How many roads are there to a simultaneous reading?

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Past-under-past only sometimes yields simultaneous readings in non-Sequence of Tense (SOT) languages. I claim that a distinction should be made among non-SOT speakers. Indeed, only some of them get temporal *de re* readings of the embedded past. An analysis in terms of an individually parametrized *Prefer Local Binding* rule in the temporal domain is proposed, prioritizing logical forms with locally bound temporal variables. So, present-under-past temporal *de se* is preferred over past-under-past temporal *de re* to get simultaneous readings. Finally, interspeaker variation is predicted for SOT languages and a new diagnostic for temporal *de re* in SOT languages is developed.

1. Introduction

Temporal features are used to temporally locate an Inflectional Phrase relative to the time of the utterance or the time of the attitude. However, sometimes temporal features are not semantically interpreted. Consider, for example, the following English sentence:

(1)   2 years ago, John thought that Mary was pregnant.

This sentence has two possible readings: the simultaneous and the back-shifted one. The former conveys simultaneity between John's thought and the embedded event, i.e., his thought two years ago was 'Mary is pregnant'. The latter conveys anteriority of the embedded event relative to John's thought, i.e., his thought two years ago was 'Mary was pregnant'.

How is the simultaneous reading possible if the past tense expresses anteriority relative to the time of evaluation? In other words, what is the effect of *was* in (1)? There are two ways to get a simultaneous reading with a past-under-past sentence: either by leaving the embedded past tense uninterpreted or by interpreting it relative to the time of the utterance rather than John's local 'now'. In the first case, the past tense is *deleted* at LF under an agreeing tense morpheme. In the second case, it is interpreted *de re*, since the temporal variable in the embedded clause is not locally bound; it is interpreted relative to the time of the utterance, not relative to the local

'now' of the attitude holder.

This paper focuses on the different strategies languages have to convey simultaneous readings. More specifically, it focuses on the accessibility of *de re* readings of the embedded past cross-linguistically. Notice that not all languages use an embedded past to convey simultaneous readings. Some languages, like Hebrew and Russian, directly make use of an embedded present that can be shifted, thus ending up referring to the 'now' of the attitude holder rather than the time of the utterance. Here is an example from Russian, which was unanimously accepted by my consultants:

(2)   V dvuxtysjačnom godu Ivan znal,   čto Maša beremenna.
        In 2000   year Ivan know.PST that aša   pregnant
        'In 2000, Ivan knew that Mary was (literally: is) pregnant.'

In this example, the indexical reading of the present tense is blocked by the temporal operator 'in 2000'. Therefore, the embedded present here is *shifted*, since it refers to the 'now' of the attitude holder, rather than the speaker's 'now'.

It thus seems that some languages preferably use an embedded present and some an embedded past to convey a simultaneous reading. I will focus on the following research question: to what extent are simultaneous readings of past-under-past sentences salient in languages with a shiftable present? I will argue that based on data from languages without a deletion rule, such as Russian and Hebrew, there is interspeaker variation with respect to the accessibility of simultaneous readings with past-under-past. I will provide an analysis in terms of a *Prefer Local Binding* rule in the domain of tense.

2. Theoretical background

This section introduces the three main roads to a simultaneous reading: 1. past-under-past with a deleted past (temporal *de se*), 2. past-under-past with a *de re* past, and 3. present-under-past with a shifted present (temporal *de se*). Some languages, like English, have only the first two roads, while others primarily have the last road. In this paper, I will argue that there is variation with respect to how accessible road 2 is for speakers of a language without road 1. Lastly, there are mixed languages, like Modern Greek, where all three roads are available.

2.1. Sequence of Tense rule

As previously mentioned, there are two ways that yield a simultaneous reading with a past-under-past sentence. Either the embedded past is left uninterpreted or it is interpreted relative to the time of the utterance rather than the attitude holder's local 'now'. This subsection introduces the deletion rule that makes it possible to leave the embedded past uninterpreted. Crucially, as we will see, not all languages have such a deletion rule.

How can an embedded past as in (1) express simultaneity rather than anteriority? One explanation is that this is due to a *Sequence of Tense* (SOT) rule which deletes past tense features. In the literature, a distinction is usually made between Sequence of Tense (SOT) languages, like English, and non-SOT ones, like Hebrew and Russian. In SOT languages past tense features can be 'deleted', thus remaining uninterpreted. How does one test whether a language has such a

rule? One would need to block a *de re* reading of the embedded past and see if a simultaneous reading is still possible. To do so, the embedded past should not be interpretable relative to the time of the utterance. If the past tense still does not express anteriority, despite the fact that it has to be interpreted, then it must be the case that it is deleted, remaining uninterpreted. This is the point made by Abusch (1988, 1994), who provides the following example in English, reconstructed from Kamp & Rohrer (1983):

(3)   John decided a week ago that in 10 days he would say to his mom that they *were having* their last meal.

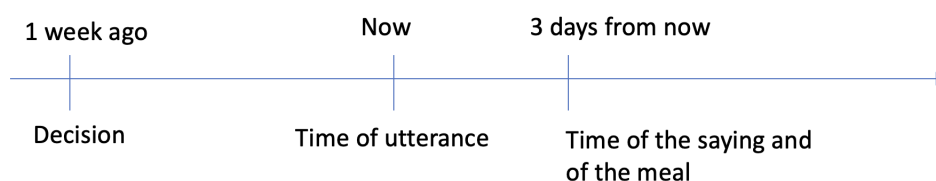The temporal relations in this sentence are understood as follows:

Figure 1. Temporal relations in (3).

The time of the meal is after any other time in the sentence. This example demonstrates that the embedded past tense can under certain circumstances remain truly uninterpreted. The same holds for Modern Greek (Schlenker 1999; Sharvit 2018; Tsilia 2021, forthcoming). Sharvit (2018) provides the following example, where a *de re* interpretation of the past is false and yet a simultaneous reading is accessible:

(4)   Prin   mia evdhomadha, o   Jorghos ipe   oti se dheka meres tha eleghe
        Before one week   the Jorghos say.PST that in ten   days   will say.IMPFV.PST
        stin   kopela   tu   oti sinadjiondusan   ja teleftea fora.
        to-the girlfriend of-his that meet.IMPFV.PST for last   time.
        'A week ago, Jorghos said that in ten days he would say to his girlfriend that they were meeting for the last time.'   (Sharvit 2018:233)

What Jorghos planned to say is 'We are meeting for the last time'; the embedded past remains uninterpreted. Indeed, if past tense features were computed semantically, the most embedded past tense would have to denote a point in time anterior to (i) the time of the utterance (temporal *de re*) or (ii) the time of the saying (temporal *de se*). Yet, the temporal relationships are understood in a way that excludes both (i) and (ii): the embedded past does not refer to any past moment at all. Therefore, the past tense seems to be there solely for morpho-syntactic reasons, being in a sense 'deleted' in the semantic computation. Non-SOT languages would necessarily use a shifted present in this case. Thus, the conclusion is that the embedded past can remain truly uninterpreted in English as well as in Modern Greek, but not in non-SOT languages. Past tense features can remain uninterpreted thanks to an SOT rule that deletes them at LF.

    I should mention that there are two ways to implement an SOT rule. One is by feature deletion under c-command (Ogihara 1996; Sharvit 2003, 2018), another is by feature transmission under

agreement (Abusch 1997; Grønn & Von Stechow 2010). Semantically, whether a feature is deleted or inserted will not make any difference, so for the purposes of this paper, I will follow Ogihara (1996) and Sharvit (2003, 2018) in stating the SOT rule in terms of feature deletion. I posit an agreement rule in the domain of tense, namely an SOT rule, which deletes the past tense features at LF. Such features are merely there so that an agreement relation with the c-commanding matrix past can be established, like an agreement marker. Here is the rule in its simplest form, reconstructed from Ogihara (1996); Sharvit (2018):

(5) **SOT rule:** When a tense morpheme is c-commanded by an agreeing tense morpheme (attached to an intensional predicate), it may be deleted at LF.

According to this rule, a past c-commanded by another past can be deleted at LF and thus remain uninterpreted. Past tense features are first transmitted through the lambda binder to the embedded verb with the bound time variable, but are then deleted by the SOT rule at LF. That is precisely what happens with (3), as seen in the following LF:[1]

(6)   [a week ago] $\lambda t1$ John decide$^{\text{past}}$t1 $\lambda t0^{\text{past}}$ he will$^{\text{past}}$t0 say $\lambda t0$ that they have$^{\text{past}}$t0 their last meal together.

Whenever a language has such a deletion rule, it is considered an SOT language. Yet, as previously mentioned, not all languages display tense deletion. For example, Russian, Hebrew, and Japanese are non-SOT languages; thus, all tense features have to be semantically interpreted. As seen above, an embedded past can be interpreted either *de re* or *de se*. In (3), however, the *de re* reading is blocked since the embedded past is not prior to the time of the utterance. Thus, the Hebrew equivalent of (3) would necessarily get a back-shifted reading. In other words, the embedded past would express anteriority with respect to the c-commanding one. Consider the following example from Hebrew:

(7)   Lifney šavua, Dan hexlit   še be'od asara yamim, bizman aruxat ha-boker,   hu
        Before week Dan decide.PST that in   ten   days   at-time food the-morning he
        yomar   le-imo   še hu hitga'agea ele-ha.
        will-tell to-his-mother that he miss.PST   to-her
        'Dan decided a week ago that in ten days at breakfast he would say to his mother that he
        had missed (literally: missed) her.'   (Sharvit 2003:670)

In this case, what Dan will say in three days is 'Mom, I missed you'. All five consultants agreed with this judgment. I also tested the following sentence with five consultants:

(8)   Lifney šavua, Yosef amar   še be'od asara yamim hu yagid   le xavera   šelo še
        Before week, Yosef say.PST that in   ten   days he say.FUT to girlfriend his that
        hemnifgešu ba   pa'am ha'axrona.
        they   meet.PST for   last-time
        'A week ago, Yosef said that in ten days he would say to his girlfriend that they have

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[1] I provide simplified LFs and represent tense features as superscripts by analogy with other features. Also, I take the t0 parameter to be the perspectival point, i.e., the 'local now' to use the terminology of Abusch (1988) and Heim (1994). Finally, only the deleted past tense features on the verb are important. The features on the lambda binder illustrate feature transmission, since the past tense features are transmitted to the verb through the lambda binder before being deleted.

met for the last time.'

All my consultants agreed that this sentence only has the back-shifted reading, according to which Yosef will say 'We met for the last time'. Crucially, the simultaneous reading is inaccessible, which confirms that Hebrew does not have tense deletion (Ogihara & Sharvit 2012; Sharvit 2003, 2018). Therefore, every embedded past must be interpreted.

The same holds for Russian. I tested the following sentence with five consultants:

(9)   Nedelju nazad, Ivan skazal, čto čerez 10 dnej on skažet svoej devuške čto oni
        Week back, Ivan say.PST that across 10 days he say.FUT his girlfriend, that they
        vstretilis'   v poslednij raz.
        meet.PST.PFV in last   time.
        'A week ago, Ivan said that in 10 days he would say to his girlfriend that they have met
        (literally: met) for the last time.'

As was the case for Hebrew, this sentence unambiguously had the back-shifted reading. I asked my consultants to pick between these two scenarios:

(10)   <u>Simultaneous scenario:</u> In 10 days from now, Ivan will meet his girlfriend and say in person 'We meet.PRS for the last time'.

(11)   <u>Back-shifted scenario:</u> In 10 days from now, Ivan will say to his girlfriend over the phone 'We met.PST for the last time'. In other words, he will say that their last meeting was their very last one.

The sentence is felicitous in the back-shifted scenario and infelicitous in the simultaneous one. Interestingly, however, it is not incompatible with them meeting in person in 10 days. The crucial part is only that what Ivan utters is in the past tense. For example, he could say at the end of the meeting something like 'Now, we have met for the last time'. One Hebrew consultant expressed the same intuition. So, in both languages, the requirement is that the utterance be in the past tense, not that the event is in the remote past.

The unavailability of simultaneous readings in Hebrew and Russian shows that these languages do not have an SOT rule. Therefore, the most embedded past is always interpreted, expressing anteriority with respect to the time of the utterance.[2]

In this subsection I showed how to test whether a language has an SOT rule, controlling for the temporal *de re* confound. Based on the literature and my own fieldwork, I concluded that English and Modern Greek have an SOT rule, while Russian and Hebrew do not. In non-SOT languages, sentences where temporal *de re* is blocked only have a back-shifted reading. The main focus in what follows will be whether simultaneous readings of past-under-past through temporal *de re* are accessible in non-SOT languages.

2.2. De re readings of the embedded past

What if *de re* readings of the embedded past are not blocked? I show that in simple past-under-past cases simultaneous readings are in principle accessible via temporal *de re*, without an

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[2] As previously mentioned, the anteriority does not have to refer to the remote past, but it crucially has to be in the past, i.e., prior to the time of the utterance.

SOT rule. This is because the embedded past could indeed be interpreted (and not deleted), but relative to the time of the utterance rather than relative to the local 'now' of the attitude holder. Let us compare the temporal *de se* and the temporal *de re* LFs giving rise to the simultaneous reading of the sentence in (1), repeated below as (12) for clarity:

(12)   2 years ago, John thought that Mary was pregnant.

(13)   Temporal *de se* (SOT rule):
        [2 years ago] λt1 John think$^{\text{past}}$t1 λt0$^{\text{past}}$ that Mary be$^{\text{past}}$**t0** pregnant.

(14)   Temporal *de re*:
        [2 years ago] λt1 John think$^{\text{past}}$t1 λt0 that Mary be$^{\text{past}}$**t1** pregnant.

In temporal *de re*, where the temporal variable is not locally bound, the embedded past tense is indeed interpreted, but not with respect to John's temporal perspective. It is rather interpreted with respect to the same temporal perspective as the matrix past tense is. Therefore, John's thought and Mary's pregnancy are in the speaker's past, but the two could co-occur. In temporal *de se*, however, the embedded past tense is deleted by an SOT rule and then interpreted as a zero-tense with respect to John's local 'now'. Therefore, t0 ends up being simultaneous with t1, which on its turn precedes the time of the utterance by 2 years. The LF in (13) is only available in SOT languages, such as English and Modern Greek, but the LF in (14) is in principle available in non-SOT languages as well. The empirical question is whether this LF is indeed attested in non-SOT languages, giving rise to simultaneous readings of past-under-past.

Therefore, there are in principle two ways to get a simultaneous reading with past-under-past: (i) temporal *de re*, where the embedded past is interpreted relative to the time of the utterance and (ii) temporal *de se*, where the embedded past is deleted by an SOT rule and thus remains uninterpreted. The latter is only available in SOT languages, but the former is in principle available in non-SOT ones, too. The rest of this paper empirically investigates the extent to which this reading is indeed attested in non-SOT languages.

2.3. Shifted present

A separate question that arises is whether a present-under-past sentence allows for simultaneous readings. In other words, can the embedded present tense in a given language refer to the same moment as the matrix past tense? This depends on whether the present tense is shiftable, in the sense that it can refer to the local 'now' of the agent in indirect discourse (possible in Hebrew, Russian and Japanese, often impossible in French and English).

If a non-SOT language has a shiftable present tense, then the simultaneous reading can be expressed with a present-under-past. Non-SOT languages usually achieve this reading via a shiftable present indeed. On the contrary, standard SOT languages, like English, usually have a non-shiftable present, which has to be evaluated at the time of the utterance. Yet, there is also at least one SOT language with a shiftable present, namely Modern Greek, which has been argued to be a mixed-tense language (Schlenker 1999; Sharvit 2003, 2018; Tsilia 2021, forthcoming). The present tense is a matrix indexical in English, necessarily referring to the time of the utterance. Thus, it cannot be shifted, as shown by the infelicity of the following sentence:

(15)   #20 years ago, John thought that Mary is pregnant.

By contrast, in non-SOT languages the present tense shifts under past tense attitude verbs. This is the mechanism non-SOT languages use to express a simultaneous reading. Here is an example from Hebrew:

(16) Lifney alpayim šana, Yosef gila   še Miriam ohevet   oto.
      Before 2,000   year Yosef find-out.PST that Miriam love.PRS him
      '2,000 years ago, Yosef found out that Miriam loved (literally: loves) him.'

                                                         (Ogihara & Sharvit 2012:642)

In this example, the indexical reading of the present tense is blocked by the temporal operator '2,000 years ago'. The only plausible LF for (16) would thus be:

(17) [before 2,000 years] λt1 Yosef find-out^{past}t1 λt0 that Miriam love-**t0** him.

In other words, the present tense is interpreted relative to Yosef's local 'now'. What he found out is: 'Miriam loves me (now)'. The exact same pattern is observed in Japanese (Ogihara & Sharvit 2012), in Russian (Grønn & Von Stechow 2010), and in Modern Greek (Tsilia 2021, forthcoming).

It thus seems that SOT languages use a matrix indexical present (Schlenker 1999; Sharvit 2003), while non-SOT languages use a shiftable present. From a theoretical perspective, there are thus two parameters: (i) a deleted past and (ii) a shiftable present. Modern Greek is the only language observed so far where both parameters are active, showing that the correlation between having either a deleted past or a shiftable present but not both is accidental. This is theoretically important, because it confirms that the two parameters are independent and can both be active in the same grammar.[3]

Importantly, non-SOT languages with a shiftable present would express the English example (3), repeated here as (18) for clarity, with an embedded present. Here is an example from Russian, which was unanimously accepted by my consultants as having the simultaneous reading:

(18) John decided a week ago that in 10 days he would say to his mom that they *were having* their last meal.

(19) Nedelju nazad, Ivan skazal, čto čerez 10 dnej on skažet   svoej devuške, čto oni
      Week   back, Ivan say.PST that across 10 days he say.FUT his   girlfriend, that they
      vstrečajutsja v poslednij raz.
      meet.PRS   in last   time.
      'A week ago, Ivan said that in 10 days he would say to his girlfriend that they met (literally: meet) for the last time.'

The same holds for Hebrew. As for Modern Greek, it was previously seen that (18) can be expressed with an embedded past as in (4) thanks to the SOT rule. Interestingly, however, since Modern Greek also has a shiftable present, it has one more way to express (18), namely using an embedded present as in Russian and Hebrew:

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[3] I thank an anonymous editor for raising the question of what happens if both parameters are inactive and a language cannot express simultaneous readings. Such languages are not attested. Sharvit (2003) argues that there is a principle of Universal Grammar, requiring every well-formed matrix sentence to be 'embeddable' under an attitude verb. She calls this the *Embeddability Principle*.

(20)   Prin   mia evdhomadha, o   Jorghos ipe   oti se dheka meres tha eleghe
        Before one week   the Jorghos say.PST that in ten   days   will say.IMPFV.PST
        stin   kopela   tu   oti sinadjiondude ja teleftea fora.
        to-the girlfriend of-his that meet.PRS   for last   time.
        'A week ago, Jorghos said that in ten days he would say to his girlfriend that they were
        (literally: are) meeting for the last time.'

Therefore, having a shiftable present is another strategy languages have to express the simultaneous reading. This strategy is usually available in languages without a deletion rule, such as Hebrew and Russian, but it can also be available in some SOT languages, such as Modern Greek.

   This section presented all the ways of getting a simultaneous reading under a past tense attitude verb. If a past-under-past sentence has a simultaneous reading, then (a) the language has an SOT rule, or (b) there is temporal *de re*. If a present-under-past sentence has a simultaneous reading, then the language has a shiftable present. What follows investigates the following question: is there temporal *de re* in non-SOT languages?

3. Temporal de re: the empirical picture

This section is an empirical investigation of the availability of temporal *de re* in non-SOT languages. The focus is on Russian and Hebrew, providing data from 10 consultants in total, 5 for each language. The claim in the literature for non-SOT languages is usually that past-under-past preferably conveys a back-shifted reading rather than a simultaneous one (Grønn & Von Stechow 2010; Ogihara & Sharvit 2012; Altshuler 2016). However, there are authors who claim that past-under-past has a simultaneous reading, too; in Russian (Vostrikova 2018), as well as for some Hebrew speakers (Ogihara & Sharvit 2012).

   Based on my own fieldwork, the main generalization will be that there is interspeaker variation with respect to the availability of a simultaneous reading with a past-under-past sentence. Given that there is no SOT and that therefore temporal *de re* is the only explanation for such a reading, I will conclude that there is variation with respect to the availability of a *de re* LF of past-under-past.

   Before I present the empirical picture, a few words about the judgment elicitation methodology used: I gave the consultants past-under-past sentences with statives in out of the blue contexts.[4] First, they were asked to make a binary acceptability judgment. If the sentence was acceptable, I asked them to reproduce the attitude in direct speech. I then asked them whether the sentence was ambiguous and if so, which was their preference (if any). In some cases, I presented them with two sentences in direct speech and they had to choose which attitude the sentence reports.

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   [4] Eventive predicates often block simultaneous readings for aspectual reasons, independently of tense (Stowell 2007; Altshuler 2016).

3.1. Simultaneous readings in Russian

My goal was to see to what extent Russian speakers get simultaneous readings with past-under-past sentences. I tested the following sentence:

(21) V dvuxtysjačnom godu Ivan znal, čto Maša byla beremenna.
      In 2000 year Ivan know.PST that Masha be.PST pregnant
      'In 2000, Ivan knew that Masha was/had been pregnant.'

I asked my consultants to choose either one or both of the following answers to the question 'What did Ivan know?'. They had to choose the one(s) that could be reported by (21):

(22) 'Maša is pregnant' (in 2000)

(23) 'Maša was pregnant' (before 2000)

For 3/5 of my consultants the sentence was ambiguous between a simultaneous and a back-shifted reading, while for 2/5 only the back-shifted reading was possible. When asked if they have a preference for one of the two original utterances, 2/5 consultants had no preference, (21) being completely ambiguous, while 3/5 had a preference for the back-shifted reading in an out-of-the-blue context.

   Therefore, I conclude that there is interspeaker variation in Russian with respect to whether and to what extent simultaneous readings of past-under-past are accessible. For some speakers they are not accessible at all, for others they are accessible but dispreferred, while for yet others they are accessible and as available as back-shifted readings.

3.2. Simultaneous readings in Hebrew

The claim in the literature for Hebrew is that although both readings are accessible for some (but not all) speakers, the back-shifted reading is more salient. Ogihara & Sharvit (2012) provide the following example:

(24) Lifney alpayim šana, Yosef gila še Miriam ahava oto.
      Before 2000 year Yosef find-out.PST that Miriam love.PST him
      '2,000 years ago, Yosef found out that Miriam had loved (literally: loved) him.'
                                                    (Ogihara & Sharvit 2012:640)

My goal was to test whether simple past-under-past sentences, where temporal *de re* is possible, are ambiguous between the simultaneous and the back-shifted reading in Hebrew. Here is the example I tested:

(25) Be šnat alpayim, Yosef yada še Miriam haita be-heraion.
      In year 2000 Yosef know.PST that Miriam be.PST pregnant
      'In 2000, Yosef knew that Miriam was/had been pregnant.'

3/5 consultants found this sentence ambiguous, while 2/5 could only access the back-shifted reading. Among those who found it ambiguous, one had a preference for the back-shifted read-

ing in out-of-the-blue contexts, while the other two perceived complete ambiguity.[5]

Again, notice the interspeaker variation seen in Russian. For some speakers the simultaneous reading of past-under-past is not accessible at all, for others it is accessible but dispreferred, while yet for others it is accessible and at the same level as the back-shifted reading.

In the next section, I will aim to explain this observed interspeaker variation with respect to the accessibility of temporal *de re* in non-SOT languages. Note the contrast with the judgments about SOT, as in the examples in (8) and (9), which where sharp and unanimous. Why is there no interspeaker variation when it comes to whether the language has an SOT rule, but there is variation with respect to whether temporal *de re* is possible?

4. Enriched typology

Based on the literature and my own fieldwork, I conclude that simultaneous readings can be achieved through a *de re* reading of the embedded past in past-under-past sentences at least for some non-SOT speakers. Whenever temporal *de re* is blocked, this reading disappears for all speakers unanimously. Therefore, these languages clearly do not have an SOT rule. But some speakers can still use a past-under-past sentence to express a simultaneous reading, indicating that temporal *de re* is possible.[6]

So far in the literature, a distinction was made between SOT (e.g., English, Modern Greek) and non-SOT languages (e.g., Hebrew, Russian). Based on my empirical investigation, there seems to be a further division between non-SOT speakers, since some can get simultaneous readings with an embedded past, while others cannot. I propose a new 4-way distinction between (i) SOT and non-SOT languages on the one hand and (ii) the availability of a simultaneous reading with an embedded past in non-SOT languages on the other hand:

	English	**Modern Greek**	**non-SOT speaker A**	**non-SOT speaker B**
Embedded Tense	PAST	PAST or PRESENT	PAST or PRESENT	PRESENT
SOT rule	✓	✓	✗	✗

Table 1. Preferred embedded tense for simultaneous readings

The above table should be read as indicating what embedded tense is used to convey a simultaneous reading (*Embedded Tense* row) and whether a language has an SOT rule or not (*SOT rule* row). In what follows, I will propose an analysis in terms of *Prefer Local Binding*, accounting for this enriched typology.

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[5] The reader could be worried about *know* being a factive verb. Bar-Lev (2014) notes that when the matrix verb is non-factive, simultaneous readings might be somewhat harder, but still accessible. His hypothesis is that simultaneous readings are easier when the embedded clause is contextually false. A non-factive verb triggers the inference that the complement is not known to be true (but still not that it is known to be false) and is therefore closer to the conditions that facilitate a simultaneous reading. If anything, having a factive verb, which presupposes the truth of its complement, should make simultaneous readings harder given this hypothesis. Yet, they are still accessible for many speakers. In this paper, I will abstract away from the difference between factives vs. non-factives, trying to account for the possibility of temporal *de re* with past-under-past, *whenever this is possible*.

[6] Lungu (2008) shows that Romanian also allows for simultaneous readings of the embedded past in simple past-under-past cases, while being a non-SOT language. Whether there is interspeaker variation in Romanian, too, as in the other non-SOT languages investigated here, is left for future research.

5. Proposed analysis

In this section I will aim to predict the difference between non-SOT speakers that get a simultaneous reading of past-under-past via temporal *de re* and those who do not. I will propose an analysis in terms of a *Prefer Local Binding* rule, referring to the syntax of LF. The parametrization of this rule will account for the observed interspeaker variation.

5.1. Possible LFs

First, let us present all the possible LFs that give rise to a simultaneous reading. The criteria that determine which language has which LF are: (i) whether the language has an SOT rule, (ii) whether the language has a shiftable present, and (iii) whether the language/speaker allows for temporal *de re*.

There are two *de se* and one *de re* way to get to a simultaneous reading. In other words, there are two possible LFs where the temporal variable in the embedded clause is locally bound by the 'now' of the attitude holder (temporal *de se*) and one LF where the temporal variable is non-locally bound (temporal *de re*) that give rise to a simultaneous reading.

If a language has an SOT rule, then it has a way to delete the embedded past tense features if they are locally bound. Therefore, the result is a simultaneous reading, because the embedded past is never interpreted. Such an LF is available in all SOT languages (e.g., English, Modern Greek):

(26)   [In 2000] $\lambda t1$ John know^{past}t1 $\lambda t0^{past}$ that Mary be^{past}**t0** pregnant.

In this LF, the embedded temporal variable is locally bound (temporal *de se*), but the past tense is deleted and therefore the embedded tense is treated as semantically vacuous.

If a language has a shiftable present, then the embedded present tense need not refer to the speaker's 'now', but can refer to the 'now' of the attitude holder, giving rise to a simultaneous reading. This is again a case of temporal *de se*, since the embedded temporal variable is locally bound. But contrary to the SOT case, there is no past tense morpheme to delete and given that the present tense is semantically vacuous, the same reading as with (26) arises. Such an LF is available in all languages with a shiftable present tense, namely non-SOT languages as well as mixed tense languages (e.g., Hebrew, Russian, Modern Greek) (Schlenker 1999; Sharvit 2018; Tsilia 2021, forthcoming):

(27)   [In 2000] $\lambda t1$ John know^{past}t1 $\lambda t0$ that Mary be^{present}**t0** pregnant.

So, there are at least two ways to get to a simultaneous reading with temporal *de se*, one via an embedded deleted past and one via an embedded shifted present. In principle, the past-under-past sentence may have another LF as well, namely one where the embedded temporal variable is read *de re*.

If a language or a speaker of a language allows for temporal *de re*, i.e., if they allow for the embedded temporal variable to be bound non-locally, then there is yet another LF that can give rise to a simultaneous reading of a past-under-past sentence. More specifically, the embedded temporal variable may be bound non-locally, in which case the past tense features can still be interpreted without expressing anteriority with respect to the time of the attitude. In other words,

the embedded past and the matrix past may take the same temporal variable, namely the time of evaluation, the speaker's 'now'. In this case, a past-under-past sentence conveys that the matrix as well as the embedded event precede *the speaker's 'now'*; but nothing prevents them from being simultaneous. Thus, this LF of past-under-past is compatible with a simultaneous reading without requiring an SOT rule. This is the LF I argue gives rise to simultaneous readings of past-under-past for some non-SOT speakers of Russian and Hebrew:

(28)   [In 2000] λt1 John know^{past}t1 λt0 that Mary be^{past}**t1** pregnant.

Notice that the embedded temporal variable is the same as the matrix one. However, one could wonder why t1 was chosen rather than some other temporal variable. After all, temporal *de re* only requires that the embedded temporal variable is not locally bound, not that it is the same as the temporal variable of the matrix verb.

I motivate this choice by a general tendency/cognitive preference towards *de se* descriptions. For example, if one hears the following sentence in an out-of-the-blue context, there is a tendency to interpret *she de se* as referring to 'Rosa':

(29)   Rosa believes that she is smart.

Crucially, not all *de se* readings arise from *de se* LFs. So a *de re* LF can still give rise to a simultaneous reading. Given a view of *de re* where the temporal description is not quantified over at LF but is rather contextually provided via the assignment function (Cresswell & von Stechow 1982; Heim 1994), a sentence like *John believed that Mary was pregnant* would be equivalent to 'John believed that Mary was pregnant at time *d*, where *d* is the description assigned to *t* by the assignment function'. So in such a system *de re* LFs can be specified to achieve *de se* truth conditions if the temporal description provided contextually in a *de re* LF happens to be *de se*. I propose that there is a pragmatic preference for *de se* readings, due to a *Prefer De Se* rule (Schlenker 1999; Ogihara & Sharvit 2012): *Prefer de se readings whenever they are true.* This describes a pragmatic or cognitive preference for *de se* readings, independently of their LF. In the case of the LF in (28), *Prefer De Se* would predict that if the temporal variable is non-locally bound, the preferred contextually provided temporal description is *de se*. So, the reason why t1 was chosen as the contextually provided temporal variable in (28) is *Prefer De Se*.[7]

Closing this parenthesis, three possible LFs that give rise to simultaneous *de se* readings, i.e., readings where the embedded clause is simultaneous with the time of the attitude, are identified:[8]

(30)   <u>Deleted past</u>: [In 2000] λt1 John know^{past}t1 λt0^{past} that Mary be^{past}**t0** pregnant.

(31)   <u>Shifted present</u>: [In 2000] λt1 John know^{past}t1 λt0 that Mary be^{present}**t0** pregnant.

(32)   <u>Temporal *de re*</u>: [In 2000] λt1 John know^{past}t1 λt0 that Mary be^{past}**t1** pregnant.

Based on (i) whether a language has an SOT rule, and (ii) whether it has a shiftable present, I predict the following LFs to be possible in the languages I have investigated so far:

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[7] A version of this rule was used in Schlenker (1999) to explain disjoint reference effects triggered by logophoric pronouns. For example, in *John hopes he$^{de.re}$ will be elected* the logophoric pronoun *he* needs to be disjoint from *John*.

[8] Even though the meta-language used in the LFs is English, note that (31) is not available in the grammar of English (as an object language).

	English	Modern Greek	Rusian	Hebrew
Deleted past	✓	✓	✗	✗
Shifted present	✗	✓	✓	✓
Temporal de re	✓	✓	✓	✓

Table 2. Predicted LFs for simultaneous readings

As this table illustrates, all languages in principle have temporal *de re*. Indeed, given the current system, nothing prevents a temporal variable from being non-locally bound. In SOT languages, such as English and Modern Greek, this prediction would be hard to test, given that simultaneous readings are independently accessible with past-under-past thanks to the SOT rule. I will develop a diagnostic based on ellipsis in section 6 of this paper. In non-SOT languages, such as Russian and Hebrew, this predicts that past-under-past sentences should always be ambiguous between the standard back-shifted reading (achieved via temporal *de se* by locally binding the variable and interpreting the embedded past) and a simultaneous reading (achieved via temporal *de re*). This is indeed the case for some non-SOT speakers, but crucially not for all. The research question to be answered is: what blocks temporal *de re* in the grammar of some non-SOT speakers? In other words, what makes the LF in (32) unavailable?

5.2. Prefer Local Binding

The empirical investigation has shown that some non-SOT speakers can only express the simultaneous reading with present-under-past. This suggests that the only available LF is the one in (31). Thus, something that blocks the LF in (32) is needed. Otherwise, the cross-linguistic typology would over-generate simultaneous readings for some non-SOT speakers.

So, the question that arises is: why do some speakers of non-SOT languages disprefer a *de re* simultaneous reading of the embedded past? I suggest that this observed competition between a *de se* present- and a *de re* past-under-past to derive the simultaneous reading is the result of a *Prefer Local Binding* rule, referring to the syntax of LF:

(33)   *Prefer Local Binding*: Let S and S' be two LFs such that they only differ in a temporal variable being bound locally in S and being provided contextually in S'. If S and S' have the same meaning, S' is ungrammatical.

The rule falls under a more general principle, which has been argued to operate in the pronominal domain. Related principles are Condition C and Rule I (Reinhart 1983, 2006; Heim 2009). I argue that *Prefer Local Binding* may vary across speakers. When relevant, it prioritizes structurally *de se* LFs, where the temporal variable is locally bound.

Given that the shifted present LF in (31) and the *de re* past LF in (32) both yield a simultaneous reading in Russian/Hebrew, the one where the temporal variable is bound locally is preferred. Thus, the shifted present LF in (31) is preferred. This is how the unavailability of temporal *de re* is explained for some non-SOT speakers. The proposal is that this principle is part of the grammar of some (but not all) non-SOT speakers.

5.3. Interspeaker variation

Given *Prefer Local Binding*, I predict that *de se* LFs with locally bound temporal variables are preferred over *de re* ones. However, given that temporal *de re* is possible in non-SOT languages at least for some speakers, *Prefer Local Binding* cannot be a language parameter. In other words, to account for the two different populations of non-SOT speakers observed, I need to parametrize *Prefer Local Binding* individually.[9] The proposal is that there are there are two sub-grammars of non-SOT languages, one with and one without *Prefer Local Binding*:

	non-SOT sub-grammar 1	non-SOT sub-grammar 2
Prefer Local Binding	✓	✗

Table 3. Sub-grammars of non-SOT languages

In this way, individual variation is accounted for, since a given non-SOT speaker may have acquired sub-grammar 1 or sub-grammar 2. If they acquire sub-grammar 1, they prefer present-under-past to express the simultaneous reading and do not get temporal *de re* with past-under-past, which ends up having only the back-shifted reading. If they acquire sub-grammar 2, then temporal *de re* is not blocked by anything, in which case past-under-past is ambiguous between a simultaneous and a back-shifted reading. Thus, table 2 can now be fine-grained as follows:

	English	Modern Greek	non-SOT 1	non-SOT 2
Deleted past	✓	✓	✗	✗
Shifted present	✗	✓	✓	✓
Temporal de re	?	?	✗	✓

Table 4. Attested LFs of simultaneous readings

The existence of *Prefer Local Binding* in non-SOT sub-grammar 1 accounts for the absence of temporal *de re*, while its absence in non-SOT sub-grammar 2 accounts for the presence of temporal *de re*. If there is *Prefer Local Binding*, then temporal *de re* is blocked, since LFs with temporal variables that are non-locally bound are dispreferred. If there is no *Prefer Local Binding*, then nothing prevents temporal *de re*.

Why would speakers of the same language acquire two different sub-grammars, one with and one without *Prefer Local Binding*? From a learnability perspective, the data that would arguably be needed to distinguish between the existence of a *Prefer Local Binding* rule and its absence in a given grammar are so scarce that a child could plausibly make an arbitrary choice for the value of this parameter. In other words, given the poverty of the stimulus, interspeaker variation is the result of an arbitrary choice for *Prefer Local Binding*. Some speakers assume

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[9] If parametrizing an economy principle makes the reader uncomfortable, because economy laws are pragmatic and thus universal, I could in principle parametrize the comparison of LFs of morphologically different sentences. The idea would be that some non-SOT speakers tolerate comparison across morphologically different sentences (present- and past-under-past), while others do not. In other words, it could be that all speakers have *Prefer Local Bidning*, but some consider the present to be an alternative to the past, while others do not. However, this move is not theoretically preferable, since the morphology playing a role in determining which LFs are in competition is implausible — especially morphology that is by definition not visible at LF, i.e., deleted past.

their language has it in the temporal domain, while others do not. Thus, the result are the two sub-grammars in table 3.

To sum up, I have proposed a new enriched typology of simultaneous readings, positing a division between non-SOT speakers. I accounted for the variation in the availability of temporal *de re* among non-SOT speakers in terms of a *Prefer Local Binding* rule, referring to the syntax of temporal variables in the LF. If the parameter is active, then LFs where temporal variables are locally bound are preferred over ones where they are not. Finally, I argued that the interspeaker variation is a result of two non-SOT sub-grammars, differing in the value of *Prefer Local Binding*. I argued that these two sub-grammars are the result of an arbitrary choice by the speakers, given the limited data they have about binding of temporal variables. For this reason, different speakers end up learning different things about their language.

6. Insights from ellipsis

I argued that there are two sub-grammars in non-SOT languages, accounting for the interspeaker variation observed. The question that naturally arises is: are there two sub-grammars in SOT languages as well, such as English and Modern Greek? If there is interspeaker variation with respect to the availability of temporal *de re*, then this is the case. In other words, the question that needs to be answered is: is *Prefer Local Binding* active for some but not all SOT speakers?

As previously mentioned, the problem with SOT languages is that the effects of *Prefer Local Binding* are not easily felt, given that there is an SOT rule that independently accounts for simultaneous readings of past-under-past. Therefore, the simultaneous reading of past-under-past does not teach us anything about the possibility of temporal *de re*.

I develop an ellipsis diagnostic, arguing that it detects whether a temporal *de re* LF of past-under-past is available in SOT languages. Modern Greek is a mixed tense language, which has both an SOT rule like English and a shiftable present like Hebrew and Russian. Therefore it is going to be particularly informative since comparing the present- and the past-under-past sentence as antecedent of an ellipsis will show us whether (i) the two are equivalent having only the LFs in (31) (repeated below as (35)) and (30) (repeated below as (34)) respectively, or (ii) the past-under-past sentence has the temporal *de re* LF in (32) as well (repeated below as (36)), creating an additional antecedent for the ellipsis compared to the shifted present.

(34)   Deleted past: [In 2000] λt1 John know$^{\text{past}}$t1 λt0$^{\text{past}}$ that Mary be$^{\text{past}}$**t0** pregnant.

(35)   Shifted present: [In 2000] λt1 John know$^{\text{past}}$t1 λt0 that Mary be$^{\text{present}}$**t0** pregnant.

(36)   Temporal *de re*: [In 2000] λt1 John know$^{\text{past}}$t1 λt0 that Mary be$^{\text{past}}$**t1** pregnant.

Thus, the present-under-past sentence in Modern Greek, which only has the temporal *de se* LF in (35) will be the control. Only the LF in (35) should be available for reconstruction in the ellipsis site. The crucial diagnostic will be whether the past-under-past sentence gives rise to two potential antecedents, namely (34) and (36), or just the temporal *de se* (34).

So, if a temporal *de re* reading of the embedded past is possible, ambiguity is expected with the past-under-past antecedent, since both (34) and (36) could be copied in the elided material. But if the temporal *de re* reading is blocked by *Prefer Local Binding*, then the present- and the past-under-past antecedents are expected to give rise to the same unambiguous reading for the elided material. I tested the following sentence in Modern Greek with three consultants:

(37) Context: *There are everyday press conferences for the ongoing pandemic situation.*

Chtes   i   omilitria   iche   tin
yesterday the.NOM.FEM spokesperson.NOM.FEM have.PST.3SG the.ACC.FEM
entiposi   oti kani   / ekane   ena   lathos.
impression.ACC that make.PRS.3SG / make.PST.3SG a.ACC.NEU mistake.ACC.NEU.
Simera episis.
Today too.
'Yesterday the spokesperson had the impression that she is making/was making a mistake. Today too.'

The use of the embedded present gives rise to an unambiguous reading as expected since only a *de se* LF , namely (35), is available to be copied. More specifically, it means that the spokesperson is making a mistake again today, thus having made two mistakes in total. On the contrary, the use of the embedded past is ambiguous for all my consultants; it could have the same meaning as the embedded present, giving rise to the inference that the spokesperson made two mistakes, one yesterday and one today. In this case the *de se* LF in (34) is copied. It could also have another meaning, namely that today she has again the impression of having made a mistake yesterday, thus having made only one mistake in total. In this case the temporal *de re* LF in (36) is copied.

Given that the past-under-past is ambiguous, I conclude that the temporal *de re* LF in (36) is an available antecedent. Thus, *Prefer Local Binding* is absent for at least some SOT speakers as well. I conclude that temporal *de re* is possible for at least some Modern Greek speakers.

What about English? Given that English does not have a shiftable present, I do not have the present-under-past antecedent that acts as a baseline. However, the diagnostic still holds, because the crucial part is whether there is ambiguity in the ellipsis site or not. If there is ambiguity between one and two mistakes in total, then both the temporal *de se* LF in (34) with the SOT rule and the temporal *de re* LF in (36) can be copied in the elided material. Meaning that both are available antecedents. If there is no ambiguity and the sentence only has the two mistakes in total reading, then *Prefer Local Binding* must be blocking the temporal *de re* LF in (36) from being an available antecedent. Here is the sentence:

(38) Context: *There are everyday press conferences for the ongoing pandemic situation.*

Yesterday the spokesperson had the impression that she was making a mistake. Today too.

I tested this sentence with two speakers: for one this sentence was ambiguous between the one and the two mistakes reading, suggesting that there is no *Prefer Local Binding*, while for another there was a strong preference for the two mistakes reading, suggesting that *Prefer Local Binding* is active, making the temporal *de re* LF dispreferred. This fits well into the picture of Hebrew and Russian, since there seems to be interspeaker variation in SOT languages as well with respect to whether *Prefer Local Binding* is active or not. This would suggest that there are two sub-grammars in SOT languages as well, accounting for the attested typology:

	English	**Modern Greek**	**Russian**	**Hebrew**
Deleted past	✓	✓	✗	✗
Shifted present	✗	✓	✓	✓
Temporal de re	✗/✓	✓	✗/✓	✗/✓

Table 5. Typology of simultaneous readings

The interspeaker parametrization of *Prefer Local Binding* accounts for the ✗/✓ difference in some SOT (English) and some non-SOT languages (Russian, Hebrew). As for Modern Greek, all my consultants seem to access temporal *de re*, which is surprising, since the variation would be expected across the board.

Does this suggest that *Prefer Local Binding* is inactive in the language? If so, how would that fit with my argument that there is not enough data to infer whether *Prefer Local Binding* is active in the language? A more thorough empirical investigation is needed to settle the issue of whether there is interspeaker variation in Modern Greek as well. However, I would like to point out that Modern Greek has an SOT rule and there is an interaction between having an obligatory or optional SOT rule and having *Prefer Local Binding*. More specifically, if the SOT rule in (5) is obligatory, then a past-under-past sentence can only have a back-shifted reading via a *de re* LF as in (36). So, if SOT is obligatory, then a past-under-past sentence can only have a back-shifted reading if *Prefer Local Binding* is inactive. Indeed, if there is both an obligatory SOT rule and *Prefer Local Binding*, then there would be no way of accessing a back-shifted reading via a simple past-under-past sentence; an additional layer of past would be needed to get the back-shifted interpretation (e.g., 'Mary thought that she *had* been pregnant'). If SOT is optional, then a past-under-past sentence could be ambiguous between a simultaneous and a back-shifted reading, regardless of whether there is *Prefer Local Binding* or not. This is summarized in the following table:

	Prefer Local Binding ✓	*Prefer Local Binding* ✗
SOT obligatory	Past-under-past only simultaneous	Past-under-past ambiguous
SOT optional	Past-under-past ambiguous	Past-under-past ambiguous

Table 6. Interaction between SOT and *Prefer Local Binding*

Thus, the absence of variation in Modern Greek can be accounted for by the obligatoriness of the SOT rule in the language, together with the fact that past-under-past sentences are generally ambiguous. If SOT is obligatory, then for past-under-past to be able to have a back-shifted reading, *Prefer Local Binding* should be inactive. As for English, to the extent that there is variation w.r.t. *Prefer Local Binding*, I could argue that the SOT rule is optional.

7. Predictions

A prediction of this theory, according to which *Prefer Local Binding* is a principle that can be parametrised, is that other related principles could be parametrized as well. One such principle is Rule I from Reinhart (1983, 2006), which is meant to derive Condition C effects. Here is its simplified version in Trinh & Truckenbrodt (2018):

(39)   <u>Rule I:</u> If coreference and binding are semantically indistinguishable, then use binding instead of coreference.

The idea is that if temporal economy is parametrized, then pronominal economy could be as well. So, this would predict that there are languages without Condition C effects.[10] Indeed, this typological prediction is borne out in Vietnamese. Trinh & Truckenbrodt (2018) argue that Rule I is parametrized and in fact inactive in Vietnamese. This is because the equivalent of the following two sentences in Vietnamese can be synonymous, i.e., truth-conditionally equivalent:

(40)   Minh said to Linh: 'I will live here.'

(41)   Minh said to Linh: 'Minh will live here.'

Saying 'I' or the proper name can convey the same meaning. In other words, there is no requirement that the speaker and the addressee must be referred to by pronouns; one can use their own name to refer to themselves. Thus, it seems that Rule I is inactive, since it would otherwise predict that these two sentences are in competition, and that binding (i.e., the pronoun) should be used instead of coreference (i.e., the proper name). I take this as evidence that there is parametrization of Rule I operating in the pronominal domain, which is related to *Prefer Local Binding* operating in the temporal domain. Therefore, parametrizing principles that promote binding over coreference is something independently needed to explain the absence of condition C effects in Vietnamese. I argued that a related principle, operating in the temporal domain, is parametrized within a language, across speakers (interspeaker variation).[11]

8. Conclusion

To sum up, the literature so far has made a distinction between SOT and non-SOT languages. SOT languages, being able to delete the past tense features on the embedded verb, can express the simultaneous reading with a past-under-past. Non-SOT ones, being unable to do so, have a shiftable present and thus express the simultaneous reading with a present-under-past. Mixed tense languages, like Modern Greek, which have both an SOT rule and a shiftable present have two ways of expressing the simultaneous reading.

Based on my empirical observations, I argued that there is interspeaker variation with respect to how accessible a simultaneous reading of a past-under-past sentence in non-SOT languages is. More specifically, I argued that there are two populations of non-SOT speakers in Hebrew and in Russian: those who get a simultaneous reading with past-under-past and those who do not. For the former, past-under-past sentences are ambiguous between a simultaneous and a back-shifted reading, while for the later, they only have a back-shifted reading.

Having introduced a further distinction between non-SOT speakers, I proposed to account for it in terms of a *Prefer Local Binding* rule in the temporal domain, stating that LFs where the temporal variable is locally bound are preferred. This rule is parametrized across speakers, who

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[10] Notice that in this case, the parametrization is at the level of the language, not the speaker. This could be because there are plausibly more data available to the learner than there are in the temporal domain. I expect to find interspeaker parametrization when the stimulus is too poor to determine the value of the parameter. In such cases, speakers make an arbitrary choice for its value, resulting in interspeaker parametrization.

[11] As an anonymous editor notes, we proposed interspeaker rather than intraspeaker variation, since speakers themselves have consistent judgements.

— given the poverty of the stimulus — make arbitrary choices for the value of this parameter. This predicts the existence of two sub-grammars in non-SOT as well as SOT languages. I argued that this is borne out, developing a diagnostic for the availability of temporal *de re* in SOT languages. Thus, I explained the attested interspeaker variation in non-SOT languages, while also making a novel prediction for interspeaker variation in SOT ones.

Acknowledgments

Abbreviations

IMPFV	imperfective	NOM	nominative
3SG	third person singular	ACC	accusative
FEM	feminine	PST	past
MASC	masculine	PRS	present
NEU	neuter	FUT	future

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