous with present tense. I will show that the latter is the case. Zero tense in finite German complement clauses always comes out as present tense and does not have to pick up the features from its antecedent. There is a lot of data which confirms this: Future-oriented predicates like *expect/erwarten* which

in English require overt *will* in its finite complement. Infinite complements have a futurate interpretation as well:

- (9) Peter expects that he will win the elections.
- (10) \*Peter expects that he wins the elections.
- (11) Peter expects to win the elections.

In German, both overt future and present tense is possible, and the (morphological) present tense is interpreted future-oriented.

- (12) Peter erwartet, dass er die Wahlen gewinnen wird.  
Peter expects that he the elections win<sub>FUT</sub>.  
'Peter expects that he will win the elections.'
- (13) Peter erwartet, dass er die Wahlen gewinnt.  
Peter expects that he the elections win<sub>PRES</sub>.  
'Peter expects that he will win the elections.'
- (14) Peter erwartet die Wahlen zu gewinnen.  
Peter expects the elections to win.  
'Peter expects to win the elections.'

If present tense denoted the holder's subjective now, (13) would come out wrong. The winning event is posterior to the subjective now. If the meaning of *expect* involves an inherent future-orientation for untensed complements like infinite or zero tense (an indispensable assumption, see Abusch, 2004; Katz, 2001), present tense in German has to be interpreted as a featureless tense and not as the subjective now.<sup>3</sup>

There is a parallel to the pronominal domain. Kratzer (1998) shows that pronouns like *he* may be zero pronouns in sentences like (15), i. e. the pronoun is featureless with respect to  $\phi$ -features.

- (15) Who<sub>1</sub> thinks he<sub>1</sub> is God? [Kratzer (1998), (26)]

Just like a zero pronoun comes out as *he* in finite contexts (and as PRO in infinitives), in German, zero tense may come out as present tense, the most unmarked tense.

Does this mean that *de se* has to be expressed always by morphological present tense in German, regardless of the matrix tense? Judgements are not clear on this issue. Stechow (2005) considers case like (16), i. e. (indicative) past-under-past in German ill-formed, both in the *de se* and in the relative past reading. He generalizes that in German, conjunctive is required under attitudes. He observes that people tend to avoid conjunctive in colloquial speech and use indicative instead.

- (16) Peter glaubte, dass Anna krank war.  
Peter believe<sub>PAST</sub> that Anna sick is<sub>PAST</sub>.  
'Peter believed that Anna was sick.'

- (17) Sie sagte mir, dass sie gerade auf mich wartete.  
 She tell<sub>PAST</sub> me that she currently for me wait<sub>PAST</sub>.  
 'She told me that was waiting for me at this moment.' [= Stechow (2005), 7-20b]
- (18) Sie sagte mir, dass sie gerade auf mich warte/warten würde.  
 She tell<sub>PAST</sub> me that she currently for me wait<sub>REPORTIVE/IRREALIS</sub>.  
 'She told me that was waiting for me at this moment.' [= Stechow (2005), 7-21a]

*Warte* is the analytic form of the German conjunctive which is also called 'reportive subjunctive' (see Fabricius Hansen and Saebo, 2004, for details on the German conjunctive), *warten würde* corresponds to the substitutional irrealis form. The precise difference is irrelevant for this issue, both are non-indicative moods. Stechow (2005) claims that the indicative past in (17) is the imprecise colloquial alternative of (18). He assumes that predicates marked with conjunctive are tenseless, i. e. carry a zero tense feature. I do not consider present-under-past as deficient, but in general, my proposal is compatible with v. Stechow. Indicative present is one correct PF manifestation of zero tense in finite clauses. But what about past-under-past sentences? See examples from a corpus study searching through newspaper articles<sup>4</sup>.

- (19) Ein Mann hatte Tierlaute gehört und die Beamten alarmiert, weil  
 A man had animal noise heard and the officers alarmed because  
 er glaubte, dass eine Katze misshandelt wurde. (COSMAS  
 he believe<sub>PAST</sub> that a cat abused is<sub>PAST</sub>.  
 M05/NOV.90910)

'A man had heard animal noises and alarmed the police because he believed that a cat was (being) abused.'

- (20) Wer nun glaubte, dass dies der TV-Sieben Auftrieb gab, sah  
 Who now believe<sub>PAST</sub> that this the *dativ* TV-Sieben a boost give<sub>PAST</sub>, saw  
 sich allerdings getäuscht. (COSMAS M02/MAR.17580)  
 himself however misled.  
 'Those who believed that this might buoy the TV-Sieben, however, felt misled.'

One possible explanation for the divergent judgements is that past-under-past in German does not really have a *de se* reading but a *de re* reading. The interpretation would be similar to DA readings in English which, in German, emerge in converse environments. Since the past feature in the embedded clause cannot be zero tense (because zero tense has to be expressed by present tense), it is an interpreted tense. Intuitively, this means that there is a past time interval and the speaker asserts that the holder has a belief in the past about a past. Depending on

the context, we might assume simultaneity of both events. Thus, it is essential to distinguish *de se* readings from simultaneous readings. Again, the complement is of a wrong semantic type and may all the same be interpreted as the argument via a general *de re* mechanism.

In mistaken time scenarios, past-under-past should be odd under this hypothesis, which, I think, is the case. The present-under-past example in (22) is much better than (21).<sup>5</sup> This follows if we assume that there are DA readings of past-under-past in German, since the speaker will not refer to a past tense with unclear temporal reference.

(21) ?Peter glaubte um 4 Uhr, dass es 6 Uhr war.  
 Peter believe<sub>PAST</sub> at 4 o'clock that it 6 o'clock is<sub>PAST</sub>.  
 'Peter believed at 4 o'clock that it was 6 o'clock.'

(22) Peter glaubte um 4 Uhr, dass es 6 Uhr ist. (zero tense,  
 Peter believe<sub>PAST</sub> at 4 o'clock that it 6 o'clock is<sub>PRESENT</sub> *de se*).  
 'Peter believed at 4 o'clock that it was 6 o'clock.'

Though there remains a lot to do for the descriptive side, what I take for granted is that (a) it follows from universal considerations that complements under attitudes carry zero tense. (b) German allows zero tense to be spelled-out as present tense, while English requires feature agreement, maybe optionally also in German. I will now show that there are good reasons to transfer this analysis to mood.

### 3 Mood under attitudes

We have seen in the previous section that under attitudes, the time variable has to be bound by the attitude. Additionally, also mood has to be bound in intensional complements. Worlds are established to play a role at LF, and I propose that we parallel them to times and person and recognize their role in the syntax as well. To my knowledge, it was Stone (1997) who was first to transfer the variable tense approaches to mood. Schlenker (2004) formulates rules of mood agreement. Bittner (2001) addresses referential and anaphoric uses in the modal domain. If the world variable is interpreted indexical, it carries the presupposition that the proposition is evaluated with respect to the utterance world. This is true in root contexts:

(23) Anna is sick.  
 [<sub>TP</sub> ind 1 [<sub>t<sub>I</sub></sub> [ Anna be sick ]]]

In attitudes, this is obviously nonsense. In (25), the holder has a belief about the utterance world which is not the case.

(24) Peter believes that Anna is sick.

(25) [<sub>TP</sub> indicative 1 [<sub>t<sub>I</sub></sub> [Peter believes that [<sub>TP</sub> indicative 1 [<sub>t<sub>I</sub></sub> [ Anna is sick ]]]]]]]

(26) [<sub>TP</sub> indicative 1 [<sub>t<sub>I</sub></sub> [Peter believes that 1 [<sub>TP</sub> Ø<sub>I</sub> [ Anna is sick ]]]]]

In (26), mood is bound by the attitude, analogously with tense under attitudes. The fact that propositions have an ‘open’ world variable is trivial since this is standard intensional semantics. The important thing is that typically, mood is analyzed as indexical mood, i. e. the world variable is interpreted and the complement has to be intensionalized in order to apply Intensional Functional Application (see Heim and Kratzer, 1998). Complements of attitudes do not denote truth-values (or, more general extensions of propositions) but propositions. I propose that we can capture this if we assume a lexical binder in the lexical entry of the attitude which binds the world variable. Since attitudes involve quantification over possible worlds, we will get a sloppy reading since for every possible world  $w'$  in the holder’s doxastic alternatives, the proposition is true in  $w'$ . As desired, the proposition is *not* true in the actual world. If we assume with Stone (1997) and Schlenker (2004) that world variables can be analyzed analogously with time variables, we would expect all ranges of variable interpretations. As mentioned, there is indexical mood (most frequent in root clauses, and in all extensional contexts) and anaphoric mood like in (27).

(27) A wolf might walk in. A victim would be waiting. It would eat him.  
[= Stone (1997), (6b)]

Analogously with tense, we can formulate the meaning of both the indexical moods, realis and irrealis, and the zero mood. Indexical moods carry presuppositions akin to presuppositions of indexical tenses. Realis mood (indicative) carries the presupposition that the proposition hold in the actual world. Irrealis mood carries the presupposition that the proposition holds in worlds maximally similar to the actual world (but different in this respect). Thirdly, there is the zero mood which does not carry any presuppositions. I will ignore other moods like German Konjunktiv I (for an elaborate approach see Fabricius Hansen and Saebo, 2004) or Romance subjunctive (Quer, 1998).

### 3.1 English

If the analogy between tense and mood holds, we ought to find Sequence of mood-rules similar to Sequence-of-tense rules. We have already seen in (24) that indicative (under indicative) is semantically vacuous. It does carry the presupposition that the proposition be true in the actual world. This is true for irrealis mood as well. There are cases where irrealis mood embedded under an attitude is redundant:

(28) If Mother Teresa herself went up against this political machine, people *would* believe that she *was* the second coming of Hitler instead of the Saint that most of us believe today. (google)

- (29) If he briefly met a girl on a checkout line in a store, he *would* believe that she *was* madly in love with him. (google)

The belief content in the hypothetical scenarios in (29) is not that it would be possible that *p* (that she is in love with him) holds but that *p* holds. Hence, the proposition is true in all of the doxastic alternatives and not in all (hypothetically) believed hypothetical alternatives. Consequently, the irrealis mood is semantically vacuous and displays agreement with its antecedent, the matrix TP (or any other functional projection hosting mood). Of course, there could be readings where irrealis mood is interpreted. The irrealis mood is licensed by an embedded conditional antecedent.

- (30) If Peter dated Mary, he would believe that she'd become distressed (if he betrayed her like he did Anna).

However, modal agreement is optional in English. Some people judge it colloquial, but indicative is well-formed under irrealis matrix clauses:

- (31) If he met her, he would believe that she is pregnant.

We can see that it is bound because the proposition 'she is pregnant' neither holds in the actual world nor in his doxastic alternatives in  $w_\theta$ . It holds in the doxastic alternatives in (or 'seen from') hypothetical worlds.

For German, I argued that (superficial) present tense may generally be a realization of zero mood if bound by an attitude. Analogously, I argue that under attitudes, indicative mood in English is a valid realization of zero mood. Feature agreement is another option.

We have seen that DA readings source in the absence of feature agreement. If, for the domain of mood, agreement is optional, we cannot tell whether indicative mood has to be interpreted indexical or zero. Schlenker (2004) reports this problem as well, but most interestingly, he also states that factive predicates show stronger effects for DA readings in the domain of mood. We will come back to this phenomenon in section 4.2. Let us consider the German data first.

### 3.2 German

The German data resembles the English data. Again, indicative under attitudes does not carry the presupposition that the proposition holds in the actual world. Instead, mood is bound by the attitude.

- (32) Peter denkt, dass Anna genial ist.  
Peter think<sub>INDICATIVE</sub> that Anna brilliant is<sub>INDICATIVE</sub>.  
'Peter thinks that Anna is brilliant.'

- (33) [<sub>TP</sub> indicative 1 [t<sub>I</sub> [Peter thinks that 1 [<sub>TP</sub> Ø<sub>I</sub> [ Anna is brilliant ]]]]]

There is optional agreement under irrealis matrix clauses. (Morphological) conjunctive and indicative mood are equivalent under conjunctive matrix clauses.

- (34) Er würde sicher denken, dass sie schwanger wäre./ist.  
 He would surely think that she pregnant is<sub>CONJ</sub>/is<sub>IND</sub>.  
 'He would surely believe that she was pregnant.'

- (35) [<sub>TP</sub> conjunctive 1 [t<sub>I</sub> [He think that 1 [<sub>TP</sub> Ø<sub>I</sub> [ she is pregnant ]]]]]

This provides evidence for my claim that feature agreement is optional in German in the domain of mood.

Additionally, there is a relative reading of irrealis mood similar to (30) where irrealis mood has to be interpreted (under the attitude). There is no consensus about the treatment of relative readings in the temporal domain. Kratzer (1998) regards it as aspect, i. e. some embedded tenses are aspect, a view which Stechow (2005) follows. This is not transferrable to mood. We might also use two tense variables (similar to Abusch, 1997, who works with temporal relations, between evaluation time and event time), an analysis which would be compatible with mood as well. Tentatively, the evaluation worlds are the set of doxastic alternatives, the event world corresponds to the worlds where the (deepest) embedded proposition holds. In (34), there is a superset-relation between the believing worlds (relevant worlds in which Peter has beliefs) and the perspective worlds (worlds which are entailed by Peter's beliefs), and a superset-relation between the perspective worlds and the event worlds (worlds in which what Peter might believe to be true holds under certain circumstances). While with time intervals we deal with inclusion and anteriority/posteriority relations, with worlds, we deal with identity, sub- and superset-relations since possible worlds in contrast with times always come in sets. Still, it is possible to refer to these sets or *possibilities* – otherwise we could not have anaphoric mood (see Stone, 1997; Bittner, 2001).

In sum, in the English tense system, feature agreement in intensional contexts is obligatory. For mood, feature agreement is optional. Further descriptive research has to reveal whether indicative mood as a realization of zero mood is the unmarked case in English or whether this is (still) marginal/colloquial. For German, more descriptive work is necessary in order to tell whether temporal feature agreement is an option or whether *de re* analyses as proposed here may capture the relevant cases. The judgements are clearer for the modal domain. Feature agreement is optional – with indicative as realization of zero mood as the unmarked case. If temporal feature agreement is allowed in German, the sequence of tense and sequence of mood strategies are parallel.

#### 4 Factives vs. attitudes

In this section, I will address factive predicates. With factives, I refer to all predicates which semantically presuppose the truth of their complement in the sense of Kiparsky and Kiparsky (1970) and Karttunen (1971). This property distinguishes factives in (36) from attitudes, cf. (37).

- (36) Factives
- (a) Peter knows that Anna is brilliant. (presupposes: Anna is brilliant)
  - (b) Paul conceals that he himself is brilliant. (presupposes: Peter is brilliant)
  - (c) Anna finds out that Mary is pregnant. (presupposes: Mary is pregnant)
- (37) Attitudes
- (a) Peter thinks that Anna is brilliant. (no presupposition)
  - (b) Paul pretends that he himself is brilliant. (no presupposition)
  - (c) Anna feel like Mary is pregnant. (no presupposition)

With regard to the semantics of mood and tense, factives are taken into account very rarely (one exception being Speas, 2006). Let me consider tense first.

#### 4.1 Tense under factives

As for English, at the surface level, tense under factives does not differ from tense under attitudes. Apart from anterior readings like (38), we either have present-under-present like in (39) and past-under-past sentences like in (40).

- (38) Peter knows that Anna was sick. (past-under-present)
- (39) Peter knows that Anna is sick. (present-under-present)
- (40) Peter knew that Anna was sick. (past-under-past)

What about DA readings? Recall that under attitudes, we get DA readings in present-under-past sentences. This holds for factives as well:

- (41) Peter knew that Anna is pregnant.

In (41), Anna is pregnant at the utterance time, and it is asserted that Peter was acquainted with her pregnancy in the past. Again, the pregnancy and the knowing have to overlap – it makes no sense to say that someone knows something which is not yet the case. Analogously with DA readings under attitudes, the sentence is odd when an overlap is blocked by temporal adverbials (Schlenker, 2004, 7a).

- (42) Peter believed 2 years ago that Anna #is/was pregnant.
- (43) Peter knew 2 years ago that Anna #is/was pregnant.

So why bother about tense under factives? Consider the German data. As reported above, present tense is the unmarked tense under attitudes regardless the matrix tense. This, however, does not hold for factives. (44) with an attitude embedding predicate is well-formed, while its factive counterpart (45) is odd.

- (44) Vor zwei Jahren glaubte Peter, dass Anna schwanger ist. (attitude)  
 Two-years-ago believe<sub>PAST</sub> Peter that Anna pregnant is<sub>PRES</sub>.  
 'Two years ago, Peter believed that Anna was pregnant.'
- (45) #Vor zwei Jahren entdeckte Anna, dass sie schwanger ist. (factive)  
 Two-years-ago find<sub>PAST</sub> out Anna that she pregnant is<sub>PRES</sub>.  
 'Two years ago, Anna found out that she is pregnant.'

I have argued above that (44) is grammatical because present tense may be interpreted as a manifestation of zero tense. Intuitively, Peter has a belief two years ago, about his subjective now at that time. This is different in (45). (45) is odd because a *de se* reading is not accessible. Instead, we have to interpret the present tense as an indexical tense. This in turn means that we get something like a DA reading. Akin to DA readings, the time of Anna being pregnant, which is the utterance time due to indexical present tense, has to overlap the time of her finding out about her pregnancy. Since the temporal adverbial *Vor zwei Jahren/two years ago* excludes this reading, (45) is ill-formed. In this respect, attitudes and factives differ. The fact that German present-under-past sentences under factives yield readings similar to DA readings suggests that tense under factives cannot be interpreted as bound. Why? Present tense in German may be interpreted indexical (referring to the actual world) or as a manifestation of zero tense. It is very unlikely that present tense cannot be interpreted as zero tense under factives although this was the unmarked option under attitudes. So if it is not the present tense which is different, it must be the selectional requirements of the embedding predicate. If morphological present tense under factives has to be interpreted as indexical tense in (45), the reason must be that factives generally do not bind tense. Since they do not bind the time variable of their argument, they do not select for zero tense complements but for arguments having an interpreted time variable.

Additional evidence comes from relative readings. In (46), the past tense in the complement clause is a relative past to a future perspective time. It may refer to (the doxastic counterpart of) a time before the utterance time or afterwards. I will not go into bound relative readings, but certainly we need an account which involves a bound tense here because the past tense has to be interpreted with respect to a believing time (which is in the future). The German counterpart of (46), too, has both readings.

- (46) Wolfgang will believe that the students turned in their papers on time.  
 [= Katz (2001), (30)]

In contrast, in (48) involving a (true) factive matrix predicate, the turning-in event cannot be situated after the utterance time.

- (47) Wolfgang will regret that all students turned in their papers on time.

- (48) Er wird bedauern, dass alle ihre Arbeiten rechtzeitig abgaben.  
 He will regret that all their papers on time turned<sub>PAST</sub> in.  
 'He will regret that everyone turned in their papers on time.'

I assume that this contrast has its source in the fact that the relative reading is unavailable in (48) because the factive predicate does not provide a lexical binder for the time variable in the complement. The past tense has to be interpreted as an indexical past tense, i. e. refer deictically.

Why did we not see a difference within ordinary English past-under-past sentences? Simply because feature agreement may easily be confused with anaphoricity. Above, I pointed out that *de se* interpretation of tense differs from simultaneity. Whenever two time variables refer to time intervals which are situated before the utterance time, and the time intervals overlap, they are simultaneous. If a complement is interpreted *de se*, it is situated in the holder's subjective now. This roughly corresponds to the past time interval but only if we ignore that the subjective now is not related with the utterance time. The output – i. e. present-under-present or past-under-past – may look the same, but the interpretation is different.

- (49) Peter believed that Anna was pregnant. (temporal *de se*)  
 [<sub>TP</sub> past 2 [t<sub>2</sub> [Peter believe that 2 [<sub>TP</sub> Ø<sub>2</sub> [Anna is pregnant]]]]]]
- (50) Peter regretted that Anna was pregnant. (simultaneous)  
 [<sub>TP</sub> past 2 [t<sub>2</sub> [Peter find out that [<sub>TP</sub> past 1 [t<sub>1</sub> Anna is pregnant]]]]]]

In (49), the embedded tense is a zero tense which 'picks up' the past feature from its antecedent. The zero tense is bound by a lexical binder provided by the attitude. In (50), the embedded tense is an indexical tense. Both past time intervals may (or may not, in backshifted readings) overlap, but it does not denote a subjective time.

- (51) Peter suspected every morning that he was sick.  
 (52) Peter regretted every morning that he was sick.

In the unmarked reading of (51), 'every morning' takes wide scope over the whole clause including the complement clause. In this reading, every morning Peter believes anew that he is sick – intuitively, there are many imagined diseases which may vary. The first day he suspects that he suffers of diabetes, the next day that he has an unnoticed liver disease and so on. In (52), 'every morning' may marginally have wide scope as well. In this reading, Peter has a new disease every morning all of which he regrets. In the unmarked reading on (52), however, Peter has a disease covering a longer time period, i. e. the temporal quantifier does not have scope over the time variable in the complement clause. This can be captured if the past tense embedded under the factive is interpreted as an indexical tense, referring to a past time interval before the utterance time, outside the scope of the

temporal quantifier. (This second reading is impossible for the attitude in (51) unless we interpret tense *de re*, see (55) for a comparable DA reading). Intuitively, this is because the belief ‘content’ depends on the believing. This, obviously, is not the case with facts. Facts embedded by true factives (this is different for semi-factives) are independent of their being regretted.

The contrast is parallel in German, with zero/present-under-past in the attitude and indexical/past-under-past sentences with the factive predicate:

(53) Peter befürchtete jeden Morgen, dass er krank ist.  
Peter suspected every morning that he sick is.

‘Peter suspected every morning that he was sick.’

(54) Peter bedauerte jeden Morgen, dass er krank war.  
Peter regretted every morning that he sick was.

‘Peter regretted every morning that he was sick.’

(55), the past-under-past counterpart of (53), – a case for which I argued in favor of a *de re* analysis – has a reading that Peter has a fear about a particular past time interval of which he suspects every morning that he was sick in it.

(55) Peter befürchtete jeden Morgen, dass er Borreliose hatte.

Peter suspected every morning that he borreliosis had.

‘Peter suspected every morning that he (had) suffered of a borreliosis.’

#### 4.2 Mood under factives

As reported above, mood and tense have analogies, but there are differences. Due to the fact that, different from tense, agreement in the modal domain is optional in English, the difference between bound and indexical mood is hard to judge.

Under irrealis matrix clauses, morphological indicative may have a zero or an indexical interpretation. However, in contrast with modal DA readings under attitudes, factives are more easily interpreted under a DA-like reading:

(56) Peter would regret that he offended Anna.

(56) has a strong DA reading: Anna is pregnant in the utterance world, and Peter would regret this under some circumstances, for instance if he was more empathetic. But there is a wide scope reading of the conditional as well in (57). This property of presupposition cancelling (as reported by Karttunen, 1973) does not weaken my claim. The world variable may or may not be in the scope of the conditional, but it is not bound by the embedding predicate.

(57) If the rumors about her pregnancy were true, Peter would surely regret that she is pregnant.

In German, the effect is not strong as well since the world variable may be interpreted inside or outside the scope of the conditional.

- (58) Peter würde bedauern, dass Anna schwanger ist.  
 Peter would notice that Anna pregnant is.  
 'Peter would notice that Anna is pregnant.'

This cannot be addressed here in detail. The data are compatible with my claim but do not support it immediately. Still, we can use the argument for our purposes. I have shown above that with attitudes, feature agreement is optional in German in the domain of mood. Consequently, the agreeing form and the zero form ought to be equivalent. This is true for attitudes like in (59), but not for factives like in (60).

- (59) (a) Peter würde glauben, dass Anna schwanger ist.  
 Peter would believe that Anna pregnant is<sub>IND</sub>.  
 'Peter would believe that Anna was pregnant'
- (b) Peter würde glauben, dass Anna schwanger wäre.  
 Peter would believe that Anna pregnant is<sub>CONJ</sub>.  
 'Peter would believe that Anna was pregnant.' [(a) = (b)]
- (60) (a) Peter würde herausfinden, dass Anna schwanger ist.  
 Peter would find out that Anna pregnant is<sub>IND</sub>.  
 'Peter would find out that Anna is pregnant.'
- (b) Peter würde herausfinden, dass Anna schwanger wäre.  
 Peter would find out that Anna pregnant is<sub>CONJ</sub>.  
 'Peter would find out that Anna would be pregnant.' [(a) ≠ (b)]

If (60b) is not equivalent with (60a) – what does it mean? With (60b), one has the intuition that the conditions for the matrix clause have to differ from the conditional which licenses the irrealis mood in the embedded clause. A possible scenario may be that if Anna were pregnant, he would find it out if, for instance, he was more attentive. This provides evidence for my claim that mood under factives is not bound by the embedding predicate – otherwise (a) and (b) should be equivalent because feature agreement is optionally possible in the domain of mood in German.

### 4.3 Factives are different

I was able to show that in German, tense (and to some extent, mood) yield DA readings under factives. Adopting the analyses of temporal DA under attitudes, tense and mood have to be interpreted indexical under factives. Indicative is indexical mood under factives, and present/past tenses under factives are indexical tenses. For mood, this is trivial since a fact has to be true in the actual world and not with respect to some belief world. Being true in the actual world is the characteristic property of a fact.

Now, let us have a look at the consequences. If the time and the world variable are to be interpreted, then the argument has to be of type  $\langle t \rangle$ . But are facts truth values? We would run into many difficulties then. Thus, I would like to follow Kratzer (1989), Moffett (2003) (similarly) and Kratzer (2002) who propose to regard facts as single situations. Situations are ‘worldly’, i. e. they are parts of worlds. The relationship between facts and propositions is described via exemplification: ‘Facts exemplify propositions as things exemplify properties.’ (Kratzer, 2002, p. 656). Facts cannot be reduced to propositions, be they true or not (see also Gettier, 1963; Moffett, 2003; Asher, 1993). The proposition of ‘Peter is wearing a hat’ is exemplified by the fact that Peter is wearing a hat, i. e. by a concrete situation of Peter wearing a hat. This situation has to be anchored to the utterance world and the utterance time to be interpreted as a fact. There must be other factors at work, since root clauses have indexical tense and mood but do not denote facts (one candidate is non-assertion as implemented by Abbott, 2000, basing on Stalnaker (1974)).

Up to this point, I have ignored one complication. Factive complements are problematic because on the one hand, the complement denotes a fact. On the other hand, it denotes the belief content the holder has about this fact. At least for German, there are marginal non-presupposed readings of complements under canonical factive predicates. I prefer to analyse them as a reduction to an attitude, i. e. a factive without a fact. If we assume that German present tense may be zero tense, it may be the case that sometimes indicative mood is not indexical but bound. There seems to be intersubjective variation, but some speakers marginally allow a non-factive reading of (61)<sup>6</sup>.

(61) Der Hypochonder bedauerte es, dass er krank ist. ?War er aber nicht.  
The hypochondric regretted it that he sick is. Was he however not.  
‘The hypochondric regretted that he was sick. However, he wasn’t.’

(62) [<sub>TP</sub> indicative 1 past 2 [<sub>t<sub>1</sub></sub> t<sub>2</sub> [Peter regret that 1 2 [<sub>TP</sub> Ø<sub>1</sub> Ø<sub>2</sub> [ he is sick ]]]]]

Similarly, infinitival complements – which necessarily carry bound tense and mood – have non-factive readings.

(63) Der Hypochonder bedauerte, krank zu sein. Dabei war das nicht der Fall.  
The hypochondric regretted sick to be. However was this not the case.

‘The hypochondric regretted to be sick. However, this was not the case.’

This supports my claim that indexical tense and mood are characteristic and even necessary for a fact-denoting complement clause.

## 5 Conclusion

The aim of this paper was twofold. First, I compared the English and German ways to express temporal *de se*. Tense is treated analogously with pronouns, i. e. there is indexical tense and bound (zero) tense. Attitudes provide a lexical binder for the time variable of their complement. Propositional complements carry zero tense, but this zero tense may have different make up. In English, feature agreement between the matrix and the embedded clause is obligatory in the temporal domain, while in German there is no feature agreement but an unmarked morphological tense, present tense, which may manifest a zero tense. Similar to Stechow (2005), I assume that present tense has to be interpreted as zero tense in attitude contexts. Since grammatical judgements differ with regard to *de se* readings of past-under-past sentences in German, the descriptive part is not yet clear. I proposed a *de re* interpretation for past tense under past matrix clauses. Hence, it does not have a *de se* reading but a simultaneous reading.

This variable tense analysis is transferred to mood. Mood does not show obligatory feature agreement neither in English nor in German. Optionally, there is feature agreement being semantically equivalent with the indicative counterparts – an argument supporting my zero mood analysis.

Factive complements are different from propositional complements. I was able to show that present-under-past in factive sentences in German yield DA-like readings in German – a fact which is unexpected if we assume on the one hand that present tense may be analysed as zero tense in intensional contexts and on the other, that factive predicates induce intensional contexts. If treated accordingly, English past-under-past sentences with a factive predicate should be interpreted as simultaneous and not as temporally *de se*. Analogously, I could find supporting data for the claim that the world variable has to be interpreted indexical under factives as well. Consequently, I proposed that factive complements select for extensions of propositions which I trace back to single situations.

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## Notes

<sup>1</sup>There are anaphoric tenses as well, but I will not go into this issue here.

<sup>2</sup>Past-under-past in English has a backshifted (relative) reading as well, when Anna's being sick is anterior to Peter's believing time:

(64) Yesterday, Peter believed that Anna was sick last week. (event time < believing time)

These case will not be regarded here.

<sup>3</sup>Other arguments come from the analogy of mood since indicative mood has to be interpreted as zero mood accordingly, both in English and German (for details see Rau, 2009).

<sup>4</sup>For more information on the COSMAS corpora, see the *Institut für Deutsche Sprache*, [www.ids-mannheim.de](http://www.ids-mannheim.de).

<sup>5</sup>The usual way to mark the counterfactivity of it being 6 o'clock in German would be to use irrealis mood in the complement clause. I will not go into these here. In Rau (2009), irrealis mood under attitudes may have a *de re* interpretation, i. e. mood is interpreted and mirrors the speaker's disagreement with the holder's belief.

<sup>6</sup>I will not go into *verbum dicendi* readings here which most emotive factives have with subjunctive verb-second complements, for examples see Fabricius Hansen and Saebo (2004).