Complement Tense in Contrast:
The SOT parameter in Russian and English

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ABSTRACT

In an SOT-language like English, ‘past under past’ may have a simultaneous interpretation, i.e., we have temporal agreement. In a non-SOT language like Russian, we only have the shifted interpretation. In English, the temporal morphology of the embedded verb is determined by the matrix tense via a binding chain through verbal quantifiers such as ‘say’ or ‘think’. In Russian, these attitude verbs break the binding chain. The morphology of the embedded verb is determined locally by an embedded relative PRESENT, FUTURE or PAST. We propose that the difference between English and Russian is derived from:

The SOT-parameter

A language L is an SOT-language if and only if the verbal quantifiers of L transmit temporal features.

Verbal quantifiers quantify over times (e.g. fut. will) or world-times (e.g. verba dicendi).

The paper gives a precise formulation of the syntax and semantics of the constructions involved. The essential idea is that temporal features are transmitted via semantic binding; following the SOT-parameter, verbal quantifiers may or may not act as barriers for feature transmission. The main tense of an attitude complement will be a semantically empty PRO.

The paper will take up a recent challenge by Daniel Altschuler and Olga Khomitsevich against existing accounts: verbs of perception and, occasionally, factive verbs in Russian may express simultaneity by ‘past under past’. We will show that the problem is in fact non-existent when the complement is imperfective. Concerning factives, however, we argue that the complement tense is an independent de re past. Finally, perception verbs are normally not verbal quantifiers and hence not subject to the SOT-parameter.

1. INTRODUCTION TO COMPLEMENT TENSE

The role of tense is ubiquitous in natural language, yet many phenomena pertaining to subordinate tense remain to be properly investigated and understood. In this paper we will provide a semantically motivated explanation – the SOT parameter – which is intended to capture the difference between tense agreement and non-agreement languages. In other
words, we explain the distribution of complement tense in sequence-of-tense languages (notably Germanic and Romance languages) and non-sequence-of-tense languages like Russian. The proposal restores the traditional view of Russian as a non-SOT language despite the challenges, notably from factives and perception verbs, recently discussed by Altschuler and Khomitsevich. In future work, we intend to extend the theory to capture adjunct tense, as well.

In this section, we will introduce the SOT parameter and some key notions central to the theory – dependent (vs. independent) tense, verbal quantifiers, and zero (vs. fake) tense. In section 2, we will introduce the basic patterns found in Russian and English complement tense. Our methodology is based on retrieval of authentic data from parallel corpora. Next, in section 3 we give a formal implementation of our theory. Finally, in section 4 we show that Russian “past under past” with imperfective complements and/or matrix factives and perception verbs are compatible with the SOT-parameter.

1.1. The SOT parameter

The contrast in (1) illustrates the difference between sequence of tense found in Germanic languages, and non-sequence of tense characteristic of Russian.

(1)  
(1R) Он сказал, что живет под Москвой (Viktor Pelevin, Pokolenie P)  
(1E) He said he was living just outside Moscow in the village of Rastorguevo  
(1N) Han fortalte at han bodde utenfor Moskva

Tenses express relations between times: backward shift (precedence), simultaneity (overlap), or forward shift (succession). Russian thus apparently represents the most natural form-meaning mapping. The embedded tense in (1R) is a (relative) present tense – expressing simultaneity with the higher past tense of the verbum dicendi. In our feature system, the present tense morphology is licensed by a relative PRESENT operator in complements of attitude verbs in Russian ((Ogihara, 1989), (Kusumoto, 1999), (Schlenker, 1999) (von Stechow, 2003b)). The fact that the feature transmission is done locally in the complement in non-SOT languages gives us the right to claim that morpho-syntax matches
semantics.

In sequence-of-tense languages like English and Norwegian, morphology is not in a one-to-one relation with semantics due to the phenomenon of temporal agreement: the past tense morphology (“was” (Eng.), “bodde” (Nor.)) in the complement in (1E)/(1N) is semantically void and simply agrees with the past tense operator in the matrix. This fact requires syncategorematic rules and cannot be reformulated in a compositional way.

Semantically, temporal agreement only occurs if the agreement tense is not interpreted; cf. the difference between English and Russian as illustrated in figure 1.

Fig.1  a. PAST He said ∅-tense he was living outside Moscow (English)
     |________|_______|_______|
     (non-local agreement)
 b. PAST On skazal chto ∅-tense PRES zhivet pod Moskvoj (Russian)
     |________|________|
     (local agreement)

We adopt a feature theory whose conceptual attractiveness comes from the explicit encoding of every detail in the morpho-syntax and the corresponding dependence on semantic operators. The system gives us a precise formulation of the syntax and semantics of the constructions involved. The basic machinery is the following (more details are given below in section 3.2): Every verb has a temporal argument. The temporal argument is satisfied by a variable coming from the tense morphology with an uninterpretable feature. The interpretation of this variable is determined by a binding relation with a semantic operator (written in capital letters in figure 1) having a corresponding interpretable feature. With complements in SOT-languages we get agreement throughout the c-command domain, with a semantic operator checking several instances of the same uninterpretable feature (a kind of Multiple Agree). In non-SOT languages, the morphology is licensed locally by a corresponding semantic operator.

(Khomitsevich, 2007) adopts a similar framework with feature checking but seeks primarily a syntactic explanation of subordinate tense data. Following (Abusch, 1994), (Schlenker, 1999), (von Stechow, 2003a) among others, we focus on the semantics of the matrix verb in our explanation of the data.
The difference between English and Russian is derived from:

**The SOT-parameter**

A language \( L \) is an SOT-language if and only if the verbal quantifiers of \( L \) transmit temporal features.

In English, the temporal morphology of the embedded verb is determined by the matrix tense via a binding chain through verbal quantifiers such as ‘say’. In Russian, ‘skazat’-‘say’ breaks the binding chain. The morphology of the embedded verb is determined by an embedded relative PRES or PAST.

The SOT-parameter explains the different distribution of subordinate tenses in SOT and non-SOT languages such as the expression of simultaneity in (1) as ‘past under past’ in SOT and ‘present under past’ in non-SOT languages. The SOT-parameter gives the right predictions. For instance, a ‘present under past’ in English cannot have a simultaneous interpretation like in Russian, since the present in the English complement is licensed by feature transmission of the deictic now through the verbal quantifier.

### 1.2. Verbal quantifiers

Verbal quantifiers quantify over times\(^1\) or world-time pairs. In order to avoid temporal paradoxes analysed in (von Stechow, 1981), (Heim, 1994a), (von Stechow, 1995), among others, attitude verbs cannot be simply quantifiers over worlds.

The paradox is illustrated in the following sentence:

(2)    At 5 o’clock Mary thought it was 6 o’clock.

\(^1\) i.e. "there is a time in the future/past …". Formally, these verbs embed a lambda abstract over times.
The sentence is coherent and makes perfect sense although Mary is obviously wrong about the time in the context of (2). However, if the complement is analyzed in the Hintikka-style as a proposition (set of worlds) we end up attributing the absurd belief to Mary that “5 o’clock = 6 o’clock”.

The solution is to let attitudes quantify over worlds and times (and individuals, neglected here). Hence the complements must be properties of time, whose highest semantic tense is a “zero tense” (a temporal abstract) cf. (Kratzer, 1998). Our semantics for attitude predicates follows the insights of (Lewis, 1979):

\[
\begin{align*}
(3) \quad \text{believe}, \text{ type } (s(it))(i,et) \\
F(\text{believe}) &= \lambda w.\lambda s(it).\lambda t.\lambda y.((\forall w')((w',t') \text{ is compatible with everything } y \\
& \quad \text{believes of } (w,t) \text{ in } w \text{ at time } t \rightarrow p(w')(t'))
\end{align*}
\]

In order to understand complement tense under attitudes, it must be stressed that the semantics of attitudes gives us an abstraction over the highest tense in the complement. Since tenses express relations, this has the following consequence for an embedded semantic tense: When we have a semantic past under a verbal quantifier, i.e. in the complement, it is not the “past variable” \( t \) that is bound, but the present variable \( t0 \) to which this variable is related through the relation \( t < t0 \). This subtle fact is a permanent source of confusion.

We will not try to give an exhaustive list of verbal quantifiers in natural language\(^2\), but we will make one demarcation in the next subsection.

1.3. Zero tense vs. fake tense

Consider the following sentence\(^3\):

\(^2\) The future auxiliaries “will/would” (Eng.) and “budet” (Rus.) as well as the mirror operator – the perfect auxiliary “have” (Eng.) – are quantifiers over times, hence verbal quantifiers in our understanding.

\(^3\) D = Dutch, E = English, F = French, G = German, N = Norwegian, R = Russian.
(4)

(4E) Tony thought it was time the Queen sat down. (Townsend, “The Queen and I”, 1992)

(4N) Tony syntes\textsuperscript{PAST} det kunne\textsuperscript{PAST,MODAL} være\textsuperscript{INF} på tide at dronningen satte\textsuperscript{PAST} seg.

(Heyerdahl Larsen, “Dronninga og jeg”, 1993)

(4D) Tony dachte\textsuperscript{PAST} dat het tijd werd\textsuperscript{PAST} dat de koningin ging\textsuperscript{PAST} zitten\textsuperscript{INF}.

(Fransse, “De koningin en ik”, 1992)

Semantically the English sentence has only one semantic past operator, the one associated with the highest verb “thought”, despite the presence of two more past tense forms: the embedded “it was time”, which in turn embeds “sat”. Apparently, the past tense morphology is semantically empty and simply agrees with the highest operator. Other sequence of tense languages like Norwegian and Dutch display similar patterns.

However, the deepest embedded past tense verb forms “sat” (4E), “satte” (4N), and “ging zitten” (= “went to sit down”) (4D) are not in the complement of an attitude verb or verbal quantifier, hence not zero tenses in our understanding. The difference between the two complements comes about when we change the higher verb into present tense:

(4E’) Tony thinks it is (#was) time …

(4E’’) It is time the Queen sat down.

The difference in grammaticality of past tense under a present tense matrix suggests that we are dealing with two separate phenomena. In (4E), “was” is semantically a zero tense embedded under “thought” (i.e. the tense morphology of “was” does not have any meaning). On the other hand, “sat” in (4E) is a so-called “fake tense” (Iatridou, 2000). It does not have the normal temporal feature, but points to a subjunctive interpretation – here in a bouletic (wish) context. Hence, the past tense of “sat” is not in an agreement relation with “thought” but agrees with the implicit “wish” in the expression “it is time”. That this interpretation is correct is also supported by the German translation, where the translator has chosen an explicit modal with an infinitive complement to express Tony’s wish:
(4G) Tony fand^PAST, die Königin solle^SUBJ,MODAL sich setzen^INF.
(Reitz & Wulfekamp, “Die Queen und ich”, 1993)

Clearly, we must look carefully at the semantics of the matrix in order to properly analyze the tense configuration in the complement. The example in (4E) shows that there is no 1-to-1 correspondence between semantic features and morphology. The same morphology may encode different semantic features.\(^4\) For the purposes of this study we will rely on an intuitive and informal distinction between zero tense and fake tense exemplified above. Verbal quantifiers which transmit their mood features as fake tense morphology (e.g. the counterfactual operator “would”) are not relevant for the SOT parameter.

### 1.4. Dependent vs. independent tense

The SOT parameter applies to dependencies between matrix and subordinate tenses. Obviously, tense in subordinate clauses often has a different status from matrix tense, since the former can be dependent on the latter. SOT languages thus provide nice evidence that tenses cannot always be operators, but may be temporal pronouns (cf. (Partee, 1973) who proposed in a classic paper to treat tenses in general as pronouns – deictic or anaphoric).

The distinction between independent (deictic) and dependent tense is crucial in our survey. When we consider complex data from subordinate tense, we should keep in mind the possibility of the lower complement tense being independent of the higher matrix. In such cases, the morphology of the subordinate tense is licensed by the speaker’s deictic now\(^*\) in the utterance situation or by a de re past, and the SOT parameter does not directly apply to the construction.

The difference between dependent and independent tense is illustrated below:

\(^4\) The opposite is also true: the same semantic feature may be encoded by different morphological means even in one single language. To give an example: the German past form war ‘was’ and the present perfect form bin gewesen ‘have been’ mean the same.
The embedded present in the Norwegian original and French translation requires an independent interpretation: the complement reports a universal truth which was true at the time of the ancient Romans and remains true for the author at the moment of writing – a kind of “double access” interpretation. Arguably, we have an independent de re extended now* in the complement (Abusch, 1997a). For SOT languages like Norwegian and French, a dependent interpretation in (5N)/(5F) would have required tense agreement, hence past tense morphology both in the matrix and complement. This tense agreement is precisely what we find in the English translation.

Concerning the Russian translation, we cannot distinguish between a dependent and independent (“double access”) reading. The surface syntax in (5R) matches the Norwegian original, but since Russian is not tense agreement language, the present tense in the Russian complement remains indistinguishable between a relative present (a simultaneous interpretation dependent on the matrix) and an independent present.

2. COMPLEMENT TENSE IN PARALLEL AND CONTRAST

The examples5 in our study are taken from two searchable parallel corpora developed at the

5 Due to limitations of space, glossing is reduced to a minimum in the examples. AUX = auxiliary, COND = conditional mood, FUT = future tense, IMPF = imperfective aspect, INF = infinitive, PART = participle, PF = perfective aspect, PRES = present tense, REL.PRON =
University of Oslo – the Oslo Multilingual Corpora (OMC) and the RuN corpus, as well as the English-Russian and German-Russian parallel corpora provided by the Russian National Corpus. The first item listed in the examples is the original text – typically a Norwegian or Russian fiction text – then follow translations made by professional translators. Our main focus will be on Russian and English, but we will occasionally also comment on examples from other languages, notably Norwegian, German and French.

2.1. Simultaneous interpretation under past attitudes

The simultaneous interpretation under past attitudes is expressed by a “past under past” (past\past) configuration in SOT languages and “present under past” (present\past) in non-SOT-languages.

(6)

(6N) De sa at Hanna var Stines unge (Herbjørg Wassmo, Dina's bok)
(6E) They said Hanna was Stine's child
(6G) Die Leute sagten, daß Hanna Stines Kind war
(6F) On disait que Hanna appartenait à Stine.
(6R) Все говорили, что Ханна — дочь Стина.

SOT languages include Germanic languages (English, German, and Norwegian) and Romance languages (French). The present tense in the complement of the Russian sentence (6) is a zero copula.

Fig.2 a. PAST They said Ø-tense Hanna was Stine’s child (English)

relative pronoun, SUBJ = subjunctive, SUBJ.PART = subjunctive particle.
The intensional nature of attitude verbs shows up in German, in which the embedded complement can display different versions of the subjunctive, instead of the expected past\past.\textsuperscript{6} Accordingly, German attitude verbs must have a feature like SUBJUNCTIVE, which is transmitted to the complement verb. In (7G), the subjunctive present is used in German:

(7)

(7N) Han sa at han ikke kjente noen ting. (Nikolaj Frobenius, Latours katalog)
(7E) He [...] said he couldn't feel anything.
(7G) Er sagte, er spüre nichts.
(7F) Il m'a dit qu'il ne sentait rien.
(7R) Он сказал, что ничего не чувствует.

If the matrix tense is expressed by a present perfect in an SOT language, we expect to find a present tense in the complement – in agreement with the present auxiliary of the matrix. This pattern is found in the Norwegian translation (8N) – present\present\_perfect – which contrasts with the English (8E) past\past.

(8)

(8R) Ты не сказал, что любишь меня ... (Ulitskaja, Medeja i ee deti)
(8E) You didn't say you loved me.
(8N) Du har ikke sagt at du er glad i meg …

The translator’s choice of lexical aspect (Aktionsarten) or grammatical aspect can influence the tense configuration, blurring the distinction between SOT and non-SOT, as witnessed by the following example:

\textsuperscript{6} Short for "past under past".
The Norwegian original in (9N) displays past\past with a stative complement verb “bebo”. The German translation follows this pattern, but the English translation makes use of the inchoative VP “take up residence”, which excludes a simultaneous interpretation with the matrix. Hence, the English construction requires the addition of a second layer of past tense: the past tense suffix of “had” is empty and agrees with the matrix past, while the perfect operator – the lexical content of “have” – expresses the required tense transposition by converting the VP into a stative. This gives the wanted result: The resultant state of the VP “take up residence” is simultaneous with the matrix event. Note that also the Russian translator has chosen an inchoative perfective verb, which requires tense transposition and a past\past in Russian.

Due to cases like (9), the literature on SOT has mostly been concerned with embeddings of stative and imperfective complements, where the opposition SOT vs. non-SOT is apparently more transparent in cases of simultaneous interpretations: past\past vs. pres\past. However, in section 4 we will address data in Russian which complicate this picture, e.g. with factive matrix verbs.

Below we give some examples with factives that correspond to the “expected” pattern for non-SOT languages, i.e. pres\past with a simultaneous interpretation. Note that the distinction between factives and other verbs of attitudes such as verbs of speech can be quite subtle. In the context of (10) below, the factive verb “learn” means “be told” (+ a factive presupposition):

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7 But see some examples below. In some cases a simple past\past construction in Germanic can have a backward shifted interpretation.

8 See section 4 and our analysis of these cases.
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(10)

(10N) Latour lærte at det var udannet å drikke suppe fra (Nikolaj Frobenius, Latours katalog)
(10E) Latour learnt that it was unseemly to drink soup from the bowl
(10G) Latour lernte, daß es ungezogen war, Suppe aus der Schale zu schlürfen
(10F) Ainsi Latour put-il apprendre que c'était manquer au bon usage que de boire la soupe à l'assiette
(10R) Латур узнал, что неприлично пить суп из миски

(11)

(11N) Han visste at hun sto der. (Herbjørg Wassmo, Dina's bok)
(11E) He knew she was standing there.
(11G) Er wußte, daß sie dort stand
(11F) Il savait qu'elle était là
(11R) Он знал, что она стоит у окна.

(12)

(12N) Mor Karen gjennomskuet at ferdighetene ikke var så overvettes i tysk
(12E) Mother Karen discovered that his proficiency in German and French was quite limited.
(12G) Mutter Karen durchschaute, daß die Fertigkeiten in Deutsch und Französisch nicht überwältigend waren.
(12F) Mère Karen s'était bien rendu compte que ses connaissances en allemand et en français n'étaient pas excessives.
(12R) Матушка Карен быстро раскусила, что его познания во французском и немецком оставляют желать лучшего.
(13N) Mor Karen forsto at Dina neppe kunne oppøves i filosofiske diskusjoner
(Herbjørgh Wassmo, Dina's bok)
(13E) Mother Karen sensed that philosophical discussions or theological topics were not the way to train Dina.
(13G) Mutter Karen begriff, daß Dina für philosophische Diskussionen und theologische Themen wenig Verständnis hatte.
(13F) Mère Karen compri qu'on pouvait difficilement entraîner Dina dans des discussions philosophiques ou théologiques.
(13R) Матушка Карен поняла, что Дина вряд ли может подняться до философских дискуссий или богословских бесед.

(14)
(14N) Mor Karen innså at Jacob måtte til kyndig behandling (Herbjørgh Wassmo, Dina's bok)
(14E) Mother Karen realized that Jacob required expert treatment.
(14G) Mutter Karen kam zu der Einsicht, daß Jacob eine sachgemäße Behandlung brauchte.
(14F) Mère Karen se rendit compte que Jacob demandait des soins qualifiés.
(14R) Матушка Карен понимала, что Иакову требуется умелая помощь.

(15)
(15R) Медея поняла, что ему очень хочется пойти с ней в этот самый "Кавказ".
(Ulitskaya, Medeya i ee deti)
(15E) Medea understood that he really was very keen to take her to this restaurant of his.
(15N) Medea forsto at han hadde veldig lyst til å gå på dette "Kaukasus"-stedet sammen med henne.

2.2. \textit{Forward shifted interpretation under past attitudes}

A forward shifted interpretation may require the insertion of a covert future operator at LF in SOT languages.

(16)
(16E) I asked what time the attack was to be and they said as soon as it was dark.
(Ernest Hemingway. A Farewell to Arms)
(16R) Я спросил, в котором часу начнется атака, и мне сказали, что как только совсем стемнеет.
The covert future operator does not break the checking relation, as we see in figure 3:

Fig.3  

a. PAST they said Ø-tense as soon as it FUT was dark (English)  

|___________|______|_______________| (non-local agreement)

b. PAST skazali chto Ø-tense kak tol'ko PRES FUT stemneet (Russian)  

|_________| |____________|__________| (local agreement)

We have not depicted viewpoint aspect in figure 3, but a full analysis requires two PF operators in 3b, one in the matrix and one in the complement. Perfective verbs with present tense morphology like “stremneet – becomes dark” receives a future (and perfective) interpretation. The combination PF(N) – perfective and present – is semantically inconsistent. Accordingly, a FUTURE operator is obligatorily inserted and we get the feature combination PRES + FUT + PF for “stemneet” above, where the relative PRES checks the tense morpheme “t” across FUT, while PF checks the perfective prefix “s”. Thus, a semantic relative present and not the covert FUT – which is not a verb or verbal quantifier – licences the verbal morphology.9

In example (17), the forward shifted meaning is explicitly conveyed by a modal or periphrastic construction in the complement of the SOT languages. The Russian (17R) displays the familiar pf_fut\past:

(17)

9 Note that this analysis of the synthetic Russian “perfective future” is different from our treatment of the periphrastic future in English and Russian inasmuch as “will” and “budet” are verbal quantifiers, hence subject to the SOT parameter. The English auxiliary “have” is a verbal quantifier as well.
Verbs of control like "promise" and "convince" have a relative future in the complement:

(18)

(18R) Договорились о встрече через неделю, Сергей обещал, что к этому времени будет готов сценарий ролика (Viktor Pelevin, Pokolenie P)

(18E) They agreed to meet again in a week's time; Sergei promised the scenario for the video would be ready by then.

(18N) De avtalte å møtes om en uke. Sergej lovte at scenarioet til videoklippet skulle være ferdig til den tid

(19)

(19R) Дядя пообещал ему, что в самое ближайшее время его посадят в тюрьму (Ulitskaya, Medeya i ee deti)

(19E) His uncle assured him that he would land himself in jail in the very near future

(19N) Onkelen lovte ham at han nokså snart skulle sørge for å få ham i fengsel.

With a non-finite complement, as the Russian (20R), the relative future is covert:

(20)

(20N) Hun overbeviste Goupils om at de burde sette ned rentene (Nikolaj Frobenius, Latours katalog)
(20E) She persuaded Goupils that they should lower their interest rates  
(20G) Sie überredete Goupils, die Zinsen herabzusetzen  
(20F) Elle persuada Goupil qu'ils devaient abaisser leurs taux d'intérêt  
(20R) Она убедила Гупил снизить проценты

Forward shifted interpretations under factives are always encoded with fut\textsuperscript{past} in Russian:

(21)

(21N) Jacob skjønte at hun kom til å dra alene om han ikke føyde henne (Herbjørg Wassmo, Dina's bok)  
(21E) Jacob realized she would go alone if he did not accompany her.  
(21G) Jacob begriff, daß sie allein hinfahren würde, wenn er sich nicht fügte.  
(21F) Jacob comprit qu'elle était capable d'y aller seule s'il ne se pliait pas à sa volonté.  
(21R) Иаков понял, что она поедет одна, если он ей не уступит.

2.3. \textit{Backward shifted interpretation under past attitudes}

In Russian, past\textsuperscript{past} is expected to have the shifted reading, meaning that the time of the complement precedes the matrix. In SOT languages, where past\textsuperscript{past} typically produces a simultaneous interpretation, the backward shifted interpretation is normally conveyed through tense transposition using a past perfect in the complement:

(22)

(22R) Ona […] sprosila\textsuperscript{PAST,PF}, spal\textsuperscript{PAST,IMPF} li on. (Tolstoy, “Anna Karenina”, 1877)  
(22E) She […] asked him if he had slept. (Garnett, “Anna Karenin”, 1901)  
(22N) Hun […] spurte\textsuperscript{PAST} om han hadde\textsuperscript{PAST,AUX} sovet\textsuperscript{PAST,PART}. (Egeberg, “Anna Karenina”, 1974)
The English auxiliary “had” is a verbal quantifier.\textsuperscript{10} It has the same semantics as the PAST operator. Its morphology is checked by the higher PAST associated with the matrix. The semantic precedence relation in the SOT languages thus comes from the perfect operator in (22E) and (22N).

In non-SOT languages like Russian, the past tense morphology in the complement points to a local semantic past operator. Recall from our informal discussion above that tenses express relations and that the highest tense under the attitude is a zero tense, bound by lambda abstraction. Thus, when we have a semantic PAST under a verbal quantifier as in (22R), it is not the “past variable” that is bound, but the “present variable” to which this variable is related.

The same patterns as in (22) occur frequently in the parallel corpora. Example (23) below is similar, except for an aspectual difference in Russian: In (23R), the matrix is imperfective and the complement is perfective, while in (22R) the matrix was perfective and the complement imperfective. In the examples under discussion, this aspectual distinction does not seem to make any difference for the temporal ordering of the events – in both cases the complement event/state precedes the matrix event/state (but see section 4.000 below on the role of aspect in Russian non-SOT configurations).

(23)

\textsuperscript{10} The present form “has” has a special semantics. It expresses the “extended now”; cf. (Dowty, 1979), chap. 7.
Here are some examples with factive attitude verbs and backward shift:

(24)
(24N) Men de visste at han endelig hadde tatt sin avslutningseksamen. (Herbjørg Wassmo, Dina's bok)
(24E) But they knew he had taken his final examinations at last.
(24G) Aber sie wußten, daß er endlich sein Abschlußexamen gemacht hatte.
(24F) Mais on savait qu’il avait enfin passé ses derniers examens.
(24R) Но родные знали, что он сдал свой последний экзамен.

(25)
(25N) Han visste at han hadde vært den betydeligste i redningsarbeidet (Herbjørg Wassmo, Dina's bok)
(25E) He knew he had done more than anyone else to save the barn.
(25G) Er wußte, daß er bei den Rettungsarbeiten der Wichtigste gewesen war.
(25F) Il savait qu’il avait eu le rôle le plus important dans la lutte contre le feu.
(25R) Он знал, что на пожаре играл самую важную роль.

While past\past typically has a simultaneous interpretation in SOT languages, the context can also license a shifted interpretation similar to the Russian past\past construction. This is illustrated in the English translation in (26E) with a simple past\past – in contrast to the Norwegian past perfect and the expected tense transposition in (26N). In the latter case, the past tense morphology on the auxiliary “hadd” is semantically void, the anteriority being conveyed by the perfect operator lexically expressed by the auxiliary (“ha” – “have”):

(26)
(26R) Varen’ka skazala\(^{\text{PAST,PF}}\), chto Anna Pavlovna prisylala\(^{\text{PAST,IMPF}}\) skazat\(^{\text{INF,PF}}\), chto vy ne poedete\(^{\text{FUT,PF}}\). (Tolstoy, “Anna Karenina”, 1877)

(26E) Varenka said that Anna Pavlovna sent word you were not going. (Garnett, “Anna Karenin”, 1901)

(26N) Varenka sa\(^{\text{PAST}}\) and Anna Pavlovna hadde\(^{\text{PAST,AUX}}\) sendt\(^{\text{PAST,PARF}}\) bud at det ikke ble\(^{\text{PAST}}\) noe av turen. (Egeberg, “Anna Karenina”, 1974)

The Russian original in (26R) is particularly interesting. We have two verba dicendi – the first embeds a relative past and the second a relative future. As expected for a non-SOT language, the relative future is expressed with a perfective future. On the other hand, surprisingly, the relative past is expressed with an imperfective past, “prisylala\(^{\text{PAST,IMPF}}\)” (“sent”), instead of the perfective aspect. This peculiar use of the imperfective with a “perfective” complete event interpretation – the so-called konstatacija fakta (“the general-factual imperfective”) – is quite common in Russian and was treated extensively in (Grønn 2003), see also Altschuler (this volume).

2.4. Simultaneous interpretation under future attitudes

We ignore data with present tense matrix since the dependent/independent distinction is typically blurred in this environment. On the other hand, configurations with a future matrix attitude verb are expected to comply with the SOT-parameter. We observe pres\:\\ fut both in English and Russian:

(27)

(27E) Hanging around like this, people will think you're up to something. (Joanne Kathleen Rowling, Harry Potter and the Sorcerer's Stone)

(27R) Если вы будете расхаживать с таинственным видом, то все подумают, что вы опять что-то затеваете.

Fig. 5 a. N people will think \(\varnothing\)-tense you’re up to something (English)

\[
\begin{array}{c|c|c|c|c|c|}
\hline
& & & & & \\
\hline
\end{array}
\]

(non-local agreement)

b. FUT vse podumajut chto \(\varnothing\)-tense PRES vy opjat’ chto-to zatevaete (Russian)

\[
\begin{array}{c|c|c|c|c|c|}
\hline
& & & & & \\
\hline
\end{array}
\]

(local agreement)
Despite the apparent similarities between (27E) and (27R), the SOT-parameter forces different LFs for the two languages. This is depicted in figure 5. In English, both “will” and “think” are verbal quantifiers which transmit the feature N from the deictic utterance situation. In Russian, the checking relation is broken by the verbal quantifier “дума́ть/think”, hence a relative PRESENT must be inserted in the complement to license the present tense morphology of “зата́ваете – be up to something”.

Many examples of English and Russian in the parallel corpora display a similar pattern as in (27), i.e. pres\fut. However, the context typically suggests an independent (deictic) interpretation of the complement, hence the data are not directly related to the SOT-parameter. An example of independent complement tense is given in (28).

(28)

(28R) Мне не веришь, спроси стариков; каждый тебе скажет, что рыба теперь совсем не та, что была. (Антон Павлович Чехов. Свирель)
(28E) If you don't believe me ask the old people; every old man will tell you that the fish are not at all what they used to be.

2.5. **Forward Shifted interpretation under future attitudes**

With a forward shifted interpretation under a future matrix we expect to find an additional FUTURE operator in the complement. The pattern is illustrated in two examples below:

(29)

(29E) ’Well,’ said the gipsy, ’I'll tell you what I will do. (Kenneth Grahame. The Wind in the Willows)
(29R) Ладно, сказал цыган, я тебе скажу, что я сделаю.

(30)
(30E) I am going to reply to Mark Darcy's invitation and say quite clearly and firmly that I will be unable to attend. (Helen Fielding. Bridget Jones's Diary)

(30R) Сейчас отвечу на приглашение Марка Дарси и вежливо, но твердо заявлю, что прийти не смогу.

2.6. Backward shifted interpretation under future attitudes

The backward shifted interpretation is highly frequent in the parallel corpora. As expected, Russian expresses the relative past with past tense morphology: past\fut. In SOT languages of the Germanic type we typically find present\_perf\_fut in this environment:

(31)

(31E) "When I have caught forty fish," said he, "then I will tell people that I have caught fifty, and so on. (Jerome K. Jerome. Three Men in a Boat (To Say Nothing Of The Dog))

(31R) “Когда я поймаю сорок штук”, говорил он, “я буду всем рассказывать, что поймал пятьдесят, и так далее.

Fig. 6

<table>
<thead>
<tr>
<th>a. N I will tell people that Ø-tense I have caught fifty (English)</th>
<th>(non-local agreement)</th>
</tr>
</thead>
<tbody>
<tr>
<td>______</td>
<td>____________</td>
</tr>
<tr>
<td>b. N ja budu vsem rasskazyvat' chto Ø-tense PAST pojmal 50 (Russian)</td>
<td>(local agreement)</td>
</tr>
<tr>
<td>______</td>
<td>____________</td>
</tr>
</tbody>
</table>

The pres\_perf\_fut competes with the past\_fut in SOT languages, as witnessed by (32N) vs. (32E):

(32)

(32R) Я скажу им, что просто на ночлег зашел (Ulitskaya, Medeja i ee deti)

(32E) I'll tell them I just came in to find a room for the night, no more than that.

(32N) Jeg skal si til de typene at jeg ganske enkelt har tinget meg nattelosji her.

The analysis of the pres\_perf\_fut in (32N) is straightforward – the present tense auxiliary in the complement gets its morphology from the deictic N in the matrix through the verbal
quantifiers “skal – will” and “si – say”. The English past\fut shows that we must allow for the insertion of a relative PAST in the complement also in SOT languages (importantly, a relative PRES like in Russian cannot be inserted in the same environment in English).

Constructions like the past\fut or pres\perf\fut are ambiguous between a dependent and independent (deictic) interpretation of the complement. A dependent interpretation amounts to the precedence relation “complement tense < matrix tense”. However, the context may pragmatically strengthen the interpretation further to the precedence relation “complement tense < utterance time”, an independent reading which is presumably what we have below:

(33)

(33E) Everybody will swear you've never taken a drink. (Ernest Hemingway. A Farewell to Arms)

(33R) Все присягнут, что вы никогда капли в рот не брали.

3. ANALYSIS

The data in section 2 convincingly show:

• English is a clear SOT language – simultaneity under attitudes is expressed by temporal agreement.
• Russian is a non-SOT language – simultaneity under attitudes is expressed by the present.

We will now present the details of a formal analysis. We also refer the reader to (von Stechow, 2008) for an introduction to tense semantics and feature theory.

3.1. Temporal structure of simple sentences

Our LFs are expressions of an intensional λ-language, which is based on the types e (individuals), i (times), v (events), t (truth-values), s (world histories). “Intensional” means that expressions of type a express meanings of type (sa), i.e., a-intensions. For details see
the appendix.

(34)  
  a. John called.
  b. Mary is happy.

(35)  
  Tenses
  a. Present, type i: \( F(N) = \lambda w.s^* \).
  b. Past, type \( i(it,t) \): \( F(P) = \lambda w.\lambda t.\lambda P_{it}.(\exists t')[t' < t \& P(t')] \) (Heim, 1997)

\( s^* \) is the speech time. Thus the semantic present simply denotes the speech time. \( P \) is an indefinite relative tense.\(^{11} \) The argument of \( P \) is always \( N \) in matrix clauses. In subordinate clauses, \( P \) can have a time variable \( t \) as argument that is bound by a higher tense or locally bound by a \( \lambda \)-operator.

\( (36) \)  
  a. \( F(\text{John}_e) = \lambda w.\text{John} \)
  b. \( F(\text{called}_{(et)}) = \lambda w.\lambda t.\lambda x. x \text{ calls in } w \text{ at } t. \text{ feature: } uP \)
  c. \( F(\text{happy}_{(et)}) = \lambda w.\lambda t.\lambda x. x \text{ is happy in } w \text{ at } t. \text{ no tense feature} \)

The time argument is the first by convention. Like \textit{happy}, \textit{called} has a tenseless semantics! The morphology of the latter is checked by a semantic tense.

At deep structure (DS) the time argument is filled by the semantically empty pronoun PRO, which is moved for type reasons at LF (PRO-theory of (Heim and Kratzer, 1998), 226-28). PRO-movement is an essential ingredient for the construction of binding chains for feature transmission.

\( (37) \)  
  Derivation of (34a)
  \( \) 
  DS: \([TP \ [TP[N] \ [VP \text{ John [called PRO]]}\]
  \) 
  PRO-movement (with subsequent PRO deletion)
  LF: \( N \lambda_0 \ [TP \ [TP[P \ t_0] \ PRO \lambda_1 \ [VP \text{ John [called } t_1]]\]
  \) = \( \lambda w.(\exists t < s^*) \text{ John calls in } w \text{ at } t \)

\( (38) \)  
  The temporal auxiliary \textit{be}: type \( i(it,t) \)

\(^{11} \) For the Partee Problem, see (von Stechow, 2008).
The copula does not break the binding chain – it acts as a verbalizer by converting an adjective into a verb. Note that the copula doesn’t count as a verbal quantifier and as such it is orthogonal to the system we are developing in this paper. This also means that the copula both in English and Russian always transmits temporal features.

The perfect temporal auxiliary ‘have’ is a verbal quantifier, which has the same meaning as the semantic past. But as a verb it has its own morphology, which has to be licensed by a semantic tense. (The Extended Now meaning for have-pres is ignored below).

The future auxiliary will is the mirror image of have:

\[ F(is) = \lambda w \lambda t. \lambda P_{it}. P(t) \quad \text{feature: uN} \]

\[ \lambda w. \lambda t. \lambda P_{it}. (\exists t')[ t' < t \land P(t') ] \]

\[ \lambda w. (\exists t')[ t_1 < s^* \land (\exists t_2 < t_1)[John calls in w at t_2]] \]

\[ \lambda w. \lambda t. \lambda P_{it}. (\exists t')[ t > t \land P(t') ] \]

\[ \lambda w. (\exists t')[ t_1 > s^* \land (\exists t_2 > t_1)[John calls in w at t_2]] \]

The temporal auxiliary would has the same meaning but the feature uP.
John will call.

\[ N [\lambda_1 ([\text{will } t_1][\lambda_2 [\text{John } [\text{call } t_2]]])] \]

\[ = \lambda w. (\exists t') [t' > s^* \& \text{John calls at } t'] \]

Russian \textit{budet} “will” has the same semantics as Engl. \textit{will}, it has the feature uN. In addition it has the feature iIP (interpretable Imperfective) because the embedded infinitive is always in the imperfective. The feature iIP has no impact on the interpretation of \textit{budet} itself but is transmitted to the IP-operator as uIP. The IP-operator will have its own feature iIP; see section 4.1. So the assumption that \textit{budet} has the feature iIP merely serves the purpose to implement aspect selection.

3.2. Feature Theory: Temporal agreement

Following (Chomsky, 1995, Zeijlstra, 2004), among others, we assume the following theory of features: There are two sorts of features, interpretable ones [iF] and uninterpretable ones [uF]. Interpretable features check uninterpretable features.

In English, finite verb forms have uninterpretable temporal features. Present forms of a verb have the feature [uN] “uninterpretable Present/Now”. The semantic Present N has the feature [iN] “interpretable Present/Now”. Past forms of a verb have the feature [uP] “uninterpretable Past”. The semantic Past tense P has the feature [iP].

Some verb forms with spell out:

Present: \textit{call/calls} [uN]
Past: \textit{called} [uP]
Past Participle: \textit{called} (no inherent temporal feature)
Infinitive: \textit{call} (no inherent temporal feature)

Meaning of all these: \( \lambda w. \lambda t. \lambda x. x \) calls in \( w \) at time \( t \)

Feature transmission under semantic binding.
A semantic tense \( P \) or \( N \) transmits a feature \([uP]/[uN]\) to the time variable it binds. If the variable is an argument of a tensed verb form, the feature has to agree with the tense feature of the verb, i.e. with the verbal morphology.

(Heim, 1994b), (Heim, 2005).

We assume the conventions for semantic binding outlined in (Heim and Kratzer, 1998). In particular, a phrase or operator \( \alpha \) may bind a variable via a \( \lambda \)-operator. In addition to QR, \( \lambda \)-abstracts are created by PRO- and WH-movement. As said before, our theory makes crucial use of PRO-movement, as we see by comparing the deep structure (DS) and logical form (LF) of the toy sentence below:

(46) Mary called. (DS) (not interpretable)

![Diagram of DS](image)

(47) Percolation of tense features

a. Features percolate along the head line.

b. The feature of a temporal variable either agrees with the inherent feature of the head or it is transmitted to the head (and percolates to the phrase).

Since the semantic Past is the head of the semantic tense \([P N]\), the feature \([iP]\) percolates to the phrase \([P N]\).

(48) The LF (interpretable)
The LF is created by PRO-movement: PRO is semantically void and has to be moved for type reasons. Assuming Heim & Kratzer’s QR conventions, PRO leaves the variable t₁ in situ. The movement index of PRO is interpreted as the λ-operator. Given that PRO is semantically empty, it is deleted at LF by Chomsky’s principle of Full Interpretation. (Our trees don’t represent the deletion.) Thus PRO₁ can be read as λ. Note that the transmission mechanism sends the feature iP of the semantic past P to the bound variable t₁. Here the feature locally agrees with the inherent temporal feature uP of called. Non-finite forms have a temporal feature on their variable as well, but since they don’t have inherent temporal morphology, we don’t need the features for licensing the morphology. But we may need them for feature transmission to further embedded tenses.

3.3. Tense under Attitudes

Attitudes are verbal quantifiers and quantify over worlds and times (and individuals, neglected here). We repeat the semantics here:

\[(49) \text{ Quantifier over worlds and times } \ (\text{style of (Lewis, 1979)}) \]
\[
\text{believe, type (s(it))(i,et)}
\]
\[
F(\text{believe}) = \lambda w.\lambda P_{i(it)}.\lambda t.\lambda y.((\forall w')(\forall t')[((w',t') \text{ is compatible with everything } y \\
\text{ believes of } (w,t) \text{ in } w \text{ at time } t \rightarrow P(w')(t')])
\]

Hence complements must be properties of time, type i(st). The properties are generated by assuming a temporal PRO (or TPRO) as the highest semantic tense (“zero-tense”). PRO has to be moved for type reasons and thus creates a temporal abstract. This follows from the
logical type of the attitude verb. Details aside, the analysis follows (Kratzer, 1998).

Verbs of speech (“say”, “tell” ...) and verbs of thought (“think”, “believe” ...) follow this scheme. The same also holds for factive verbs (“know”, “understand” ...), which have an additional factive presupposition that the complement is true. We will say more about their semantics in section 4. Control verbs like “promise” or “convince” behave similarly with the additional proviso that we find a covert relative future in non-finite complements:

(50)  
  a. John promised Jane he would vote for Obama.  
  b. John promised Jane to vote for Obama.  
  c. John convinced Jane to vote for Obama.

(50a) has an explicit relative future in the complement (“would”). Since (50b) means the same, we must assume a covert future FUT in the complement of the latter. (50c) is analysed analogously to (50b), i.e. with a covert FUT as well. Control verbs are rarely discussed in the SOT literature, so we give the relevant lexical entries here for the interested reader (where the causative component of convince is ignored):

(51)   
  promise with finite complement  
  \[ \lambda w \lambda P_{promise} \lambda x \lambda y \lambda t. (\forall w') w' \in \text{Acc}(y,w,t) \rightarrow P(y)(w')(t) \]  
  c. convince (object control)  
  \[ \lambda w \lambda P_{convince} \lambda x \lambda y \lambda t. (\forall w') w' \in \text{Acc}(x,w,t) \rightarrow P(x)(w')(t) \]

These are the LFs for the sentences in (50):

(52)
a. N \( \lambda_1 \) P(t) \( \lambda_2 \) John promised(t) \( \lambda_4 \) HE \( \lambda_5 \) would(t) \( \lambda_5 \) x6 vote(t) for Obama
b. N \( \lambda_1 \) P(t) \( \lambda_2 \) John promised(t) Jane PRO \( \lambda_4 \) PRO \( \lambda_6 \) FUT(t) \( \lambda_5 \) x6 to vote(t) for Obama.
c. N \( \lambda_1 \) P(t) \( \lambda_2 \) John convinced(t) Jane PRO \( \lambda_4 \) PRO \( \lambda_6 \) FUT(t) \( \lambda_5 \) x6 to vote(t) for Obama.

The HE in (a) is a *de se* pronoun. Like PRO it is semantically void and has to be moved for type reasons. (The *de re* case with mistaken identity has to be analysed differently, say with the method of structured propositions; see e.g. (Percus and Sauerland, 2003)) This gives a parallel analysis for finite and non-finite complements, a desideratum pronounced in (Katz, 2002).

3.3.1. English attitudes

Thus, attitude verbs are verbal quantifiers. The SOT-parameter says that these verbs transmit their temporal features under binding to the temporal variable in the clausal complement.

Here are the relevant LFs:

(53) Past\Past (simultaneous)
At 5 o’clock Mary thought it was 6 o’clock.

\[
N \lambda_0 \ P \ t_0 \ \lambda_1 \ t_1 \ at \ 5 \ Mary \ thought(t_1) \ PRO \ \lambda_4 \ t_4 \ \lambda_2 \ was(t_2) \ \lambda_3 \ t_3 \ at \ 6
\]

\[
iP \quad \ uP \quad \ uP \quad \ uP
\]

\[
= \lambda w.(\exists t_1 < s^*)(t_1 = 5 \ o’clock \ & \ ((\forall w’,t’) \in Dox_{Mary}(w,t_1)) \ t’ = 6 \ o’clock]
\]

The temporal variable of the subordinate *was* inherits its feature from the matrix *P* via feature transmission through *thought*. The temporal adverb *at 5 o’clock* means \( \lambda w \lambda t.t = 5 \ o’clock \). It is composed with the VP by Predicate Modification; for details, see the appendix.

(54) Past\Past (anterior)
Mary thought Bill left.

\[ \text{N} \lambda_0 \ P \ t_0 \ \lambda_1 \text{Mary thought}(t_1) \text{ PRO } \lambda_2 \ P(t_2) \ \lambda_3 \text{ Bill left}(t_3) \]

\[ \text{iP} \quad \text{uP} \quad \text{iP} \quad \text{uP} \]

\[ = \lambda w. (\exists t_1 < s^*) \text{Mary thinks in } w \text{ at } t_1 [\lambda w'. \lambda t_2. (\exists t_3 < t_2) \text{ Bill leaves in } w' \text{ at } t_3] \]

The complement contains its own relative Past that checks the uP of left. Hence we get the shifted interpretation.

3.3.2. Russian Attitudes

The Russian verbal quantifiers ‘budet’ and verbs of attitudes do not transmit temporal features. This is what the SOT-parameter says for non-SOT languages.

The relative PRESENT plays an important role in Russian complements:

(55) Russian Present

\[ [[\text{PRES}_R]] = \lambda t. \lambda P \ P(t), \text{feature iN}. \]

Semantically \( \text{PRES}_R \) is identity, i.e. void. The trivial operator merely serves the purpose to assign the feature uN to the temporal variable it binds. This is the Present analysis for non-SOT languages of (Ogihara, 1996). English-type languages seem to lack a relative PRESENT of the Russian kind, otherwise we cannot explain the impossibility in English of pres/past with a simultaneous, dependent interpretation:

(1E’) He said that he lives outside Moscow – *simultaneous, dependent interpretation.

(only “double access”)

In addition to \( \text{PRES}_R \), Russian has the deictic Present N, which also checks the feature uN. In complement clauses, N is ruled out for type reasons. Therefore, the temporal argument of \( \text{PRES}_R \) at DS is always PRO.

(56) Present\Past (simultaneous)
Vanya said, that Mary is in the opera.

\[
\lambda.1 \text{ P}(t_1) \lambda.2 \text{ Ivan said}(t_2) \text{ PRO } \lambda.3 \text{ PRES}_R(t_3) \lambda.4 \text{ IS}(t_4) \lambda.5 \text{ Mary in}(t_5) \text{ opera}
\]

\[
\lambda w.(\exists t_1 < s^*) \text{ Ivan says in w at } t_1 [\lambda w'.\lambda t_2.\text{Mary be in the opera in w'} at t_2]
\]

The morphological present of the (silent) copula is locally licensed by \(\text{PRES}_R\).

(57) Past\Past (anterior)

Vanya сказал, что Маша была в опере.

\[
\lambda.1 \text{ P}(t_1) \lambda.2 \text{ Ivan said}(t_2) \text{ PRO } \lambda.3 \text{ P}(t_3) \lambda.4 \text{ was}(t_4) \lambda.5 \text{ Mary in}(t_5) \text{ opera}
\]

\[
\lambda w.(\exists t_1 < s^*) \text{ Ivan says in w at } t_1 [\lambda w'.\lambda t_2.\text{Mary be in the opera in w'} at t_2]
\]

Since Russian is a non-SOT-language, the verbal quantifier \textit{said} does not transmit its feature uP. Therefore we need an additional \textit{P} in the complement, which gives us the backwards shifting.

### 3.4. \textit{Insertion of covert past}

As shown in (von Stechow, 2005), we must allow for the insertion of covert future operators in modal contexts. We have seen in section 2.5 above that this is also the case in the complements of intensional attitude verbs. To a certain extent, we must make a similar allowance for covert past operators. As argued in (Paslawska and von Stechow, 2003) and (Grønn, 2007), we need a covert relative past operator in a language like Russian which lacks a composite perfect. We can insert a relative past under past or future to obtain a semantic Pluperfect or Future Perfect.

An illustration from subordinate tense is provided below:

(58)
(59R) И мы надеемся на то, что уже до праздника каждый ветеран получит свой ордер. (Internet)

(60E) We hope that already before the anniversary each veteran will have received authorization to an apartment (our translation)

Fig. 7  N nadeemsja, chto ∅-tense PRES FUT PAST uzhe do prazdnika poluchit (Russian)
[________] [________] [____________________________] (local agreement)

4. CHALLENGES TO RUSSIAN AS A NON-SOT LANGUAGE

According to the SOT parameter, past\past in Russian should give us a shifted anteriority reading. Claims in the literature to the contrary – i.e. that past\past in Russian sometimes allows for a simultaneous interpretation – at first seem to challenge our theory. We will show that three kinds of explanations in defence of the SOT parameter are available depending on the data under discussion:

• Aspectual properties of the complement – notably the semantics of imperfective aspect – is compatible with a simultaneous event interpretation as long as the topic time in the complement is backward shifted, hence not in contradiction with the SOT parameter.
• The matrix is not a verbal quantifier, hence not subject to the SOT parameter.
• The past tense complement has an independent (de re) interpretation, hence not subject to the SOT parameter.

4.1. Shifting under attitudes and aspect in Russian

(Altshuler, 2009) objects against the traditional view that past\past means backward shifting in non-SOT languages like Russian. He says that embedded imperfectives in the past can have a simultaneous or a backward shifted reading. Embedded perfectives are always anterior.

To simplify the exposition, we have not given a semantic analysis of aspect so far. The fact that we can have a kind of ‘simultaneity’ with past\past in Russian if the embedded verb is imperfective is straightforwardly explained by considering the meaning of the imperfective.
Aspect

a. Imperfective
[[IPF]] = \lambda w. \lambda E_v.t. (\exists e)[E(e) & t \subseteq \tau(e)] \quad \text{type} \quad (vt, it)

b. Perfective
[[PF]] = \lambda w. \lambda E_v. \lambda t. (\exists e)[E(e) & \tau(e) \subseteq t] \quad \text{type} \quad (vt, it)

We use E for properties of events e. \tau(e) is the running time of the event e. The meaning of
the imperfective is crudely simplified, but good enough for our purposes.\textsuperscript{12}

Here are some examples of the kind which motivated Altschuler's objections to treatment of
Russian as a non-SOT language:

(62)

(62E) Harris said that, to himself, it was always a mystery how people managed to
get sick at sea (Jerome K. Jerome, Three Men in a Boat (To Say Nothing Of The
Dog))

(62R) Гаррис сказал, что лично для него всегда было загадкой, как это люди
ухитряются страдать морской болезнью

(63)

(63E) Poor fellow, I thought my own trouble was bad enough, but his.... (Bram
Stoker, Dracula)

(63R) Бедный малый, я думал, что мое собственное горе было достаточно
велико, но его!

(64)

(64R) С магистратской башни приметили только часовые, что потянулась часть
возов за лес; но подумали, что козаки готовились сделать засаду; тоже думал и
французский инженер. (Николай Васильевич Гоголь, Тарас Бульба)

\textsuperscript{12} The imperfective has at least three different uses: (a) Progressivity: this interpretation needs an
intensionalisation in the style of (Dowty, 1979); (b) Habituality; for a recent proposal, see (Bary, 2009, Deo,
2006). For Russian, one also has to consider the general-factual interpretation, see (Grønn, 2003). It is a matter
of dispute whether a unified account can be given for all these readings.
From the tower of the town hall the sentinel only perceived that a part of the wagons had been dragged into the forest; but it was thought that the Cossacks were preparing an ambush — a view taken by the French engineer also.

In the examples above, we have past\past, but the imperfective state in the complement clearly holds before, at and after the matrix event. This allows for an analysis where the topic time of the complement (a proper subinterval of the (progressive) state) precedes the topic time of the matrix:

(65) подумали, что козаки готовились сделать засаду (it was thought that the Cossacks were preparing an ambush)

\[ N \lambda_0 P t_0 \lambda_1 \text{ on podumali (t)} P(t_2) \lambda_4 \text{ IMP(t)} \lambda_5 \text{ gotovilis' sdelat'} zasadu (t_3) \]

\[ \lambda w.(\exists t < s^\ast) \text{ they thought in w at t } \lambda t'. \lambda w'.(\exists t'' < t')(\exists e)[t'' \subseteq \tau(e) & e \text{ is preparing of an ambush in w''}] \]

We have backwards shifting in the embedded clause. But since the VP expresses a progressive state and the topic time is in the time of the state, the state might continue at the “subjective now” \( t' \). This gives us the feeling that the reading is simultaneous. This is a point stressed emphatically in (Klein, 1994).

Consider also the following example, which has an "extended now" interpretation:

(66) (66G) Ich war so erschrocken, dass ich fast geschrien hätte, aber der Untersuchungsrichter war sehr freundlich, ermahnte mich zur Vorsicht, flüsterte mir zu, dass er bis jetzt geschrieben habe, dass er mir jetzt die Lampe zurückbringe und dass er niemals den Anblick vergessen werde, wie er mich schlafend gefunden habe. (Franz Kafka, Der Prozeß)

(66R) Я до того испугалась, что чуть не закричала, но этот следователь такой любезный, попросил меня не шуметь и сказал, что он до сих пор писал, а теперь возвращает мне лампу и никогда в жизни не забудет, как он увидел меня сонную.
The “Extended Now” perfect says that the event time is a past interval that abuts the reference time. That this must be a special case of the relative past can be best seen by trying to express the sentence in question in the present: it becomes ungrammatical:

(67)  *Er flüstert mir zu, dass er bis jetzt schreibt.  
    lit: ‘He whispers to me that he writes up to now’

If on the other hand the embedded past VP in Russian is in the perfective aspect, we always have the anterior reading. This was confirmed by our survey of the data in section 2. We give the analysis of one example here:

(68)  
(68E) I’ve told them I’ve found someone. (Helen Fielding, Bridget Jones's Diary)  
(68R) Я уже сказала им, что нашла кой-кого.

(69)  
N λ₀ P t₀ λ₁ ja skazala im (t₁) chto PRO₂ P(t₂) λ₄ PF(t₄) λ₆ nashla koj-kogo (t₆)  
λ₆.(∃t < s*) I tell in w at t λ₁’.λ₁’.(∃t’ < t’)(∃e)[τ(e) ⊆ t’] & I find someone(e) in w’]  

It is clear that the reading has to be anterior because the backward shifted interval contains a complete or “quantized” event. A property of events is “quantized” if it does not apply to subintervals of its running time.

4.2. Tense under perception verbs

Not every verb that selects a CP is a verbal quantifier. Perception verbs are not verbal quantifiers in their prototypical use; hence we should not be surprised to find past\-past with a simultaneous interpretation in Russian. Nevertheless, constructions with perception verbs often follow the familiar patterns predicted by the SOT parameter. We will review the different data below.
4.2.1. Simultaneous interpretation under past perception verbs: pres\past in Russian

First, we note that the distinction between factives and perception verbs may be very subtle. Evidence for knowing can be visual or acoustic. The Russian translator in (70R) below can therefore use a perception verb to convey the meaning of the factive verb in the original:

(70)

(70N) Bou-Bou visste at han løy (Nikolaj Frobenius, Latours katalog)
(70E) Bou-Bou knew he was lying
(70G) Doch Bou-Bou wußte, daß er log
(70R) Бу-Бу видела, что он лжет

The evidence for him being a liar in (70R) can be indirect. Accordingly, constructions with perception verbs are often ambiguous between direct perception and indirect perception.

When we have a pres\past in Russian, we get a kind of evidential reading. The perspective is not that of the speaker, but of the perception holder:

(71)

(71N) Men han så at hun ikke var helt seg selv. (Herbjørg Wassmo, Dina's bok)
(71E) But he saw that she was not completely herself
(71G) aber er sah, daß sie nicht ganz sie selbst war.
(71F) Mais il vit bien qu'elle n'était pas tout à fait elle-même.
(71R) Но он видел, что она совсем не такая, как всегда.

In the next example, only the Norwegian original (past\past) and Russian translation (pres\past) has a finite complement clause:

(72)
(72N) De hørte at hun gikk ute og inne (Herbjørg Wassmo, Dina's bok)
(72E) They heard her pacing outside and inside.
(72G) Man hörte sie drinnen und draußen herumlaufen.
(72F) On l'entendait aller et venir.
(72R) Люди слышали, как она то выходит из дому, то снова возвращается в дом.

With the non-finite complements in the English, German and French translations, the perception construction can only have a direct perception reading. The Russian complementizer "kak – how/as" – instead of "chto – that" – is also a clear indication of direct perception. Given a Higginbotham style analysis of perception verbs (see below), one would expect a past\past construction also in Russian. The translator's choice of pres\past makes the construction more "vivid" and similar to attitude verbs: the complement is reported from the perspective (acoustic alternatives) of the perception holder.

4.2.2. Simultaneous interpretation under past perception verbs: past\past in Russian

Khomitsevich observes that past\past frequently expresses simultaneity in perception constructions even for embedded achievements or accomplishments. She correctly claims that this is an effect of the semantics: on the default, direct perception reading, the fact/event perceived must be simultaneous with the perception. Here are some examples from our parallel corpora:

(73)
Thus, perception verbs express simultaneity either by embedding a past or a present. If these verbs were analysed like attitudes, present would be expected, with a sort of evidential reading. If past and present were freely interchangeable in these constructions without a
change in meaning, then that would be a problem. We suggest that the alternation may to some extent reflect an ambiguity between visual/acoustic alternatives and direct perception.

Our analysis of perception verbs closely follows (Higginbotham, 1983). Higginbotham analyses perceptions as a relation between an individual and an event, the eventive reading. The analysis will entail that these verbs are (normally) not verbal quantifiers and hence not subject to the SOT-parameter. Let us relate the discussion to a toy example from (Altshuler, 2004):

(76)  Dina videla, chto/kak voda lilas' (l'jotsja iz vedra). (Altshuler, 2004)

Dina saw that/how water poured (pours from basket).

‘Dina saw that/how water was pouring from the basket’

The complement describes the event and may, of course, localise it in time. We expect a de re past in the complement, given that the truth-condition of (76) is something like this:

(77)  There was a water pouring e & Dina saw e.

It is obvious that ‘see’ is not a (normal) verbal quantifier, at least when the verb is used to denote direct perception. This analysis of the construction has interesting consequences for the semantics of aspect. Here is the result we want (in Altshuler’s Russian example the perception verb itself is also in the imperfective aspect):

(78)  \( \lambda w(\exists e)(\exists t < s^*)(t \subseteq \tau(e) \land \text{water pouring}_w(e) \land (\exists t' < s^*)(\exists e')(t' \subseteq \tau(e')) \land \text{see}_w(Dina,e'e)) \]

We have two independent deictic pasts, so no temporal agreement is needed. Furthermore, the existential quantifier on top binds the aspect variable e that occurs in the main and in the subordinate clause. This means that the event variable in the aspect is not always locally

\[^{13}\text{Factive verbs have a related analysis but exhibit an additional complication and are therefore considered later.}\]

bound by an existential quantifier. Here is the compositional build up of the LF:

\[(79)\]  
\[kak\ voda\ lilas’\ iz\ vedra\ ‘how\ the\ water\ was\ pouring\ from\ the\ basket’\]

\[\lambda_1\ \text{water was pouring}\]
\[\lambda_2\ (vt, t)\]
\[IP(e_1)(t_2)\]
\[vt\]
\[it\]
\[(it, t)\]
\[P(N)\]
\[kak\]
\[how_1\]
\[\lambda\text{-abstract}\]

\[\text{kak} \ ‘how’\ is\ a\ semantically\ empty\ WH-operator\ that\ has\ to\ be\ moved\ on\ logical\ grounds\ and\ thus\ creates\ a\ \lambda\text{-abstract.}\\]

The operator originates in the event argument of the imperfective aspect IP. So we have to modify the usual semantics:

\[(80)\]  
\[\text{Aspect}\]
\[\text{a. Imperfective}\]
\[\text{usually:}\ [\text{IP}] = \lambda w. \lambda E_{vt}. \lambda t. (\exists e)[E(e) \& t \subseteq \tau(e)] \quad \text{type} \quad (vt, it)\]
\[\text{here:}\ [\text{IP}] = \lambda w. \lambda e. \lambda t. \lambda E_{vt}. E(e) \& t \subseteq \tau(e) \quad \text{type} \quad (vi, (vt, t))\]
\[\text{b. Perfective}\]
\[\text{usually:}\ [\text{PF}] = \lambda w. \lambda E_{vt}. \lambda t. (\exists e)[E(e) \& \tau(e) \subseteq t] \quad \text{type} \quad (vt, it)\]
\[\text{here:}\ [\text{PF}] = \lambda w. \lambda e. \lambda t. \lambda E_{vt}. E(e) \& \tau(e) \subseteq t \quad \text{type} \quad (vi, (vt, t))\]

We can regain the familiar existential analysis for aspect by existential closure of the variable \(e\).

In order to be able to have the \textit{how}-clause as an object, we prefix it by a covert existential quantifier \(\exists\) of type \((vt, (vt, t))\). This makes the complement clause a generalized quantifier that we can QR from the object position.
Dina videla, kak voda lilas’.

\[
\begin{align*}
&\text{[cr} \exists \text{kak}_3 P(N) \lambda_2 IP(e_3)(t_2)\lambda_1 \text{voda lilas’}(e_1)] \\
&\lambda_3 [s P(N) \lambda_5 (\exists e_6) IP(e_6)(t_5)\lambda e_7 Dina videla(e_5)(e_7)] \\
&F(videla) = \lambda w.\lambda e_1.\lambda e_2.\lambda x. e_1 \text{ is a seeing of } e_2 \text{ by } x \text{ in } w \\
&\text{features: } uP, uIP
\end{align*}
\]

A note to feature transmission is in order: Temporal features are transmitted across the aspect operator to the variable that the latter binds. Thus the aspect operator transmits two kinds of features: its own aspect feature and the temporal feature inherited from the semantic tense of the sentence.

This analysis explains the fact that past\past may express simultaneity in perception constructions. A complication arises from the fact that, according to Khomitsevich, the present and past are freely interchangeable in these constructions and occur even in conjunctions:

\[\text{(83)}\]

\[\begin{align*}
&(83R) \text{ Ona gljadela, kak sizye kol’ca ot sigary Azarello uplyvali v kamin i kak kot lovit ikh na konec shpagi. (Mikhail Bulgakov, Master i Margerita)} \\
&(83E) \text{ She watched as Azarello blew (past!) smoke-rings at the fireplace and the cat spiked (present!) them on the end of his sword.} \\
&(83N) \text{ Hun så på Azazello, som sendte ringer av sigarrok inn i peisen, og på katten, som fanget dem opp med kordespissen.}
\end{align*}\]

This conjunction presumably expresses an event plurality. We can explain that either present or past is used for perceived states, but the present analysis cannot explain free variation in conjunctions. Perhaps the present in the second conjunct is a stylistic means signalizing vivid presentation.
To sum up: Perception verbs like "videt' – to see" have an independent simultaneous interpretation with past\past. With pres\past the construction is reminiscent of attitude verbs (visual/acoustic alternatives for the perception holder). It is also conceivable to have a double access reading\(^\text{14}\) with pres\past.

\section*{4.3. Tense under factive verbs}

Our informal corpus study in section 2 suggests that the majority of cases with factives comply with the patterns predicted by the SOT parameter, i.e. pres\past is used for a simultaneous interpretation in Russian.

However, there are, apparently, Russian counterexamples to our SOT theory: We find data with past\past and a “simultaneous” interpretation:

\begin{itemize}
  \item \((84)\)
  \begin{itemize}
    \item \((84N)\) Alle visste at lensmannsfrau var flere måneder på vei da hun ble skoldt i hjel.
    \begin{flushright}
      (Herbjørg Wassmo, Dina's bok)
    \end{flushright}
    \item \((84E)\) Everyone knew the sheriff's wife was several months pregnant when she was scalded to death.
    \item \((84G)\) Alle wußten, daß die Lehnsfrau schon mehrere Monate schwanger war, als sie zu Tode verbrüht wurde.
    \item \((84R)\) Все знали, что жена ленсмана была беременна, когда обварилась щелочью.
  \end{itemize}
  \end{itemize}

\begin{itemize}
  \item \((85)\)
  \begin{itemize}
    \item \((85R)\) Он понял, что она ехала в Ергушово со станции железной дороги. (Tolstoy, Anna Karenina)
    \item \((85E)\) He understood that she was driving to Ergushovo from the railway station.
    \item \((85N)\) Han skjønte at hun var på vei til Jergusjovo fra jernbanestasjonen.
  \end{itemize}
  \end{itemize}

\(^{14}\) The relevant paraphrase for the double access reading of pres\past is this: “There is a state s of water pouring and she saw s”. A present state of water pouring may have had its beginning some time ago, and she saw that very state in the past. This is precisely the idea behind the double access reading of “John believed that Mary is pregnant.” (cf. (Abusch, 1997b)).
Khomitsevich writes that embedded past and present are freely interchangeable in Russian in these constructions without change in meaning. Indeed, the difference in truth conditions may be very subtle, but the LFs must still be different, in our view. Note that in principle we could adopt the same explanation for these data as for the examples discussed above where a simultaneity reading occurred with imperfective past complements under attitude verbs. For those cases we argued that the SOT parameter only requires the topic time of the complement to precede the topic time of the matrix. However, when it comes to factives, it seems that we are dealing with an independent de re past in the complement, similar to what we observed with past\past and perception verbs in the previous section.

Thus, we agree with (Khomitsevich, 2007) that past\past with matrix factives is never a tense agreement phenomenon in Russian. Our corpus survey also confirms Khomitsevich’ observation that with matrix factive predicates whose judgment holder is the author, we easily get a de re interpretation, hence past\past and (possibly) simultaneity. Our analysis of these readings will follow (Kratzer, 1990)’s analysis of factual belief, according to which one of the roles of the complement clause is to describe the known fact. This will bring the complement clause in a transparent position and explain why the subordinate tense is interpreted independently from the matrix tense. In other words, the temporal locations of the two facts are described independently, which does not exclude the two facts from overlapping in time (simultaneity).

In order to understand the semantic rationale behind these findings, we remind the reader of
the analysis of facts given in (Kratzer, 1990). Consider the following sentence and its analysis:

(87)  John knew that it was raining  
(88)  
(a) There was a state/event e, which was a raining and  
(b) John was acquainted with e and  
(c) John believed of e the property of raining.

The complement clause is used in condition (a) and in condition (c). (a) is a purely extensional environment and the interpretation of the past tense is independent of the tense of the main clause. (c) is an intensional environment. The complement clause serves for the description of a tenseless property (a zero tense; a relative bound present in Russian). Given that the complement clause has to fulfil two roles for getting the content right, we face a dilemma: if the complement is in the present, the complement can describe only condition (c) correctly. If the complement is in the past, it can describe only condition (a).

In order to implement the two strategies of projecting the complement clause, we will adopt a trick: if the visible complement clause is in the past, it will describe the res, i.e. the event/situation the subject holds the attitude of, and the property believed of the res will be represented by a free property variable, which is supposed to be the tenseless counterpart of the complement. If the complement is in the present, it will be the property attributed to the res and the tensed counterpart will be represented by a free property variable. Now, let us see how this works with a minimal pair from Russian:

(89)  On znal, chto ona stojala y okna
\[
\lambda w. (\exists t < s^*)(\exists e)(\tau(e) \supset t \land (\exists e') (\exists t' < s^*)(\tau(e') \supset t' \land \text{stay_at_window(she, e', w)}) \land \text{acquainted}(he, e, e', w) \land \text{believes_of}(he, e, e', Q, w))
\]

Here \texttt{chtoe} is a \(\lambda\)-operator. We assume that \(Q = \lambda w \lambda e \exists t (\tau(e) \supset t \land \text{stay_at_window(she, e, w)})\)

The relevant semantic rule is this:

(90) \text{de re knowledge 1}
This is the version where the past in the complement denotes a tense that is independent from the matrix tense. Hence we can have simultaneity.

Next consider the case where we have present in the complement clause:

(91) Он знал, что она стоит у окна.

The upper part of the LF tree is exactly as before, but the complement clause is in the present:

(92)

This is the overt version of our former property Q. We now need a new rule where Q plays the role of the past tensed counterpart of this property:

(93) de re knowledge 2

\[
[[\text{know}^2_Q]] = \lambda w \lambda e \lambda P_{(sv,t)} \lambda x. (\exists e') Q(w)(e') & \text{acquainted}(x, e, e', w) & \text{believe}_o f(x, e, e', P, w)
\]
If we evaluate the LF for (91) we find that the following proposition is expressed:

$$\lambda w. (\exists t < s^*)(\exists e)[\tau(e) \supset t \& (\exists e')(\exists t' < s^*)(\tau(e') \supset t' \& Q(e')(w)) \&$$

$$\text{acquainted}(he,e,e',w) \&$$

$$\text{believes}_{-\text{of}}(he,e,e',\lambda w(\lambda e(\exists t)[\tau(e) \supset t \& \text{stay}_\text{at}_\text{window}(she,e',w)],w))$$

By assumption, $Q$ is the property $\lambda w\lambda e'(\exists t' < s^*)(\tau(e') \supset t' \& \text{stay}_\text{at}_\text{window}(she,e',w))$. Therefore, the proposition is the same as before, and we have an explanation of why we can express simultaneity either by past\past or by pres\past.

There are of course other factive verbs than knowing, e.g. the emotive factive. We cannot go into these here. We hope that similar explanations are available. For the time being we conclude that factive verbs provide no counter examples against the SOT-parameter.

5. **Future extensions**

In the study of tense dependencies and subordinate tense, three syntactic environments are particularly interesting:

- Tense in complements
- Tense in relative clauses
- Tense in adverbial clauses

We have only dealt with complement tense in this article, but we intend to further explore the SOT parameter with respect to tense dependencies in adjuncts. This issue is less explored in the literature since adjuncts are not syntactically dependent on the matrix in terms of c-command and adjunct tense is often independent of the matrix (deictic). Still, certain configurations – especially with a future matrix – clearly shows tense dependency and tense agreement in SOT languages.

6. **Summary**

1. The temporal features of finite verbs are licensed by semantic binding by a semantic tense.

2. Non-local tense agreement in English is licensed by verbal quantifiers such as
will/would, have and verbs of attitude. The feature transmission is achieved via binding chains that are created by PRO-movement.

3. In Russian, no feature transmission across temporal quantifiers is possible. This fact motivates the formulation of the SOT-parameter, according to which Russian is a non-SOT-language.

4. Recent objections against the view that Russian is a non-SOT-language are refuted by a more careful investigation of the semantics of the verbs involved. Not all verbs with complements are verbal quantifiers.

(a) Verbs of perception are normally not verbal quantifiers and therefore not subject to the SOT-parameter. The syntactic complement serves the purpose to describe the event perceived. There is no temporal subordination.

(b) Factive verbs like “knowing” are more complicated. There the complement serves two purposes: (a) it describes the res situation, and this description is not subordinated to the main verb; (b) it describes the tenseless property ascribed to the res. The visible complement may relate to the (a) purpose or the (b) purpose. In the first case, the factive behaves like a perception verb and we find past\past for simultaneity. In the second case, the factive behaves like a verb of attitude, i.e., a verbal quantifier, and we find pres\past.

5. There are obvious differences between the English and the Russian tense systems. Russian has no perfect auxiliary have and may therefore require the insertion of a covert past. Another difference is the assumption of a relative present PRES_R for Russian. English does not have such a tense. The necessity for such a tense follows directly from the SOT-parameter and the requirement that tensed forms have to be licensed by a semantic tense. In English, embedded tenses can be licensed from semantic tenses in the matrix across temporal quantifiers. This is not possible in Russian (SOT-Parameter). Therefore we need a local licenser, and this must be something like Ogihara’s PRESENT.

7. **APPENDIX: INTENSIONAL LF LANGUAGE**

We introduce an intensional λ-language. “Intensional” means that expressions of type a express meanings of type (sa), i.e., a-intensions.

Recursive definition of the interpretation function \[\mathbb{I} \cdot \mathbb{I}_{F,g}\]
1. Let $\alpha$ be a lexical entry of type a. Then $[\alpha]^{M,g} = F(\alpha)$.

2. Let $x$ be a variable of type a. Then $[x]^{M,g} = \lambda w. g(x)$, $g(x) \in D_a$.

3. **FA**: Let $\alpha$ have type $b$ and daughters $\beta$ of type ab and $\gamma$ of type a.

   $[\alpha]^{M,g} = \lambda w. [\beta]^{M,g}(w)[\gamma]^{M,g}(w)$

4. **IFA**: Let $\alpha$ have type $b$ and daughters $\beta$ of type $(sa)b$ and $\gamma$ of type a.

   $[\alpha]^{M,g} = \lambda w. [\beta]^{M,g}(w)[\gamma]^{M,g}(w)$

5. **PM**: Let $\alpha$ have type a and daughters $\beta$ and $\gamma$ of the same type.

   $[\alpha]^{M,g} = \lambda w. \lambda x. [\beta]^{M,g}(w)(x) \& [\gamma]^{M,g}(w)(x)$

6. **Abstraction**: Let $x$ be a variable of type a and let $\alpha$ be an expression of type b.

   $[\lambda x \alpha]^{M,g} = \lambda w. \lambda u \in D_a. [\alpha]^{M,g[x/u]}(w)$

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