ADJUNCTS, ATTITUDES AND ASPECT: SOME ADDITIONS TO A TENSE THEORY FOR RUSSIAN

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ABSTRACT

Compared to other languages, the temporal organisation in Russian relative clauses and temporal adverbial clauses is as simple as it can possibly be: The tense morphology is licensed locally and the adjunct tense and matrix tense are independent of each other.

It is tempting to give a purely deictic analysis of adjunct tense in Russian. However, there are some exceptions to the deictic story, the most important one being adjunct tense embedded under attitudes and modals. For these cases, we argue that the highest tense in the adjunct is anaphoric ($Tpro_i$). We show that our previous analyses of complement tense and adjunct tense can be combined to successfully treat adjuncts in such intensional contexts.

Furthermore, we discuss some residual issues in our tense theory for Russian, such as the insertion of covert tenses at LF (Russian lacks overt perfect tenses) and the integration of aspect in our system of feature transmission via semantic binding.

[1] INTRODUCTION

In this paper we address some open ends from our previous work on subordinate tense in Russian, and try to tie them together in a coherent theory.

The sequence of tense (SOT) parameter accounts for the following striking differences in the distribution of tenses in English and Russian:

(1) E Mary will give birth to a son who has blue eyes like his father. ("present under *will*")

  R Maša rodit syna, u kotorogo budut golubye glaza kak i u otca. ("*budet* under future")

(2) E John thought that Mary would give birth to a son who had blue eyes like his father. ("[past under *would*] under past")

  R Vanja podumal, čto Maša rodit syna, u kotorogo budut golubye glaza kak i u otca. ("[*budet* under future] under past")

In English, subordinate tenses can inherit temporal features from a higher tense across verbal quantifiers (*will, would, thought ...*). In (1E), the present tense *has* is simultaneous (and therefore coindexed) with the infinitive *give birth*. The latter inherits a deictic present tense feature from the verbal quantifier *will*, and the feature is transmitted to *has* under binding. A similar story can be told for the licensing of the past tense of *had* in (2E) which involves feature transmission from *thought* via *would*.

In Russian, a non-SOT language, this kind of LONG DISTANCE binding is not possible. Instead, the morphological tense licensing is done LOCALLY in Russian. This is true not only for complement tense, but also for adjunct tense, viz. relative clauses (RC) and temporal adverbial clauses (TAC).

Adjunct tense in Russian appears to be extremely simple in examples like (1R): Both the matrix and adjunct are interpreted deictically; the adjunct tense is therefore semantically INDEPENDENT of the matrix. But is this always so?

In this paper we will encounter constructions where the adjunct tense is BOUND and, in some cases, DEPENDENT on the matrix, for instance in configurations with a relative future in the adjunct under a matrix past. Furthermore, under intensional temporal quantifiers (attitudes and modals) the adjunct tense cannot be deictic for semantic reasons (modulo *de re* interpretations). For instance, in (2R) the embedded future birth of Maša's son need not take place after the speech time. And, a deeper point: Vanja's embedded thought (the thought of the attitude holder) cannot possibly refer to the utterance time of the speaker.

Let us therefore assume, in the general case, that the highest tense in the adjunct is anaphoric, called Tpro. Typically, though, Tpro_i is coindexed with the deictic NOW, in which case Tpro_i does not have any role to play. However, Tpro_i may also be bound by other tenses from above to produce dependent or non-deictic readings. To capture and analyse the distribution of deictic and non-deictic interpretations is the main goal of this paper.

In this Introduction we will briefly recapitulate the main tenets of our theory for complement tense and adjunct tense.

In Section [2] we address the issue of dependent (bound) vs. independent (deictic) interpretations of adjunct tense. We consider relative clauses and temporal adverbial clauses headed by *do/posle/kogda – before/after/when*.

Then, in Section [3] we analyse some special cases of backward shifting in Russian, constructions that require the insertion of a covert tense due to the absence in Russian of overt perfect tenses. Covert tenses lack inherent tense features and therefore do not interact with the SOT parameter and feature transmission.

Next, in Section [4] we show how to analyse adjuncts inside complements. Several of the examples discussed are rather complex, giving rise to issues that have not been properly discussed in the literature.

Finally, in Section [5] we raise the question of how aspect in Russian fits into our tense theory and the syntax-morphology-semantics interfaces.

This paper, which mostly focuses on Russian, builds on our previous work on complement tense (Grønn & von Stechow 2010) and adjunct tense (Grønn & von Stechow 2011) in Russian and English. Our theory of adjunct tense is worked out and explained in detail in two recent, closely related papers; the first part on RCs (von Stechow & Grønn to appear-a) and the second part on TACs (von Stechow & Grønn to appear-b). The two parts of this survey article also include an analysis of the non-SOT-language Japanese, and some discussion of the (mixed) SOT-languages German and French. We refer the reader to this work for a detailed overview of the state of the art of adjunct tense in formal semantics.

[1.1] *Architecture of Tenses*

We recapitulate some essential points below. We assume the architecture for tenses outlined in Figure 1.
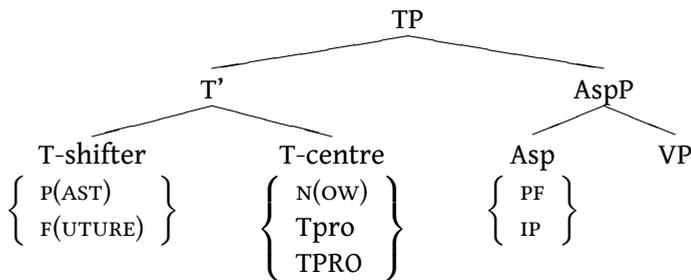

FIGURE 1: Architecture of Tense and Aspect.

Tense in complements is semantically vacuous or contains a vacuous centre (TPRO). Tense in adjuncts is deictic (N) or contains a variable (Tpro$_i$) bound by a higher tense. These claims are based on a syntax of tense consisting of two parts, the first obligatory and the second optional:

- a pronominal semantic tense, the temporal centre of the clause, which may be N ("now"), denoting the speech time, Tpro$_i$ (an anaphoric pronoun bound by a higher tense) or TPRO (a zero tense)[1]:

  (3) $\llbracket N \rrbracket = \lambda w.$ the time of the utterance context; written as s^*. (feature: in)

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[1]   The notation alludes to big PRO which is the standard notation used for subjects of infinitivals. By analogy, TPRO is the covert subject of the TP. TPRO is confined to complements of attitudes and other intensional contexts.

(4) $\llbracket \text{Tpro}_i^g \rrbracket = g(i)$ (u-feature inherited from the binder tense i in accordance with the SOT parameter.)

(5) $\llbracket \text{TPRO} \rrbracket$ = undefined!   (featureless, except for intensional contexts in non-SOT languages, where TPRO has the feature in.)

- a relative semantic tense, i.e. a T-shifter, like P(AST) or F(UTURE) with the standard "Priorian" meanings:[2]

(6) $\llbracket \text{P} \rrbracket = \lambda w \lambda t \lambda P_{\text{it}}.(\exists t' \prec t)P(t')$ type (i(it,t))
        (feature: ip)

(7) $\llbracket \text{F} \rrbracket = \lambda w \lambda t \lambda P_{\text{it}}.(\exists t' \succ t)P(t')$ type (i(it,t))
        (feature: if)

Note that our system does not contain a relative semantic tense PRES(ENT). Hence, we do not expect a present in the adjunct to express simultaneity with a matrix past or future. This is important to keep in mind in the discussion of Russian adjuncts. However, for "present under past (or future)" in Russian attitude constructions and modal contexts, our formulation of the SOT parameter makes the simultaneous interpretation possible (see below).

[1.2]   *Temporal LFs*

We assume a grammar in the style of Chomsky's GB-theory: we generate a syntactic tree that branches at a certain point (Spell-Out/SO) into Phonetic Form (PF) and Logical Form (LF).

(8)   Maša spala.
        'Mary slept.'

(9)   SO: $[_{\text{TP}}[_{\text{T}}\text{PN}][_{\text{VP}} \text{Maša}[\text{spala TPRO}]]]$
        TPRO movement (with subsequent TPRO deletion)
        LF: $[_{\text{TP}}\text{N} \lambda_0 \text{ P } t_0 \, \text{T\hspace{-0.3em}P\hspace{-0.3em}R\hspace{-0.3em}O} \, \lambda_1[_{\text{VP}} \text{Maša}[\text{spala } t_1]]]$
        $= \lambda w.(\exists t \prec s^*) \text{ Mary sleeps in } w \text{ at } t$

We see that the verb at the PF in (8) has morphological tense, whereas at the LF in (9) the verb is tenseless. The LF has a straightforward compositional interpretation assuming the following meaning for the verb:

(10) $\llbracket \text{spat'/spit/spala}_{\text{i(et)}} \rrbracket = \lambda w \lambda t \lambda x.x \text{ sleeps in } w \text{ at time } t$

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[2]   A note to the logical types: The simple types are e (individuals), i (times), v (events), t (truth-values) and s (world histories). The world argument is not projected in the syntax because we are using an intensional language; the time argument is the first by convention (other authors have the local evaluation time as the last argument).

The temporal argument of the verb in (9) is TPRO. TPRO is semantically vacuous. It has to be moved for type reasons creating the temporal variable t_1. The binding index 1 of TPRO is interpreted as λ_1. At LF, TPRO is deleted by Chomsky's principle of Full Interpretation. In what follows, we will mostly write our LFs without the deleted ~~TPRO~~, i.e., instead of ~~TPRO~~ λ_i we will simply write λ_i (or TPRO$_i$). TPRO movement is an essential ingredient for the construction of binding chains for feature transmission.

[1.3]   *Feature Transmission under Semantic Binding*

The LFs show that a semantic tense can be quite distant from the verb it modifies. But every semantic tense is connected with at least one verb via a binding chain.

Covert semantic tenses are semantically interpreted at LF, while the overt morphological tenses are not semantically interpreted. At PF it is the other way round; the semantic tenses are not interpreted (therefore covert), but the morphological tenses are interpreted (and therefore overt). The function of a morphological tense is to point at the presence of a particular semantic tense. It follows that there must be a relation between semantic tense and morphological tense, namely a LICENSING RELATION.

The feature theory, inspired by Irene Heim's work[3], is based on the following principles (simplified):

(11)   FEATURE THEORY AND PRONUNCIATION RULE
       (i) In the derivation of PF the interpretable features (i-features) of a semantic operator are copied as uninterpretable features (u-features) onto all variables that it binds.
       (ii) The u-feature of the temporal variable of the finite verb determines the temporal morphology of the verb (pronunciation rule).
       (iii) In case of conflicting features between the T-shifter and T-centre, the feature of the semantic tense (T-shifter) blocks the projection of the feature of the argument (T-centre).

In this paper we are concerned with the following interpretable (prefix: i) and uninterpretable (prefix: u) temporal features:

(12)   TEMPORAL FEATURES
       [n] "now", originates with the pronoun N, i.e. the deictic present.
       [p] "past", originates with a semantic operator P(AST).
       [f] "future", originates with a semantic operator F(UTURE), a perfective tense in Russian.

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[3]   See (von Stechow & Grønn to appear-a) for references and technical details.

To see how the feature transmission works, consider again our toy sentence from above, now with the features indicated in brackets:

(13) $[[\text{P}_{[\text{ip}]}\,(\text{N}_{[\text{in}]})]\,\lambda t[\,\text{Maša}\,[\text{spala}\,(t_{[\text{up}]})]]]$

The feature [in] originates with the deictic present N, which serves as the T-centre. This time is the argument of the relational tense P(AST). The semantic tense P has the feature [ip], which is in conflict with [in]. Therefore [in] is blocked at the argument position of P, and P transmits [up] to t under binding. Assuming that the host of the tense feature that determines the pronunciation is the time variable of the verb, the finite verb is pronounced as *spala*.

[1.4]   *Verbal Quantifiers*

Temporal auxiliaries are quantifiers over times, but they also come with their own verbal morphology. We thus define the category of VERBAL QUANTIFIERS:

(14)   A verb α is a VERBAL QUANTIFIER if and only if
        (i) α can be inflected with tense morphology (α has its own verbal morphology)
        (ii) α controls the reference time of the embedded verb (α is a temporal quantifier).

Here are the lexical entries for some verbal quantifiers in Russian and English:

(15) $\llbracket \text{budet/will} \rrbracket = \lambda w \lambda t \lambda P_{\text{it}}.(\exists t' \succ t)P(t')$ type (i(it,t))
        (subcategorisation feature: iinf[4]; feature of temporal argument of the auxiliary: un).

(16) $\llbracket \text{would} \rrbracket = \lambda w \lambda t \lambda P_{\text{it}}.(\exists t' \succ t)P(t')$ type (i(it,t))
        (subcategorisation feature: iinf; feature of temporal argument of the auxiliary: up).

(17) $\llbracket \text{dumaet/thinks} \rrbracket$ type (s(it)),(i(et))
        $= \lambda w \lambda P_{\text{s(it)}} \lambda t \lambda y.(\forall w_1)(\forall t_1)[(w_1, t_1)$ is compatible with everything y believes of (w, t) in w at time $t \rightarrow P(w_1)(t_1)]$ (Lewis 1979)
        (feature of temporal variable of the attitude verb: un).

The temporal auxiliaries *budet*, *will* or *would* change the reference time of the embedded verb to a future time. Attitude verbs like *says*, *said*, *govorit*, *govoril* are more complicated. The semantics of these verbs involves quantification over the

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[4]   The subcategorisation feature makes sure that the complement of the auxiliary is a verb in the infinitive. We must stipulate that subcategorisation features are not transmitted beyond the complement. We will omit the representation of these features below.

reference time of the complement, that is, metaphorically speaking, the "subjective now" of the attitude holder.

Obviously, the purely temporal meaning of *budet/will/would* is the same as for the synthetic semantic tense F in (7), i.e., the perfective future in Russian (modulo aspect). The difference is in the features. At the syntax-semantics interface we have to make sure that the time argument of *budet/will* (and *dumaet/thinks*) has the feature [un], while the temporal variable of English *would* has the feature [up]. Otherwise the tense morphology of the verbal quantifier itself will not be licensed.

In our system (ignoring aspect), the following sentences therefore come out as truth-conditionally equivalent:

(18)   R   Dolli podumaet, čto ja ostavljaju vtorogo muža.
             ("present under future")
             [Lev Tolstoj. "Anna Karenina". (*RuN-Euro Corpus*)][5]
        E   Dolly will think I'm leaving my second husband.
             ("present under *will*")

The synthetic (inflectional) future of the attitude verb *podumaet* (the semantic tense is F) has the same meaning as the analytic construction *will think* (the semantic tense is N shifted to the future). Concerning the present tense in the complement, *ostavljaju/am leaving*, the SOT parameter will allow for a simultaneous interpretation in both cases: In non-SOT languages like Russian, the embedded present is licensed by the vacuous tense of the complement, the T-centre TPRO, while in English we find long distance agreement: The highest tense, a deictic present with the feature [in], transmits its feature as [un] to the time argument of *will*, from where the feature is further transmitted through the infinitive verbal quantifier *think* down to the finite auxiliary in the complement, where it is pronounced as *am*.

[1.5]   *The SOT Parameter*

We adopt the formulation of the SOT parameter from (von Stechow & Grønn to appear-a). In the definition in (19) we refer to the broader class of TEMPORAL QUANTIFIERS which include verbal quantifiers but also various modals such as *nado* ('must'), *dolžen* ('must'), *možno* ('can'). The latter are not verbs in Russian.

(19)   *A language L is an* SOT *language if and only if*
        (i) temporal quantifiers of L without their own temporal i-features trans-

mit temporal features.

(ii) intensional temporal quantifiers of L do not license present tense morphology.

By contraposition, Russian is a non-sot language: temporal/verbal quantifiers without temporal i-features (*budet, govorit, govoril, (po)dumaet, (po)dumal* etc.) DO NOT TRANSMIT temporal features, while intensional temporal quantifiers (*govorit, govoril, (po)dumaet, (po)dumal, nado, dolžen, možno* etc.) LICENSE present tense morphology. Another way of formulating clause (ii) above is to say that in intensional contexts in Russian, the T-centre TPRO has the feature [in].

In Appendix A we show how the system works for Russian by providing our analysis of simultaneous present tense and backward shifted past complements under attitude verbs.

[2]   INDEPENDENT VS. DEPENDENT TENSE IN RUSSIAN ADJUNCTS

Apparently, adjunct tense is more straightforward and displays less idiosyncrasies in Russian than in languages like English. In the literature, tense in Russian adjuncts is therefore assumed to be deictic, most recently in (Kubota et al. 2011).

The analysis of Russian adjuncts does not have the sot-rule which we find in English. The differences between the two languages can be illustrated by looking systematically at how they express SIMULTANEOUS interpretations between relative clauses and the matrix. The semantic independence of deictic Russian adjuncts results in morphological TENSE HARMONY between the matrix and adjunct, as we see in table 1.

	English	Russian
pf_fut under matrix pf_fut	–	OK
pres under matrix pf_fut	–	#
will/budet under matrix *will/budet*	OK/marginal	OK
pres under matrix *will/budet*	OK	#
past under matrix past	OK	OK
pres under matrix past	#	#
would under matrix *would*	OK/marginal	–
past under matrix *would*	OK	–

TABLE 1: Simultaneous Interpretations in English and Russian RCs.

To obtain a simultaneous interpretation in a non-sot language like Russian, we must rely on a bit of pragmatics since the deictic adjunct and deictic matrix are semantically independent of each other. If both times are located in a past time (or future time), only the context can tell us that these two past times (fu-

ture times) are the same.[6] This remark also holds for English "past under past", unless one makes use of the Tpro$_i$ strategy and long distance binding with only one semantic P.

Note that while both languages have a synthetic past, English lacks the synthetic future that we find in Russian. However, the main difference between the two languages is that English has bound tense under the verbal quantifiers *will* and *would*.[7] In these cases, long distance binding is required to license the temporal morphology in the adjunct. The bound, simultaneous configurations "present under *will*" and "past under *would*" follow from the SOT parameter and the assumption that English is an SOT language.

Given the tense distribution in table 1, we can see why the issue of tense dependencies in Russian adjuncts has been neglected in the literature. Simultaneous interpretations in Russian adjuncts do not involve binding from the matrix into the adjunct. Furthermore, a purely extensional configuration, as we typically find in ordinary RCs and TACs, does not license an embedded present tense (clause (ii) of the SOT parameter). Unlike Japanese, neither English nor Russian have a relative present tense as such (von Stechow & Grønn to appear-a).[8]

Despite the emerging pattern, which suggests a deictic and independent analysis of adjunct tense in Russian, we will in the following nevertheless give evidence for non-trivial dependent tense both in relative clauses and temporal adverbial clauses. We will review the relevant data below. In Section [4], we will have a closer look at a special case of non-deictic adjuncts, viz. adjuncts under attitudes and modals.

[2.1] *Relative Clauses*

Consider the Russian example (20) with a "past under past".

(20)   Vanja uvidel devušku, kotoraja spala. (*simultaneous or backward shifted*)
        'Vanja saw a girl, who was sleeping / who had been asleep.'

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[6] The morphological distribution is the same in *kogda/when* clauses as in RCs. However, as we will show below, an intersective analysis of *kogda/when* clauses gives us simultaneity with the matrix without any pragmatic adjustment (unlike RCs).

[7] The temporal auxiliary *would* in English is special since it cannot occur in plain matrix sentences (unlike *will*), but must be embedded under an attitude/modal.

[8] In (Grønn & von Stechow 2010) we assumed a relative PRES in Russian in our analysis of complement tense, but then it remains unclear why Russian adjuncts do not make use of this tense and do not display the configurations "present under past" or "present under future".
     The current version of the SOT parameter captures the distribution of subordinate tense in both complements and adjuncts without a semantic relative PRES. Thus we are able to predict that the following "present under past" can only have a deictic interpretation:

     (i)   Vanja uvidel devušku, kotoraja plačet. (*only deictic interpretation*)
           'Vanja saw a girl, who cries (now)'.

As indicated in the English translation, the construction is ambiguous with respect to the temporal relation between the matrix and the RC.

For the sake of the argument, let us consider the possible analyses predicted by our theory. Russian is a non-SOT language, but the sentence in (20) does not contain any intensional operators, nor any verbal/temporal quantifiers without temporal i-features. We have only past semantic tense(s) with i-features. Accordingly, the SOT parameter is irrelevant for the analysis.

To account for the simultaneous reading, we could consider the possibility of having *one* matrix past operator licensing the morphology of the *two* verbs. We would then need an anaphoric Tpro_i in the adjunct, coindexed with the temporal variable of "*uvidel – saw*". For the configuration under discussion this solution appears to be elegant, but then it becomes unclear why Russian has unbound (and typically deictic) tense in other adjunct constructions. Furthermore, if we adopt this solution, we lose the following generalisation:

(21)   LICENSING RULE IN RUSSIAN ADJUNCTS
          The temporal morphology in Russian adjuncts is always licensed locally.

As we will see throughout the paper, in examples involving various temporal configurations, tense licensing in Russian adjuncts is *always* compatible with LOCAL LICENSING. This is also the case when Tpro_i is the temporal centre of the adjunct. So we will assume that the past of *spala* in (20) is licensed by a local PAST operator – both on the simultaneous and backward shifted reading.

On the simultaneous reading, the T-centre of PAST is N, or, equivalently, Tpro_i coindexed with N. For the backward shifted reading (*spala* ≺ *uvidel*), Tpro_i is coindexed with the temporal variable of the matrix verb. In Figure 15 on page 298 in Appendix B we give an underspecified analysis of the two readings in (20) using Tpro_i. The analysis with an anaphoric tense as the highest tense of the RC is flexible enough to account for both interpretations.

Strictly speaking, examples like (20) do not require an anaphoric analysis. The RC could be treated as simply deictic on both interpretations, since the deictic (independent) reading is compatible also with the adjunct reference time temporally preceding the time of the matrix. Thus, if the T-centre of the adjunct is the utterance time, the time of the adjunct and the time of the matrix *may* be simultaneous (= 'who was sleeping') or the adjunct *may* precede the matrix (= 'who had been asleep'). The deictic analysis only requires the adjunct tense to precede the utterance time, but leaves it open how the adjunct tense is temporally located with respect to the matrix tense.

However, we do find convincing evidence for the strict necessity of anaphoric tense in certain relative clauses, cf. examples like (22) from (Grønn & von Stechow 2011):

(22)   Imenno v universitete devuška poznakomilas' s Billom Klintonom, koto-
ryj vposledstvii stanet (*?budet, ?byl*) ee mužem.
(*Internet, from a biography of Hillary Clinton*)
'At the university the girl got to know Bill Clinton who would later become
her husband.' (*our translation*).

Russian uses a synthetic future *stanet* where we have the analytical form *would be-come* in our English translation. Both forms clearly express a non-deictic, relative future because the marriage was AFTER the time of acquaintance, but BEFORE the speech time. Russian, unlike English, has a real future tense. The example shows that this future can be used not only deictically, but also PROSPECTIVELY, i.e., as a forward shifter.

We can account for (22) by letting the anaphoric tense $Tpro_i$ in the adjunct be bound by the matrix past *poznakomilas' – got to know.* The analysis of (22) is given in Figure 2.

N $\lambda_1 P(t_1)$ λ_2 devuška$_y$ poznakomilas'(t_2) s Klintonom
      ip_____up

$[_{RC}$ kotoryj$_x$ $Tpro_2$ λ_3 $F(t_3)$ λ_4 x stanet(t_4) mužem$_y]$
            up   if_____uf

$= (\exists t_2 \prec s^*)[\text{girl}_y \text{ get-to-know}(t_2) \text{ BC} \& (\exists t_3 \succ t_2)[\text{BC become}(t_3) \text{ husband}_y]]$

FIGURE 2: Future under Past in Russian RCs.

A relative future under past is possible in Russian because F has its own feature [if], which licenses the future verb in the RC. Note that the time argument of F has to be $Tpro_i$ bound by the matrix P. So this construction is a counter example to the claim that tenses in Russian RCs are always deictic, and it shows convincingly that we sometimes need an anaphoric tense in the relative clause. At the same time, the analysis confirms the generalisation in (21), viz. that tense licensing is local in Russian adjuncts.

Example (22) invites a few more remarks concerning the differences between the Russian and English tense systems. Our translation of (22) into English uses the past tense version of the verbal quantifier *will*, i.e. *would.* Russian has the verbal quantifier *budet* corresponding to *will*, but lacks a past version. The past tense copula *byl* is not a future time shifter. In Russian, one can circumvent this gap in the system by using the (perfective) semantic future in a forward shifted adjunct under a past matrix. This is what we observe in (22).

However, the inventory of Russian tenses, aspects and auxiliaries raises the question of how forward shifting under a past matrix is expressed when the ad-

junct carries IMPERFECTIVE aspect? The simplest solution is to use a purely deictic "past under past" with pragmatic accommodation of the forward shift, as in the following constructed example:

(23)   V 1909 godu on zaregistriroval firmu, kotoraja vposledstvii byla nazvana L'Oreal. ("past imperfective under past perfective")
        'In 1909 he registered the firm which later was called L'Oreal'.

The form *byla nazvana – was called* is a passive construction with the imperfective past copula. Could we use the imperfective auxiliary *budet* in the context of (23)? According to the SOT parameter, this should not be possible, but the "*budet* under past" is still attested on the internet:

(24)   V 1909 godu on zaregistriroval firmu, kotoraja vposledstvii budet nazvana L'Oreal. (*Internet, authentic example*)
        'In 1909 he registered the firm which later would be (*literally: will*) called L'Oreal'.

In our theory, *budet* must be bound by N, which licenses the feature [un] on the temporal argument of the auxiliary, but then *budet* cannot be a forward shifter bound by the past matrix verb *zaregistriroval*.

The present tense form *budet* in somewhat marginal cases like (24) appears to represent a usage reminiscent of the HISTORICAL PRESENT. So there is a kind of perspective shift between the matrix and RC. We also find such examples in Germanic languages, as shown in our German translation below:

(25)   1909 registrierte er die Firma, die später L'Oreal genannt wird.

[2.2]   *Temporal do/posle (before/after) Clauses*

Temporal adverbial clauses come in different variants and can be highly complicated. Let us start with the most simple cases:

(26)   R   Vanja ušel do/posle togo, kak Maša ušla. ("past under past")
        E   John left before/after Mary left. ("past under past")

(27)   R   Vanja uedet do/posle togo, kak Maša uedet.
            ("perfective future under perfective future")
        E   John will leave before/after Mary leaves. ("present under *will*")

The correct semantic paraphrase of the last construction is arguably the following:

(28)   Vanja will leave before/after the earliest time at which Maša leaves.

Our analysis of the Russian construction in (27R) is given in Figure 16 on page 299 and Figure 17 on page 300 in Appendix C. The temporal prepositions *do/posle* – *before/after* relate two times of type i. The definite expression *togo* in Russian overtly shows that the object of the preposition is a definite time. Following (Beaver & Condoravdi 2003), we take this definite time to be the EARLIEST time at which the proposition expressed in the adjunct holds.

The Russian syntax gives further evidence that the right input to the EARLIEST operator is a temporal relative clause; *kak* is an overt manifestation of the temporal abstraction which is needed for type reasons. In Germanic and Romance languages these elements are covert. See (von Stechow & Grønn to appear-b) for references to the literature on *before/after* in English and a comprehensive analysis of these TACs.

Parallel to the RCs discussed above, we find tense harmony in Russian TACs: "past under past" and "perfective future under perfective future". Obviously, given the meaning of the temporal prepositions, there is a semantic difference compared to RCs inasmuch as the time of the matrix cannot be simultaneous with the time of the *do/posle* adjunct. In this respect, we note that a deictic adjunct tense with local tense licensing avoids the kind of inconsistency that may arise on a naïve $Tpro_i$ analysis of (27E) in English.[9]

So, these Russian TACs seem to be straightforward. But let us ask the same question as we asked for Russian RCs: Can we reduce temporal adjuncts in Russian to independent/deictic tense, i.e., a construction in which the adjunct tense always has the same T-centre as the matrix, typically N?

It is not easy to find parallel examples to (22) above, i.e., a "future under past". For obvious reasons, we cannot have a future under *posle* – *after* with a matrix past, but even a future under *do* – *before* with a matrix past is hard to find. In cases of a non-veridical adjunct the data typically follow patterns such as the following:

(29)   K sožaleniju, Edison umer do togo, kak smog zaveršit' svoe izobretenie.
       (*Internet*)
       'Unfortunately, Edison died before the (time) that (he) could finish his invention.'

(30)   Filipp umer do togo, kak smog proizvesti na svet ešče odnogo syna.
       (*Internet*)
       'Filipp died before the (time) that (he) could produce yet another son.'

The Russian modal *smog* in the *do*-adjunct carries perfective past morphology. Semantically, one could perhaps have a bound configuration with a perfective fu-

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[9]   As we have shown in our previous work on the English construction, we need $Tpro_i$ as the highest tense in the English adjunct. The present tense morphology of the adjunct in (27E) is licensed by a feature transmitted through the verbal quantifier *will*, but since $Tpro_i$ is coindexed with the time argument of the matrix verb, covert time shifters must be inserted in the adjunct to avoid semantic inconsistency.

ture version of the modal in the adjunct, *umer do togo, kak smožet zaveršit'/proizvesti – died before he will-can ...*, but this variant seems to be pragmatically blocked by a preference for morphological tense harmony and semantically independent tenses. Thus, again we have two independent past tenses: *umer* and *smog*.

We note the presence of the modal in the examples above, but in this paper we will not try to account for the non-veridicality of these *do*-adjuncts, a problem well-known in the literature (Beaver & Condoravdi 2003). For the record, we should point out that non-veridical readings also occur without overt modals, as in the famous example below:

(31)   Mozart died before he finished the Requiem.

Here is a Russian counterpart of this example:

(32)   Štjuler umer do togo, kak zaveršil proekt. (*Internet*)
        'Stüler died before the (time) that (he) finished (his) project.'

So, do we ever find a dependent future under past in Russian *do – before* clauses? Example (33R) from our parallel corpus is a candidate:

(33)   N   Bryllupet skulle stå i mai, før jektene stevnet sør.
             [Herbjørg Wassmo. "Dinas bok". (*RuN-Euro Corpus; Oslo Multilingual Corpus*)]
        E   The wedding would take place in May, before the cargo boats headed south.
        G   Die Hochzeit sollte im Mai sein, bevor die Frachtschiffe nach Süden fuhren.
        R   Svad'ba dolžna byla sostojat'sja v mae, do togo, kak karbasy ujdut na jug. (*literally: Wedding must was take-place in May, before that how ships will-go to south*)

The three Germanic languages, including the Norwegian original, display the same construction – a past under a modalised past – in contrast to Russian, which has a future under a modalised past. The same configuration is also observed in an example from the Russian Reference Grammar (Švedova 1980, § 2972):

(34)   Valja dolžna byla soprovoždat' otca do togo, kak načnet svetat'.
        'Valja had to accompany her father before it would dawn'
        (*literally: before that how will-begin dawn*).

However, these examples contain a modalised matrix. The modal operator is an intensional temporal quantifier, which, according to clause (ii) of the SOT parameter, licenses present tense in non-SOT languages like Russian. What this means is that the T-centre under the modal is a TPRO with the feature [in]. Pre-

sumably, the forward shift is with respect to the TPRO of the modal, and the embedded future in (33) and (34) is not directly dependent on the matrix past. We will return to the analysis of example (33) towards the end of section [4].

[2.3] *Kogda (when) Clauses*

Kogda/when-clauses are typically deictic, and again we observe tense harmony in Russian – the matrix and the adjunct have the same tense.

In (von Stechow & Grønn to appear-a), following (Arregui & Kusumoto 1998), we analyse *when/kogda* as a temporal relative pronoun. Like any other relative pronoun, it is semantically vacuous. This strategy leads to an intersective analysis (predicate modification), which in our approach has the consequence that the time of the *kogda*-clause is SIMULTANEOUS with the time of the main clause.[10] Below we give two examples with the synthetic future; see Appendix D for the analysis.

(35) R Ja priedu, kogda vy vyjdete zamuž.
         [Lev Tolstoj. "Anna Karenina". (*RuN-Euro Corpus*)]
      E I'll come when you get married.
         (*literally: I will-come, when you will-get married*)
      N Jeg skal komme når De gifter Dem.

(36) R Ja eto skažu emu, kogda on priedet.
         [Lev Tolstoj. "Anna Karenina". (*RuN-Euro Corpus*)]
      E I'll tell him that when he comes.
         (*literally: I will-tell him, when he will-come*)
      N Jeg skal si det til ham når han kommer.

The derivation given in Appendix D shows that the AT-PP plays a crucial role in our account. The AT-PP makes it possible to have an independent deictic future in the adjunct and still cash out the simultaneity of the matrix and the adjunct in Russian. The reason is the following:

By Predicate Modification the *kogda*-adjunct applies to the time argument of the matrix, a variable bound by the matrix F(UTURE). The adjunct also contains a deictic future tense that binds the temporal variable of the embedded verb. Now, the AT-PP identifies the temporal variable of the verb in the adjunct with the time argument of the matrix. The main verb and the verb in the adjunct are thus evaluated at the same future time, and the adjunct is interpreted as if it were tenseless.

The SOT-parameter predicts that Russian TACs cannot have the equivalent construction of the English "present under *will*", i.e., a dependent (non-deictic) present under the verbal quantifier *budet – will*. Instead we get "*budet* under *budet*", cf. the contrast between (37E) and (37R):

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[10] The advantages of an intersective analysis of *when*-clauses were recently also pointed out in (Sæbø 2012).

(37)   E   Look ye; when captain Ahab is all right, then this left arm of mine
           will be all right; not before. ("present under *will*")
           [Herman Melville. "Moby-Dick". (*Russian National Corpus*)]

       R   Kapitan Achav budet zdorov togda, kogda opjat' budet zdorova moja
           levaja ruka, ne ran'še, slyšite? ("*budet* under *budet*")

In Figure 3 we give the analysis of a similar example, the constructed toy sentence
(38).

(38)   Alla budet rabotat', kogda Vova budet rabotat'.
       'Alla will work when Vova will work'.[11]

N λ_1 budet(t_1) λ_2[Alla rabotat'(t_2)

in_____un

[$_{RC}$ kogda$_3$ N λ_4 budet(t_4) λ_5 Vova rabotat'(t_5) & t_5 AT t_3](t_2)]

in_____un

$= (\exists t_2 \succ s^*)$[Alla work$(t_2)$ & $(\exists t_5 \succ s^*)$[Vova work(t_5) & $t_5 = t_2$]]

FIGURE 3: "budet under budet" in *kogda*-constructions.

In fact, the temporal organisation in these Russian examples is as simple as it
can be. Are there any cases that require a bound Tpro$_i$ in Russian *kogda*-clauses?

As pointed out in (Haraldsson 1999), a text book of Russian grammar, a future
under *kogda* occurs frequently with past forms of the intensional verb *ždat'* – *to
wait* in the matrix. Here are some authentic examples from the RuN-Euro corpus:

(39)   R   Vse ždali, kogda on končit.
           [Lev Tolstoj. "Anna Karenina". (*RuN-Euro Corpus*)]

       E   Every one was waiting for him to finish.
           (*literally: waited, when he will-finish*)

       N   Alle ventet på at han skulle bli ferdig.

(40)   R   Levin ne slušal bol'še i ždal, kogda uedet professor.
           [Lev Tolstoj. "Anna Karenina". (*RuN-Euro Corpus*)]

       E   Levin listened no more, and simply waited for the professor to go.
           (*literally: waited, when professor will-leave*)

       N   Levin hørte ikke efter lenger og ventet på at professoren skulle gå.

(41)   R   Djudja sidel na krylečke v odnoj žiletke, bez šapki i ždal, kogda zagov-
           orit proezžij. [Anton Čechov. "Baby". (*RuN-Euro Corpus*)]

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[11]   As we have just seen in the authentic examples above, English typically has the SOT-configuration: 'Alla
       will work when Vova *works*'.

> E   Dyudya was sitting on the step in his waistcoat without a cap on, waiting for the visitor to speak first.
>   (*literally: waited, when visitor will-speak*)
>
> N   Djudja satt på trappen i bare vesten, uten lue, og ventet på at den reisende skulle begynne å snakke.

This particular variant of *kogda*-adjuncts is not found in languages like English or Norwegian, as we see from the corpus translations. We propose to analyse the Russian examples following our general approach to TACs: The *kogda*-adjunct is here reminiscent of a FREE TEMPORAL RELATIVE CLAUSE. It combines with the covert definite operator THE EARLIEST TIME, cf. our analysis of *do/posle (before/after)*-clauses. A semantic paraphrase of example (39R) is therefore roughly as given in (42), leaving the waiting predicate unanalysed. The analysis of the adjunct is depicted in Figure 4.

(42)   Every one waited for the earliest time t such that he finishes at t.

$$\text{THE EARL } \text{kogda}_3 \text{ F}(\text{Tpro}_i) \, \lambda_4 \text{ he finish}(t_4) \,\&\, t_4 \text{ AT } t_3$$
$$\underset{\text{if} \qquad\qquad\qquad\qquad \text{uf}}{}$$

FIGURE 4: "future under *kogda – when*" (Bound by Matrix Past).

The LF for the adjunct has Tpro_i as the T-centre of a local FUTURE that checks the morphology of the verb (via the temporal argument of the latter). Tpro_i is coindexed with the reference time of the matrix.

[3]   PAST SHIFTED READINGS IN RUSSIAN ADJUNCTS

In example (20), which is analysed in Appendix B, we encountered a Russian "past under past" with a possible backward shifting of the RC. In that case we assumed a Tpro_i and bound tense, but noted that a deictic analysis of the adjunct was possible as well.

This raises the question of how we should analyse backward shifting in "past under future" configurations. Consider the following example from the Russian Reference Grammar (Švedova 1980, § 663).

(43)   Posle togo, kak postroili novyj cech, zavod uveličit vypusk produkcii.
        'After they built a new stock, the factory will increase its production'.

The Reference Grammar fails to point out that examples like (43) are only felicitous with a strictly deictic past interpretation of the temporal adjunct. Our theory, which offers the possibility of having Tpro_i as the temporal centre of the adjunct, predicts that a backward shifted, dependent reading could be pos-

sible in (43): "After the time that they will have built ...". This would be a configuration corresponding to a FUTURE PERFECT in Germanic. The future perfect solves the conflict between forward and backward shifting by expressing both, but since Russian does not have overt composite perfect tenses, Russian has to make a choice: either future *or* past. It turns out that a future perfect (future-2) interpretation must be expressed with a "perfective future under a perfective future":

(44)   Posle togo, kak postrojat novyj cech, zavod uveličit vypusk produkcii.
        'After they will-build a new stock, the factory will-increase its production'. (*constructed example*)

Since a dependent backward shifted reading is not attested in configurations like (43), we must invoke a pragmatic blocking principle. In (Grønn & von Stechow 2011), we speculate that shifted readings based on certain TENSE MISMATCHES between the matrix and RC, viz. a "past under future", are blocked due to competition from independent/deictic constructions without mismatch ("future under future"). This pragmatic phenomenon – a preference for morphological TENSE HARMONY – is also responsible for the obligatory deictic interpretation of the TAC in (43).

In a semantic representation of the "future under future" in (44), the meaning of the temporal preposition *posle – after* will guarantee the correct temporal precedence relation between the two events (matrix after adjunct) located at two independent future times. In other cases, however, we may be forced to insert COVERT RELATIVE TENSES to obtain a past perfect or future perfect interpretation in Russian; cf. (Paslawska & von Stechow 2003) and (Grønn 2003). We will illustrate this phenomenon by first looking at an example involving a *kogda – when* adjunct:

(45)   E   Audrey will double-check when I'm done.
             ("present perfect under *will*")
             [Michael Connelly. "City Of Bones". (*Russian National Corpus*)]
        R   Kogda ja zakonču, Odri pereproverit.
             ("future under future")

To license the morphology in (45R), we assume two independent deictic future tenses. However, our analysis of the temporal conjunction *kogda – when* as an overt temporal relative pronoun that abstracts over the reference time of the adjunct, has the effect that *kogda*-clauses are tenseless and express temporal identity with the matrix. So, we end up saying that the matrix and adjunct occur at the same future time. This is obviously wrong, cf. the simplified truth conditions for the English original:

(46) $(\exists t_1 \succ t_0)[\text{check}(t_1) \,\&\, (\exists t_2 \prec t_1)[\text{finish}(t_2)]]$

Admittedly, the truth conditions are a bit weak since it does not follow that the "future perfect" event must be located after the utterance time. This problem has been known for a long time in the literature on the future-2 in Germanic languages and will not bother us here.

To get the correct temporal relation between the events (reference times) of the matrix and adjunct in (45R), we need some pragmatic adjustment. Apparently, there are two ways of cashing out the condition $t_2 \prec t_1$. Given the overt perfect in the adjunct of the English original, it is tempting to have a covert PAST in the Russian adjunct. However, a pure time shifter in the adjunct will not do the trick since its effect will be cancelled by the AT-PP, which forces simultaneity between the adjunct event and the matrix.[12]

Instead, we propose to analyse (45R) by having an additional covert relative FUTURE in the matrix. We can think of this as an AND NEXT-operator, a way of encoding narrative progression. It therefore makes sense that the Russian translator has chosen to invert the order of the adjunct and matrix. On this strategy, the "backward" shifting in the Russian adjunct is analysed in Figure 5 as a forward shifting of the matrix.[13]

N λ_1 F(t_1) $\lambda_2[[_{\text{RC}}\text{kogda}_3$ F(N) λ_4 zakonču(t_4) $\&$ t_4 AT $t_3](t_2)$
 if   if_____uf

$\&\,[$ F(t_2) λ_5 Odri pereproverit$(t_5)]]$
 uf   uf

FIGURE 5: Insertion of a Covert Future in a Russian "future under future".

The best evidence for a COVERT PAST inside Russian adjuncts comes from tense under aspectual adverbs like *uže – already* or *ešče ne – not yet*. The following example has *uže – already* in a future RC, which forces a future-2 reading:

(47)   Innokentij napered znal, kak utrom za zavtrakom oni s vostorgom soob-
        ščat, čto im oboim snilsja odin i tot že son ... – Odinakovych snov ne by-
        vaet! – *skažet im otec, kotoryj uže vernetsja* s nočnogo dežurstva i budet
        zavtrakat' vmeste s nimi. *(Internet)*
        'Innokentij knew in advance that during breakfast the next morning they

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[12]   This raises the question of how one should analyse (45E). One must make sure that the AT-relation holds between the PERFECT STATE in the adjunct and the matrix event time.

[13]   If this analysis is on the right track, we will have to put restrictions on the availability of a featureless F in Russian. For instance, we cannot have a covert, featureless F in a present adjunct under *budet*. The existence of such a covert tense would predict that the "present under *budet*" could have a simultaneous interpretation.

> would tell with great enthusiasm that they both had had the same dream
> ... – Identical dreams do not happen, – *their father, who would already have*
> *returned from the night shift* and would be having breakfast with them,
> *would tell them.*' (*our translation*).

To encode the future-2 interpretation suggested by *uže* in the RC we insert a covert P, but how do we license the future tense morphology of *vernetsja* in (47)?

The Russian example contains three verbs in the synthetic future: *soobščat, skažet, vernetsja.* All these verbs follow the past attitude/factual verb *znal – knew.* We assume that *skažet, vernetsja – will-say, will-return* here occur in a context of FREE INDIRECT DISCOURSE. The temporal centre of the embedded matrix *skažet – will-say* is therefore not the deictic N, but TPRO.

Accordingly, the highest tense of the deeply embedded RC must be non-deictic, viz. the anaphoric Tpro_i. Should Tpro_i be coindexed with TPRO or the reference time of the matrix *skažet – will-say*?[14] There are principled reasons for adopting the former option.

By Ockham's razor, the second option is attractive, i.e., to coindex the time of the adjunct with the matrix. In that case, we would only need ONE FUTURE OPERATOR outscoping the matrix and RC. The problem, however, is that we lose the generalisation stated above in (21), viz. that adjunct tense in Russian is always licensed LOCALLY.

On the other hand, if we coindex the adjunct with the T-centre (TPRO) of the matrix, we get a local and independent, though non-deictic, FUTURE in the relative clause above the covert PAST. An analysis along these lines is depicted in Figure 19 on page 302 in Appendix E.

Example (47) also highlights another point, concerning the periphrastic imperfective construction "*budet zavtrakat' – will have breakfast*" in the RC. The construction involves the verbal quantifier *budet*, whose present tense morphology must be licensed by TPRO under *znal – knew* (free indirect discourse). This is where the second clause (ii) of the SOT parameter is activated. The role played by TPRO in (47) anticipates the next section, which we will turn to now: adjuncts under attitudes.

[4]   ADJUNCTS UNDER ATTITUDES AND MODALS

For many of the examples we obtain the same result regardless of whether we assume a deictic N or Tpro_i as the T-centre in RCs and TACs. However, in the general case, N is not possible as the T-centre, because we can embed adjuncts under an ATTITUDE and get a BOUND reading, as in the following examples, modelled in

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[14]   As we mentioned above in connection with (45E), the truth conditions of a "future perfect" will in neither case allow us to force the interpretation that the father's return is AFTER the T-centre of the matrix.

accordance with Ogihara's evidence that the past in English RCs must sometimes be bound (Ogihara 1996):

(48)   E   John thought that Mary would give birth to a son who had blue eyes like his father. ("[past under past] under past")

R   Vanja podumal, čto Maša rodit syna, u kotorogo budut golubye glaza kak i u otca. ("[*budet* under future] under past")

(49) $\lambda w.(\exists t \prec s^*)$ John thinks in w at t [$\lambda w_1 \lambda t_1.(\exists t_2 \succ t_1)(\exists x)$
Mary gives birth to x in w_1 at t_2 & boy(x) & x has blue eyes at t_2 in w_1]

In examples like (48) the highest tense in the complement – the T-centre of the embedded proposition – cannot be deictic. The reason is that John did not think in the past about the current speech time. Thus, in our theory, the T-centre of the highest sentence under attitudes is TPRO, i.e., eventually λ_i. We spell out the differences between (48E) and (48R) in Figure 6 and Figure 7. As we see, the feature checking is very different. Note the different coindexation of Tpro$_i$ in English and Russian in the two figures.

N λ_1 P(t_1) λ_2 John thought(t_2) TPRO$_3$ would(t_3) λ_4 Mary give(t_4) birth to
    ip————————————up————————up————————up

a boy [$_{RC}$ WH$_x$ Tpro$_4$ λ_5 x had(t_5) blue eyes like his$_x$ father]
                    up————————up
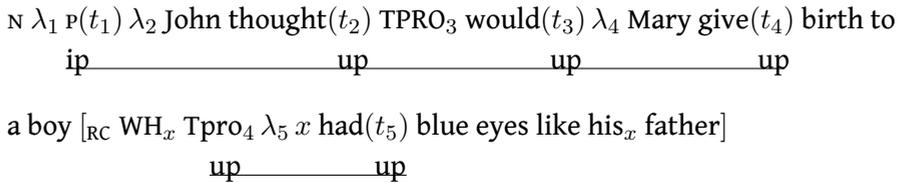
FIGURE 6: Bound RC under Attitude in English.

N λ_1 P(t_1) λ_2 Vanja podumal(t_2) TPRO$_3$ F(t_3) λ_4 Maša rodit(t_4) syna
    ip————————————————up   in   if un————————uf

[$_{RC}$ kotorogo$_x$ Tpro$_3$ λ_5 budut(t_5) λ_6 BYT'(t_6) u x golybye glaza kak u otca$_x$]
   un————————un
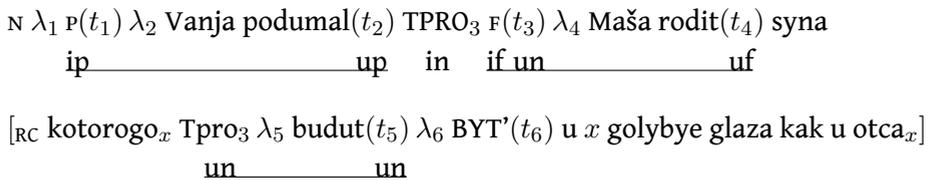
FIGURE 7: Bound RC under Attitude in Russian.

The difference in tense distribution between (48E) and (48R) follows from the SOT parameter. In English, Tpro$_i$ in the deeply embedded RC is coindexed with the infinitive *give birth*. The temporal argument of the infinitive has a feature [up], which is transmitted from the matrix P via binding. Following the SOT parameter, the feature transmission is not blocked by the two verbal quantifiers: the attitude predicate (here: *thought*) and the forward shifting auxiliary in the complement (here: *would*). In the end, the verb of the RC inherits the past tense morphology (here: *had*).

In Russian, in accordance with the SOT parameter, TPRO comes with its own feature [in] in intensional contexts. Since the present tense morphology of the verbal quantifier *budet* in the embedded RC cannot be licensed by the future perfective *rodit* in the highest embedded clause, the [un] feature of the time variable of the adjunct tense must be checked by [in] of TPRO. Accordingly, the interpretation of the adjunct is not dependent on the speaker's utterance time, but on the "subjective now" of the attitude holder (Vanja).

We conclude that the temporal anaphor Tpro_i, which can be used as the T-centre of adjuncts, is flexible enough to capture the two kinds of dependency exemplified in the English and Russian examples.

Consider next temporal *do/posle* (*before/after*) adjuncts, which encode the temporal relations $\prec$ and $\succ$ between the matrix and adjunct.

(50) E John said that he would leave before Mary left.
          ("[past under past] under past")
      R Vanja skazal, čto ujdet do togo, kak ujdet Maša.
          ("[future under future] under past")

As pointed out above, a local tense operator is needed semantically in these TACs to avoid inconsistency. If we use the Tpro_i strategy and feature checking from the matrix to the adjunct, we run the risk of equating the time of the matrix event and the subordinate event, in contradiction with the meaning of the temporal prepositions. With two INDEPENDENT tenses and the AT-PP in the adjunct this problem is neatly solved. Our analysis of example (50R) is depicted in Figure 8.

N $\lambda_1 \text{P}(t_1)$ λ_2 Vanja skazal(t_2) TPRO$_3$ F(t_3) λ_4 ujdet(t_4)
    ip————————————up   in   if————————uf

& t_4 do togo EARL kak$_5$ F(Tpro$_3$) λ_6 t_6 AT t_5 & Maša ujdet(t_6)
                         if————————————————uf

$= \lambda w.(\exists t \prec s^*)$ Vanja says in w at t $[\lambda w_1 \lambda t_1.(\exists t_2 \succ t_1)$Vanja leaves in w_1 at t_2 & $t_2 \prec$ the earliest $t_3 : t_3 \succ t_1$ & Maša leaves at t_3 in $w_1]$

FIGURE 8: TAC under Attitude in Russian.

We note for the record that (50E) is, strictly speaking, ambiguous. In the analysis given here we have represented the natural reading according to which John's leaving $\prec$ Mary's leaving. However, (50E) can marginally also mean that John's reporting (his intentions to leave) $\prec$ Mary's leaving. Interestingly, the latter reading is not attested for the Russian "[future under future] under past" in (50R). If the temporal preposition relates Vanja's saying event and Maša's leaving, the

preference for morphological tense harmony in Russian gives us the following configuration with a past tense in the adjunct:

(51)   [Vanja skazal, čto ujdet] do togo, kak ušla Maša.
          ("past under [future under past]")

Let us now turn to authentic corpus data. Given what is said above about a preference in Russian for tense harmony, how do we explain the data in (52R) and (53R)?

(52)   R   Voenvrač Platonov obeščal otpustit' ee, no velel nabljudat' Šapošniko-
           va do togo, kak Platonov sam osmotrit ego.
           [Vasilij Grossman. "Žizn' i sud'ba". (*RuN-Euro Corpus*)]
       E   Dr Platonov promised to let her go, but told her to watch over Sha-
           poshnikov until he himself came to examine him.
           (*literally: P ordered to watch over S before the (time) that P will-examine S*)

(53)   R   Ženja probiralas' na kuchnju, kogda vse spali, a utrom staralas' umy-
           vat'sja do togo, kak prosnutsja žil'cy.
           [Vasilij Grossman. "Žizn' i sud'ba". (*RuN-Euro Corpus*)]
       E   In the morning Yevgenia would steal into the kitchen when everyone
           was asleep and try to get washed before they woke up.
           (*literally: Ž tried to wash self before the (time) that will-wake-up lodgers*)

The intensional verbs *velel – ordered/told* and *staralas' – tried* subcategorise for infinitive complements: *nabljudat' – watch over* and *umyvat'sja – get washed*, respectively. Importantly, the temporal relation induced by the temporal proposition holds between the reference time of a NON-FINITE verb and a verb in the perfective future: *nabljudat' – watch over* ≺ *osmotrit – will-examine* in (52R) and *umyvat'sja – get washed* ≺ *prosnutsja – will-wake-up* in (53R). So, there is no real morphological tense mismatch.[15]

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[15]   If we minimally change the context of (53) such that we have two finite verbs, we expect an "imperfective
        past under imperfective past":

        (i)   ... a utrom umyvalas' do togo, kak prosypalis' žil'cy.
                  ... and in-the-morning got-washed before the (time) that woke-up lodgers.

        However, some informants also accept a tense mismatch between the matrix (imperfective past) and
        adjunct (perfective future):

        (ii)   ... a utrom umyvalas' do togo, kak prosnutsja žil'cy.
                  ... and in-the-morning got-washed before the (time) that will-wake-up lodgers.

        Without going into the details, we believe that this possibility is due to the MODAL interpretation of the
        HABITUAL imperfective past operator *umyvalas' – got washed.*

Our theory is flexible enough to account for various complicated configurations as they occur in real texts. Consider the Russian construction in (54R) with an overt relative past in the RC:

(54) E Sirrah Locksley, do thou shoot; but, if thou hittest such a mark, I will say thou art the first man ever did so.
         [Walter Scott. "Ivanhoe". (*Russian National Corpus*)]
      R Nu, Loksli, plut, streljaj chot' ty, i, esli, popadeš' v takuju cel', ja skažu, čto ty pervyj čelovek, kotoromu eto udalos'.

Recall that we cannot for pragmatic reasons have an overt relative past in the RC under a future matrix. We must use a "future under future" (tense harmony). However, under a future attitude as in (54R) we can express a relative past in the deeply embedded adjunct with past tense morphology, since the construction under discussion is not a "past under future", but a "past under TPRO". The relative past is evaluated with respect to the subjective now of the attitude holder. On the timeline, ignoring the intensional semantics of attitudes, the temporal configuration in (54) is thus the following: N $\prec$ udalos'/succeeded $\prec$ [ty pervyj/you are the first & skažu/will-say].

The present tense in *ty pervyj čelovek – you are the first man* is licensed by TPRO in Russian (clause (ii) of the SOT parameter) and, in English, by the present tense of *will (say)* in the matrix (clause (i) of the SOT parameter). Given that Tpro$_i$ in the deeply embedded RC is anaphoric to TPRO in Russian, the translator could obviously not have used a future form in the RC (*udastsja*) to get a BACKWARD shifted reading with respect to TPRO. This means that there is no competition from the morphological future and the past tense morphology is licensed in (54R) in order to express a relative past.

The fact that Russian adjuncts are preferably independent of the matrix verb may lead to certain tense mismatches in complicated structures. This becomes evident when we analyse authentic corpus data. The Russian translation below is a case in point.

(55) N Og Bou-Bou oppdaget at hun likte å ha ham der, likte den høflige oppmerksomheten han viet henne og talentet han hadde for tall.
         [Nikolaj Frobenius. "Latours katalog". (*RuN-Euro Corpus*)]
      E And Bou-Bou discovered that she liked having him there, liked the gentlemanly attention he paid her and his talent for figures.
      R Bu-bu obnaružila, čto ej nravitsja ego obščestvo, vežlivoe vnimanie, kotoroe on ej okazyval, i talant k rasčetam. (*literally: Bou-Bou discovered that she likes [...] the attention that he showed her*)

In (55R), if we bind Tpro_i in the RC to the embedded present (*nravitsja – likes*), we get a backward shifted reading, which is undesirable in this context. Accordingly, Tpro_i must be bound by the highest deictic N, as depicted in Figure 9.

N λ_1 P(t_1) λ_2 Bu-bu obnaružila(t_2) TPRO$_3$ ej nravitsja(t_3) vnimanie
   ip——————————————up   in——————un

[$_{\text{RC}}$ kotoroe$_x$ Tpro$_1$ λ_4 P(t_4) λ_5 on ej okazyval$(t_5)(x)$]
   ip——————————up
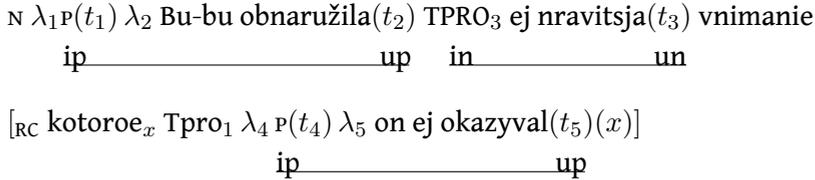
FIGURE 9: Deictic RC under Attitude in Russian.

Next, consider the Russian construction in (56R).

(56)   E   [He burnt] everything that showed that he had lived here in this empty house with a strange woman who would forget him tomorrow, who had gone and quite forgotten him already.
         [Ray Bradbury. "Fahrenheit 451". (*Russian National Corpus*)]
         R   [On sžeg] vse, čto napominalo o tom, kak on žil zdes', v etom pustom dome, rjadom s čužoj emu ženščinoj, kotoraja zabudet ego zavtra, kotoraja ušla i uže zabyla ego.

We have two deeply embedded RCs, the first displaying future tense and the second past tense. We propose the analysis in Figure 10.

N λ_1 P(t_1) λ_2 On sžeg(t_2) vse WH$_x$ P(N) λ_3 x napominalo(t_3) kak TPRO$_4$ P(t_4)
   ip——————up   ip——————————up   in ip——

λ_5 on žil(t_5) s ženščinoj [$_{\text{RC}}$ kotoraja$_y$ Tpro$_5$ λ_6 F(t_6) λ_7 y zabudet(t_7) ego]
——————up   if——————————uf

& [$_{\text{RC}}$ kotoraja$_y$ Tpro$_4$ λ_8 P(t_8) λ_9 y ušla(t_9) & P(Tpro$_4$) λ_{10} y zabyla(t_{10})]
   ip——————up ip——————————up
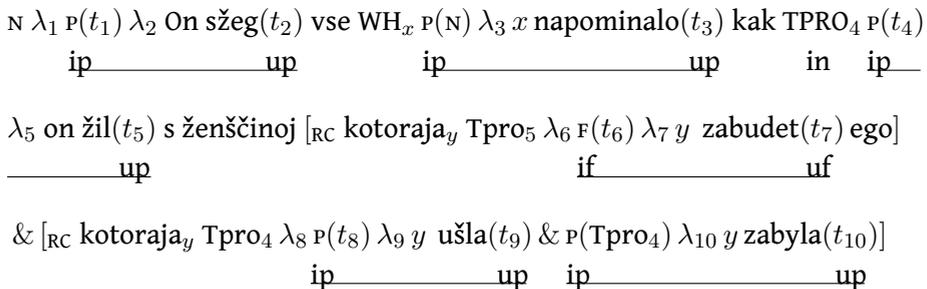
FIGURE 10: Perspective Shift in RCs under Attitude in Russian.

In fact, there is a kind of perspective shift in the construction which our theory can account for straightforwardly by having Tpro_i as the highest tense in the adjunct. In the first RC, Tpro_i is coindexed with the time of the matrix verb *žil – lived* (which itself is embedded under the factive attitude verb *napominalo – reminded*). In the second RC, we get a contradiction if the T-centre comes from the matrix verb (*ušla – left* $\prec$ *žil – lived*), so instead we coindex Tpro_i with the TPRO of the higher attitude verb. The two RCs then give us the right temporal con-

figurations: *zabudet – forgets* ≻ *žil – lived-together*, and *ušla/zabyla – left/forgot* ≺ *napominalo – reminded*.

The next example (57) is highly complicated and illustrates some interesting differences between English and Russian. Although English and Russian use different temporal prepositions in this particular case, *until ... after* and *kogda*, respectively, we assume that the truth-conditions expressed are much the same: Jacob did not wait for the earliest time (in the night) after which the departure of the guests took place.

(57)   N   Han var rasende fordi han skjønte at Jacob ikke hadde vist måte, og ventet med bryllupsnatten til folk var kommet til ro i sømmelighet. [Herbjørg Wassmo. "Dinas bok". (*RuN-Euro Corpus*)]

    G   Er war wütend, weil er begriff, daß Jacob sich nicht beherrscht und mit der Hochzeitsnacht gewartet hatte, bis die Gäste in aller det Ehrbarkeit zu Bett gegangen waren.

    E   *Dina came rushing down the stairs, making an extraordinarily loud racket. She ran through the rooms wearing only pantalets, past thirty pairs of eyes that stared at her aghast. She knocked the punsj glass from the sheriff's hand, splattering its contents and causing unpleasant stains. Then she climbed into his lap and declared loudly and clearly, so everyone could hear: "We're going home to Fagerness. Right now!" The sheriff's heart skipped several beats. He asked the maid to put the bride in "proper condition" again.*

He was furious, because he realized Jacob had shown no restraint, had not waited until the bridal night, after people had properly gone to rest.

    R   *Dina s grochotom skatilas' s lestnicy. V odnich pantalonach ona promčalas' po komnatam na glazach u vsech tridcati ispugannych gostej. Ona vyrvala iz ruki lensmana stakan s punšem, zabryzgav vsech vokrug. Potom pljuchnulas' k nemu na koleni i gromko, tak čtoby vse slyšali, ob"javila: – Dovol'no! Edem domoj, v Fagernesset! Serdce lensmana zamerlo i propustilo neskol'ko udarov. Potom on poprosil služanku pozabotit'sja, čtoby nevesta odelas' podobajuščim ee položeniju obrazom.*

On rasserdilsja na Iakova, ponjav, čto tot v svoem neterpenii ne doždalsja noči, kogda gosti razojdutsja na pokoj.

The Russian translation (57R) displays a "future under past" of the kind we encountered in Section [2], i.e., a "future under *kogda*" with a past form of *ždat' – to wait* in the matrix. However, in the example under discussion the entire construction is embedded under an attitude verb, the perfective gerund *ponjav – having realised*.

The context in (57) makes it clear that the guests have not yet left at the time of the sheriff's anger. The proposition expressed as the sheriff's thought (*realized – ponjav, čto*) contains a backward shifted matrix (*had not waited – ne doždalsja*). The embedded temporal adjunct, however, should be forward shifted, although the shift is not overtly expressed by the English verb form *had gone.* This is in contrast

with Russian, where we do indeed find an overtly expressed relative future in the temporal adjunct: *razojdutsja*.

On the other hand, the temporal adjunct in (57) should also contain a perfect stativiser. This is what we find in the Norwegian original (*var kommet*) and the English translation (*had gone*). As we recall from Section [2], a "future perfect" cannot be formed overtly in Russian, hence we have the simple future *razojdutsja – will-go* which encodes the forward shift, but not the past in the future (or perfect state) interpretation.

Finally, we end this section with some Russian examples in which the adjuncts are embedded under modals. First, we have an example displaying a deeply embedded RC:

(58)   E   At midnight, then, I have to ask you to be alone in your consulting
               room, to admit with your own hand into the house a man who will
               present himself in my name, and to place in his hands the drawer
               that you will have brought with you from my cabinet.
               [Robert Louis Stevenson. "The Strange Case of Dr. Jekyll and Mr.
               Hyde". (*Russian National Corpus*)]
         R   Tak vot: v polnoč' bud'te u sebja i nepremenno odni – nado, čtoby vy
               sami otkryli dver' tomu, kto javitsja k vam ot moego imeni, i peredali
               emu jaščik, kotoryj voz'mete v moem kabinete.

The modal expression *nado, čtoby ... – it is necessary that ...* in (58R) subcategorises for the subjunctive, a FAKE PAST in Russian. Accordingly, we get the subjunctive past tense forms *otkryli dver' – opened the door* and *peredali jaščik – gave the drawer* in the matrix clauses under *nado*. Following (von Stechow 2005), we assume that a COVERT FUTURE must be inserted in such modal contexts both in English and Russian.

Interestingly, we see that the subcategorisation feature (i-subjunctive) in Russian is only transmitted to the matrix verbs. The embedded adjuncts in the Russian translation do *not* display fake past, but simple perfective future: *kto javitsja – who will-turn-up ... kotoryj voz'mete – that you-will-take.* So, the future, which is covert in the matrix (fake past), is expressed overtly in the adjuncts. Obviously, this cannot be a deictic future, neither can the two instantiations of perfective future be relative to the matrix (the bringing of the drawer from the cabinet is *not after, but before* the placing of the drawer in the man's hands). The perfective future must be independent of the matrix, and Tpro$_i$ in the adjuncts must be coindexed with TPRO under the modal.

Once more we observe that the future-2 (*that you will have brought*) cannot be overtly expressed in Russian (*kotoryj voz'mete – that you-will-take*). So the Russian morphology is misleading: the matrix *peredali – gave/placed-in-his-hands* is apparently in the past tense, while the adjunct *voz'mete – will-take/bring* appears to dis-

play simple future tense. Still, the temporal relation between the two events must be the following: *voz'mete ≺ peredali.*

Below we give two examples with a *before* clause embedded under a past intensional/modal expression. In English and Norwegian the embedded TAC has past tense morphology, while in Russian we have a perfective future; a similar tense distribution as in (58).

(59)   R   Emu chotelos', čtoby solnce ne vzošlo prežde, čem on dojdet do bolota. [Lev Tolstoj. "Anna Karenina". (*RuN-Euro Corpus*)]
       E   He hoped the sun would not be up before he reached the marsh.
       N   Han ønsket at solen ikke skulle stå opp før han var fremme ved myren.

(60)   E   And I wanted to finish my story before the bad Patrol Boy came for the last time. [Stephen King. "The Gunslinger". (*RuN-Euro Corpus*)]
       R   I mne chotelos' zakončit' svoju istoriju, prežde čem zloj patrul'nyj zajavitsja v poslednij raz.

For the previously introduced example (33), repeated below, we now propose the analysis in Figure 11.

(61)   R   Svad'ba dolžna byla sostojat'sja v mae, do togo, kak karbasy ujdut na jug. (*literally: Wedding must was take-place in May, before the (time) that ships will-go to south*)
       E   The wedding would take place in May, before the cargo boats headed south.

N λ_1P(t_1) λ_2 byla(t_2) λ_3 dolžna(t_3) TPRO$_4$ svad'ba sostojat'sja(t_4) v mae
   ip———————up   in

& t_4 do togo EARL kak$_5$ F(Tpro$_4$) λ_6 karbasy ujdut(t_6) & t_6 AT t_5
                        if———————————uf

$= \lambda w.(\exists t \prec s^*)[(\forall w_1)(\forall t_1)[Acc_{w,t}(w_1, t_1) \rightarrow [\text{wedding take-place}(w_1)(t_1)$
$\& t_1 \prec \text{the earliest } t_2 : (\exists t_3 \succ t_1)[t_3 = t_2 \& \text{boats leave}(w_1, t_3)]]]]$

FIGURE 11: Future under Modalised Past in Russian.

The copula *byla – was* is interpreted as the identity function. The necessity modal *dolžna – must* embeds a temporal property that is formed by TPRO movement. The SOT parameter says that TPRO under an attitude or modal licenses [un], so the temporal variable of the verb *sostojat'sja – take-place* has that feature. However, like English modals, *dolžna – must* assigns the status feature [uinf], which determines the pronunciation of the infinitive. The feature [un] is also transmit-

ted to the bound Tpro_4, but once again the [un] feature does not show up at PF because the host of Tpro_4 is F which assigns [uf] to the temporal variable of the finite verb *ujdut – will-leave*.

The entire *do – before*-construction is embedded under the necessity modal. The construction leaves it open whether the wedding – and/or departure of the boats – took place at all. Furthermore, the departure of the boats could have been before the speech time. Thus, the embedded F cannot be deictic, but must be bound. In Figure 11, we take it that the T-centre of the adjunct, i.e. Tpro_4, is bound by the TPRO_4 of the modal. Alternatively, Tpro_i could be bound by the matrix P (Tpro_2). This would be similar to a *de re* perspective.

[5]   A NOTE ON ASPECT AND FEATURES

In our work on SOT and subordinate tense phenomena we make the simplified assumption that tense binds the time variable of a verb. For the examples under discussion this does no harm, but, more accurately, tenses bind the time variable of an ASPECT OPERATOR. The aspect operator in turn binds the event variable of the verb and thereby checks the aspect feature. At the same time the aspect operator must transmit the temporal features to the bound aspect (event) variable in order to check the temporal and aspectual morphology of the verb.

We will here briefly present our view on Russian aspect, starting with the following minimally different toy sentences:

(62)   a.   Vanja el arbuz.
              'Vanja was eating/used to eat/ate a melon.'
        b.   Vanja s"el arbuz.
              'Vanja ate (up) a melon.'
        c.   Vanja s"edal arbuz. (*secondary imperfective*)
              'Vanja was eating/used to eat/ate (up) a melon.'

Here are the relevant verb entries accommodated:

(63)   a. $[\![\text{el}]\!]$ features of variables: [up], [uip]
              $= \lambda w \lambda e \lambda x \lambda y.y$ eats x in e in w
        b. $[\![\text{s"el}]\!]$ features of variables: [up], [upf]
              $= \lambda w \lambda e \lambda x \lambda y.y$ eats up x in e in w
        c. $[\![\text{s"edal}]\!]$ features of variables : [up], [uip]
              $= \lambda w \lambda e \lambda x \lambda y.y$ eats up x in e in w

We note that *s"el* and *s"edal* have the same lexical meaning and differ only in the u-features of the variables.

The entries for the verbs in (63) should make clear that we separate the semantic contribution of aspect ("viewpoint aspect") from the semantic contribution of

the prefixes, which determine the Aktionsart of the VP ("lexical aspect"). For instance, the prefix *s-* says that the VP should be telic, i.e., lacking the subinterval property, cf. (Krifka 1989). This is the contribution to lexical meaning represented in the English translation with the particle "up". Telic verbs have the feature [upf] as a default value. The feature points to the semantic perfective operator PF, which takes scope over the entire VP and is separated from the verb. Many perfective verbs can be imperfectivised by the secondary imperfective, here the suffix *-da*. This suffix has no lexical meaning. It simply replaces the feature [upf] by [uip]. Note that the imperfective VP in (63c) is telic as well. So there is no absolute correspondence between telicity and perfectivity. German prefix verbs are much like the Russian ones, but German has no grammaticalised viewpoint aspect; this is a main difference between the two languages. Thus we share the views on aspect recently defended in (Tatevosov 2011) and by other scholars mentioned by him, e.g. (Issatschenko 1968).

Semantic aspects have their usual meanings, cf. (Paslawska & von Stechow 2003) and others, but the order of the arguments is different in the current system:

(64)   a. $[\![\text{PF}]\!] = \lambda t \lambda P_{\text{vt}}.(\exists e)\,\tau(e) \subseteq t \,\&\, P(e)$ type (i(vt,t))
        b. $[\![\text{IP}]\!] = \lambda t \lambda P_{\text{vt}}.(\exists e)\, t \subseteq \tau(e) \,\&\, P(e)$ type (i(vt,t))

For Russian we need a special rule saying that the feature combination [un, upf] normally has to be licensed by the presence of the operators F and PF. The reason for this coercion to a future tense is that the perfective temporal configuration $\tau(e) \subseteq s^*$, where τ gives the time span of the event and s^* denotes the speech time, does not make sense semantically. On the assumption that s^* denotes a minimal interval, it cannot include the event time, cf. (Grønn 2011).

The semantics for IP ignores the imperfective paradox, habituality, the general-factual readings etc. (Grønn 2003) assumes an underspecified semantics for the Russian imperfective and accounts for the different uses by pragmatic means (competition with the perfective, size of the reference time, etc.).

Given these basic ingredients of our theory of aspect, we depict the combined feature checking for tense and aspect in Figure 12, based on (62b) and (64a) above.

$[_{\text{TP}}\, \text{N}\, \lambda_1\, \text{P}(t_1)\, \lambda_2\, [_{\text{AspP}}\, \text{PF}\, (t_2)\, \lambda_3 [_{\text{VP}}\, \text{Vanja s''el arbuz}(e_3)]]]$
   ip   ipf up   upf, up
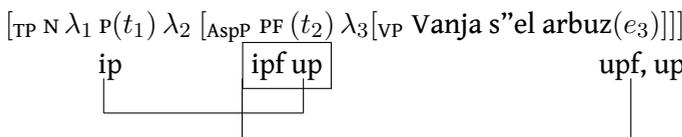
$(\exists e)(\exists t \prec s^*)$ Vanja eats a melon in $e \,\&\, \tau(e) \subseteq t$

FIGURE 12: Combined Feature Checking of Tense and Viewpoint Aspect.

Technically, when we add viewpoint aspect, the verb has only an event variable with aspect features. But, obviously, the verb morphology is also marked with tense, e.g. with past tense. We cannot cash out the agreement patterns directly, and therefore we have to add a stipulation to the system in order for the tense operator to be able to transmit a temporal u-feature via the aspect operator, cf. our use of the rather impressionistic box ⌈ipf up⌉ in Figure 12.

To be a bit more precise, we see that the tense feature [up] is first transmitted to the variable t_2 of PF. Recall that the internal argument of PF is a time. The interpretable aspect feature [ipf] of the perfective operator is not in conflict with the uninterpretable past tense feature [up]. We therefore assume that the latter is transmitted further to the event variable e_3 of the verb. The aspect feature [upf] is transmitted to the same variable. As a result, the event variable carries both a tense and aspect feature, determining the pronunciation as *s"el*. Thus, we assume crucially that features are transmitted through intervening operators – here the aspect operator PF – as long as there is no feature conflict[16], and that a variable may carry several non-conflicting features.

Finally, we would like to mention another simplification in the tense-aspect theory outlined above. Both tenses and aspects are here interpreted in a STATIC framework as INDEFINITE, i.e., as existential quantifiers over times and events, respectively. Nothing in the present paper hinges on this view. We note, however, that this is a simplification. Instead of being quantificational, both tenses and aspects can be either INDEFINITE or DEFINITE.

We believe that one would ultimately need a DYNAMIC theory of tense and aspect, as outlined in for instance (von Stechow 2012). In such a framework, an indefinite tense introduces a NEW temporal variable, while a definite tense is anaphoric to an OLD variable, presupposing its descriptive content, i.e. the temporal relation. The following temporal donkey sentence illustrates the point:

(65)   When a farmer had a donkey, the farmer usually beat the donkey.

The past tense in the antecedent should be an indefinite term (like *a farmer/a donkey*), but the past tense in the consequent should be a definite term (like *the farmer/the donkey*). A paraphrase that illustrates the intended interpretation is this:

(66)   Usually, when a farmer had a donkey at SOME PAST TIME, the farmer beat the donkey at THAT PAST TIME.

The following celebrated example from Čechov illustrates a similar point for Russian aspect:

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[16]   In logical terms, an intervening λ-operator breaks a binding chain. So, there is no semantic binding relation between PAST and the variable e_3.

(67)   V etoj porternoj ja [...] napisal pervoe ljubovnoe pis'mo k Vere. Pisal
        karandašom.
        'In this tavern [...], I wrote (*perfective past*) my first love letter to Vera. I
        wrote (*imperfective past*) it in pencil.'

Both the tense and the aspect in the second sentence (*pisal*) are definite, i.e.,
anaphoric to the indefinite tense/aspect in the first sentence (*napisal*), cf. (Grønn
2003). To implement this we would need a dynamic framework in which discourse
markers for times and events can be either new (indefinite) or old (definite). Tens-
es and aspects will then be purely relational with an indefinite or definite article
on top.

[6] CONCLUSION

Complicated authentic data of adjunct tense in Russian display a great diversity in
temporal configurations, demonstrating the need for a flexible tense theory. The
possibility of having the anaphoric Tpro_i as the temporal centre of the adjunct is
crucial in our theory. We can now account for the data presented above, but the
system overgenerates and must be constrained.

But what are the actual constraints at work in Russian adjunct tense (and as-
pect)? We have suggested that tense licensing is always local in Russian, i.e., there
is always a local tense operator inside the adjunct. Furthermore, there is a pref-
erence (which is difficult to make precise) for morphological tense harmony. In
other words, there is a tendency to avoid tense mismatches between the matrix
and adjunct.

Taken together these factors tend to produce deictic, independent tenses in
the adjunct. But not always. In the paper, we have seen various examples using
Tpro_i as the temporal centre in non-deictic adjuncts. Table 2 sums up the dif-
ferent kinds of forward shifted or backward shifted interpretations encountered
above – bound interpretations either with respect to the matrix or, frequently,
with respect to TPRO.[17]

	RC	*do/posle*	*kogda*
past under fut	blocked	# / blocked	blocked
fut under past	OK	blocked / #	marginally OK
fut under past in intensional contexts	OK	OK / #	OK

TABLE 2: Bound Interpretations in Russian Adjuncts.

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[17]   Table 2 is not exhaustive. In principle, one could also look at, say, backward shifted past readings under a
        future matrix embedded in an intensional context. However, the various analyses provided in this work
        will allow us to make precise predictions about all such marginal configurations.

We can have bound future relative clauses under a past matrix, and we have non-deictic adjuncts under attitudes and modals. Although adjuncts in intensional contexts are mostly bound by the temporal centre (TPRO) of the matrix, and not by the matrix tense itself, we do also find examples of tense dependencies between the adjunct and matrix in embedded contexts.

Thus, an important part of the paper is devoted to the analysis of data that involve both complement tense and adjunct tense. We show that the SOT parameter is relevant for both cases, and, importantly, we provide an analysis which combines the two phenomena in a unified and coherent tense theory.

APPENDIX

A. Complement Tense

Complements of attitude verbs in Russian are analysed as in Figure 13 and Figure 14 on the facing page.

(68)   Vanja dumal, čto Maša spit.
         'Vanja thought that Masha was asleep.' (*literally: sleeps*)
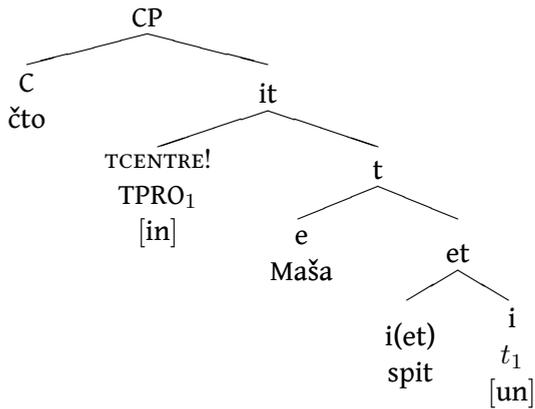
FIGURE 13: Simultaneous Complements in Russian.

(69)   Vanja dumal, čto Maša spala.
   'Vanja thought that Masha had been asleep.' (*literally: slept*)
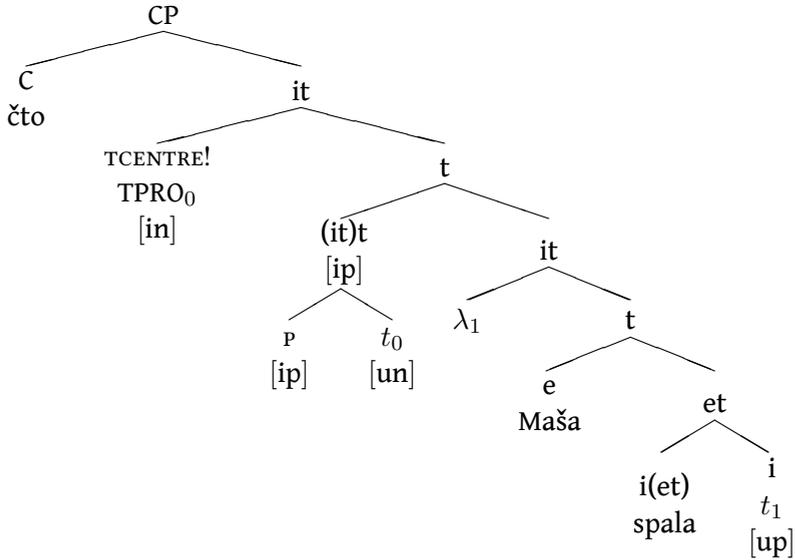
FIGURE 14: Backward Shifted Complements in Russian.

B. Relative Clauses

In Figure 15 we have a relative clause in which the highest tense is the anaphoric $Tpro_i$. If $Tpro_i$ is coindexed with N, we get the deictic interpretation (which can be simultaneous or backward shifted, depending on the context). The other option is to coindex $Tpro_i$ with the reference time of the matrix verb, which results in a backward shifted configuration.
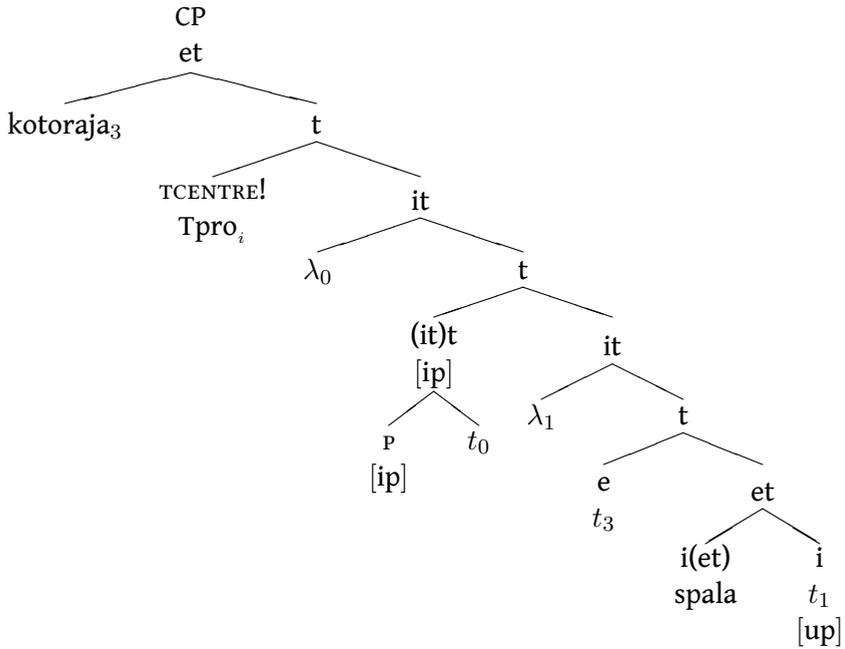
FIGURE 15: Relative Clauses in Russian (= 'who (had) slept').

C. do/posle Adjuncts

PP
reference time of the matrix
i

P′
it

P
i(it)
do / posle

THE EARLIEST time that ...
i

(it,i)
togo

it

... CP ...
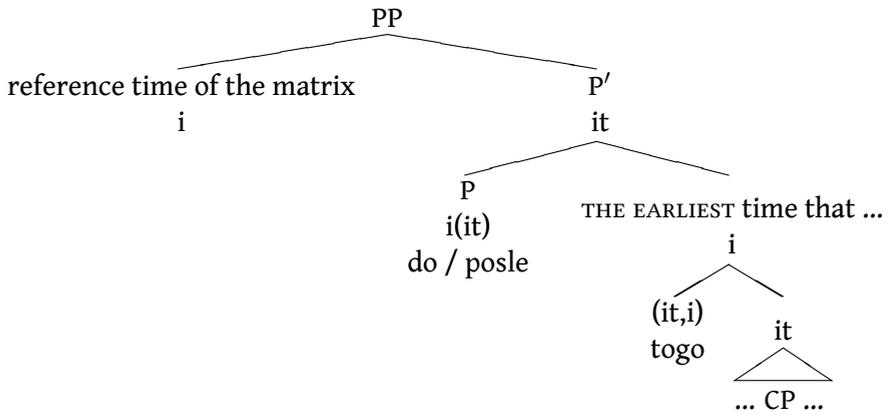
FIGURE 16: do/posle (before/after) THE EARLIEST time that ...
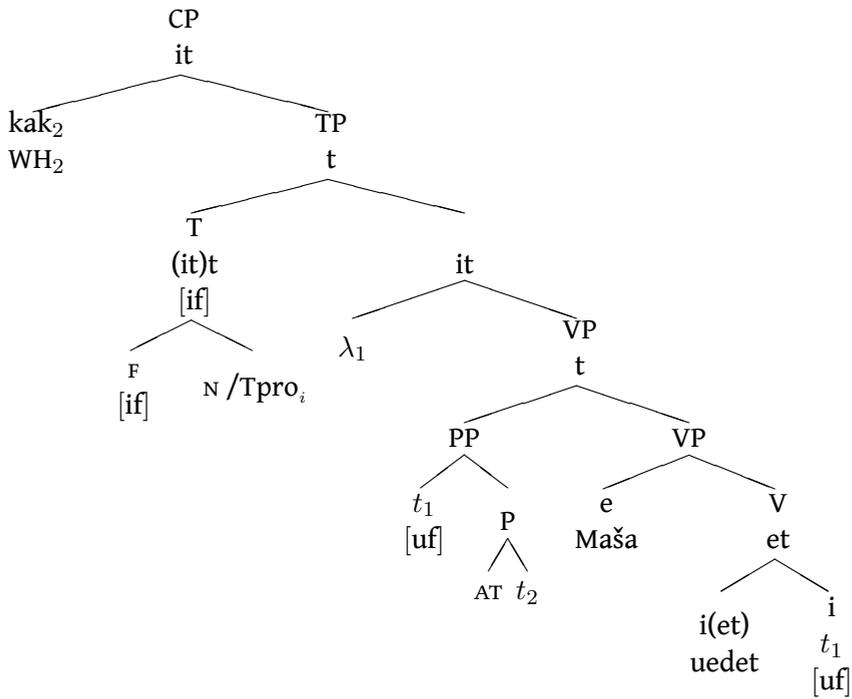
FIGURE 17: Input to THE EARLIEST Operator (*togo*) in Russian Temporal Adjuncts.

D. kogda Adjuncts

(70)   Maša uedet, kogda Dima uedet.
         'Maša will-leave when Dima will-leave.'

$\exists t_2 (t_2 \succ s^*)$ Maša leave(t_2) & $(\exists t_4 \succ s^*)$ Dima leave(t_4) & $t_4 = t_2$
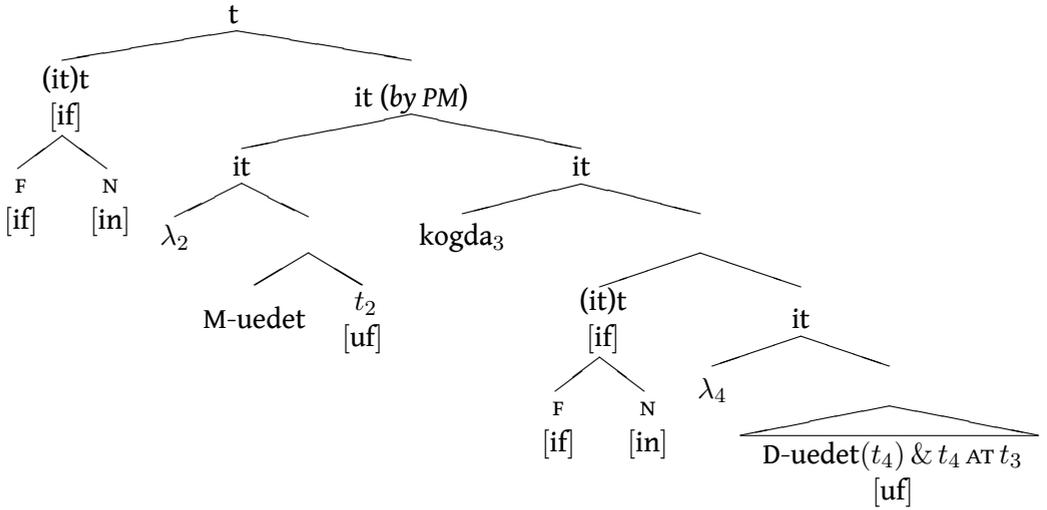

FIGURE 18: Russian *kogda*-clause in a "future under future".

E. Covert Past in RC

Here is our analysis of example (47) (*... will-say father, who will-return already*).

M (matrix verb) = skažet ("will-say")

R (verb in relative clause) = vernetsja ("will-return")
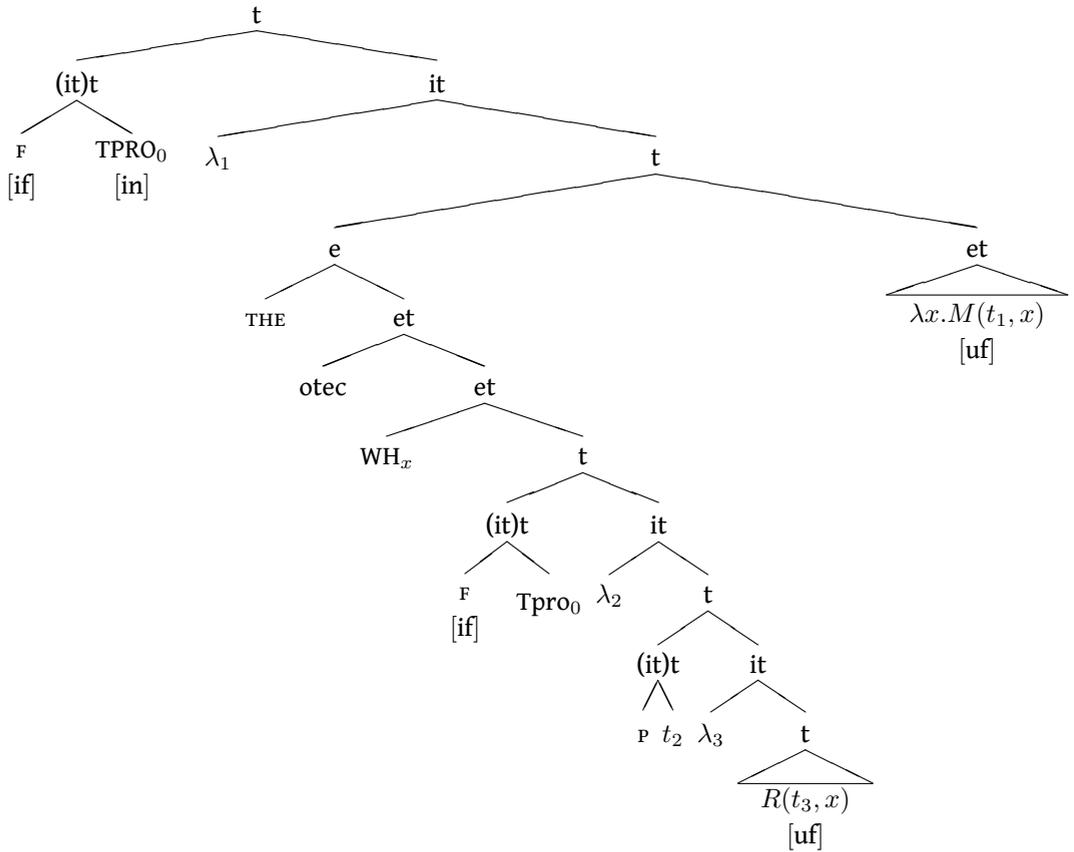
FIGURE 19: Covert Past in Russian RC – "future under future".

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