Chapter 1
On Abusch's "Sequence of Tense and Temporal *de re*"

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Abstract This chapter provides an overview of Dorit Abusch's 1997 paper *Sequence of tense and temporal de re*, reporting both on the ideas presented in the paper and its influence in the field. The paper has had a lasting impact, both in in terms of its interaction with literature at the time of publication, and in terms of how it continues to shape our debates today. The chapter aims to elucidate that by tracing how various aspects of Abusch's paper resurface in later debates.

Keywords Sequence of tense · Semantics of tense · Embedded tense · Temporal "de re" · Double access readings · Upper limit constraint · Propositional attitudes

Introduction

In *Sequence of Tense and Temporal De Re*, Abusch investigates the interpretation of tense in intensional contexts. The paper has had a lasting impact, both in terms of its interaction with literature at the time of publication, and in terms of how it continues to shape our debates today. It remains an obligatory point of reference for theories of the interpretation of embedded tense, providing profound insights regarding the resolution of temporal reference, and a rich toolbox for extending the inquiry to cross-linguistic variation. The paper begins with a set of puzzles that is given an analysis within an *independent* theory of tense. This is followed by a set of problematic examples, and a new analysis in terms of *sequence-of-tense*. A special principle, dubbed the *Upper Limit Constraint*, is invoked to explain restrictions in tense interpretation in attitude complements. Finally, the paper addresses the interpretation of present tense embedded under past attitude verbs, bringing together all strands of the proposal.

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The theory is empirically grounded on English, and key data includes examples like (1) and (2), illustrating 'shifted backwards' readings and 'simultaneous' readings of embedded past tense:

(1) Shifted backward reading

The defendant Past$_2$ was actually at home watching 'The Simpsons' at the time of the crime$_2$. But after hearing the testimony of the first eye-witness, the jurors clearly Past$_3$ believed that he Past$_2$ was in the laboratory building. (Abusch 1997: 2)

(2) Simultaneous reading

Mary Past$_2$ believed it Past$_2$ was raining. (Abusch 1997: 3)

In cases like (1), the interpretation of past embedded under *believed* appears shifted towards the past of the matrix-clause time. In cases like (2), the eventualities appear co-temporal. Examples like (2), in which a past embedded under past generates an intuition of simultaneity, have traditionally been classified as examples of 'sequence of tense'[1] (I will informally talk about sequence of tense *effects* to avoid theoretical bias). A first puzzle, therefore, is to spell out a theory of embedded tense that captures intuitions about (1) and (2). In addition, Abusch (1997) focuses on the specific issues raised by presents embedded under past, known to give rise to intricate interpretations:

(3) Present-under-Past

John believed that Mary is pregnant. (Abusch 1997: 39)

In addressing such data, Abusch (1997) provides a synthesis of earlier work (Abusch, 1988, 1991, 1994) and enters a dialogue with contemporaneous literature (e.g. Ogihara, 1989, 1996; Stowell, 1993, 1996; Kratzer, 1998; von Stechow, 1995).

The interpretation of tense in embedded contexts constitutes both a long-standing domain of inquiry[2] and a lively current agenda. In contemporary linguistics, it provides a testing ground for views about interfaces (morphosyntax vs. semantics vs. pragmatics), theories of agreement and feature transmission, views about logophoricity, indexicality and the role of the context parameter, differences

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[1] After the traditional grammatical term applied to similar effects in Latin: *consecutio temporum*.

[2] General overviews of the semantics of tense that can be useful to situate the issues in a broader context include Kuhn and Portner (2002), Grønn and von Stechow (2016), Ogihara (2011), and Ogihara and Sharvit (2012) provide a crucial critical assessment focused on embedded tenses with a cross-linguistic perspective. General descriptive overviews of tense interaction in subordinate clauses in English include a.o. Quirk et al. (1985) and Huddleson and Pullum (2002). Comrie (1985) provides a good first introduction to sequence of tense phenomena (Chap. 5), while Binnick (1991) encompasses more complex data descriptions and a history of the problem (including a brief review of the facts in Latin). A short review of discussions of sequence of tense in English within more traditional grammars can be found in Ogihara (1996: 68ff). Early discussions and treatments of sequence of tense effects in English can be found in Ladusaw (1977), Smith (1978), Dowty (1982), and Comrie (1986). Finally, though not focused on embedded clauses, the annotated online bibliography in Binnick (2017) provides very useful general references.

between sentence-level phenomena vs. discourse-level phenomena, and a rich
empirical domain in which to study cross-linguistic variation. As we will see, one of
the important responses to Abusch's work has been to examine it in light of cross-
linguistic variation. The result has been a much more nuanced understanding of
typology in this domain, dismissing the hypothesis of a two-way distinction between
languages with, or without, sequence of tense effects.

My presentation focuses on some key ingredients of Abusch (1997) and follows
closely the structure of the original paper, while establishing links to related
work. The structure is as follows: Section "An independent theory of tense"
provides an overview of Abusch's independent theory of tense, section "The upper
limit constraint" discusses the Upper Limit Constraint, section "Capturing tense
dependencies" focuses on the mechanisms of tense transmission that capture tense
dependencies, and section "Present-under-past" concludes with a discussion of
double access readings for present-under-past.

An Independent Theory of Tense

In Abusch's characterization, an *independent* theory of tense is a referential theory
in which the interpretation of tense is always anchored on the speech time/time of
the context. Following Partee (1973), tenses are treated as variables that refer to
times. The reference time for the interpretation is taken to always be the speech
time, regardless of whether tenses are embedded or not. Abusch's original views
were reconstructed in Heim (1994) as the presuppositional treatment of past (Past)
and present (Pres) tense in (4), which has become part of the standard repertoire in
the literature.[3]

(4)   a. $[[\mathbf{Past_i}]]^{g,\,c}$ is defined only if $g(i) < t_c$, in which case
            $[[\mathbf{Past_i}]]^{g,\,c} = g(i)$
      b. $[[\mathbf{Pres_i}]]^{g,\,c}$ is defined only if $g(i)$ o t_c, in which case
            $[[\mathbf{Pres_i}]]^{g,\,c} = g(i)$ (Heim, 1994: 144)
            (Where '<' means *wholly precedes*, 'o' means *overlaps*, t_c is the time of
            the context, and an utterance is only felicitous if it has a well-defined
            truth-value in the context.)

The independent theory seeks to derive the interpretations of (1) and (2) in terms
of differences in the anaphoric relation established by embedded past. We could
speculate that past-shifted readings obtain when the embedded tense is anaphoric to
a tense before the matrix believing time (as in (1)), and that simultaneous readings
obtain when it is anaphoric to the past matrix time (as in (2)). In dealing with

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[3] Abusch (1997) only includes present and past in the category of tense. A semantics for *will* is not
explicitly spelled out (but see Abusch, 1998, 2004, as well as Heim, 1994 and Condoravdi, 2002,
2003).

counterexamples to this simple proposal, Abusch puts forward a *de re* analysis of embedded tense that remains an exciting and influential aspects of Abusch's work.[4] A first type of problematic example is illustrated in (5), which crucially lacks the forward-shifted reading for $Past_2$ represented below in the complement of *thought*:

(5) John $Past_1$ found an ostrich in his apartment yesterday. Just before he $Past_2$ opened the door, he $Past_3$ thought that a burglar $Past_2$ attacked him.

The problem is that the independent theory does not seem to predict the absence of such forward shifted reading. As long as the embedded tense presupposition is satisfied and $Past_2$ is past with respect to the time of the context, it should not matter whether or not $Past_2$ is future with respect to $Past_3$.

Abusch began by investigating whether a *de re* analysis of *believe*, extended to a temporal *res*, could provide the insights needed to differentiate permitted anaphora in (1) and (2) from forbidden anaphora in (5). The account brings together the independent theory of tense with a *de re* analysis of attitude verbs, building on Lewis (1979) and Cresswell and von Stechow (1982): *de re believe* combines with a *res*-time and a property of times in the form of a structured proposition. An illustration is provided with (6a) (=2), (simultaneous reading):[5]

(6) a. Mary believed it was raining.
     b. [Mary $Past_2$ believed [[$Past_2$] λt_3 [it t_3 was raining]]] (see Abusch 1997: 13)

De re tense is in an extensional position and the independent theory predicts that it will be interpreted as preceding the speech time (t_c in (4a)). The semantics of *believe* is spelled out in terms of quantification over centered worlds, centered on both an individual and, crucially, a time (Abusch uses the notation <x_{self}, t_{now}, w> for centered worlds to emphasize the interpretation of the variables as corresponding to a 'self' and the self's 'now'). A salient acquaintance relation is responsible for identifying the *res* 'counterpart' in the belief-worlds quantified over. In (6), the salient acquaintance relation can simply identify the time perceived by Mary to be her 'now' in a belief world. The truth of (6) will require that it be raining at that time in the centered worlds corresponding to Mary's beliefs in the evaluation world at g(2) (=t_2). The *de re* semantics also requires that Mary bear the relevant acquaintance relation to t_2 at t_2 in the evaluation world (i.e. that she perceive it as her 'now'). The result will be a simultaneous reading. The analysis for past-shifted cases like (1) is basically the same as for the simultaneous case, with $Past_2$ receiving

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[4] A *de re* analysis of attitudes with consequences for temporal relations was also put forward independently by Ogihara (1989, 1995, 1996, etc.), targeting a broader empirical base including data from Japanese.

[5] I aim to present Abusch's ideas in broad strokes. For formal details, the reader is referred to Abusch (1997) and the critical reconstruction offered in Heim (1994). There are well known problems at the syntax-semantics interface for *de re* attitudes, independent of the issues under discussion here, which I set aside.

an independent interpretation in relation to the speech time. The difference with 110
(6) is that the acquaintance relation will now identify the time in the belief worlds 111
before t_{now} at which the witness experienced certain events (causally related to the 112
witness's description of what happened). This gives rise to a past-shifted reading. 113
The explanation for the disallowed forward-shifted option in (5) lies in constraints 114
on possible/salient acquaintance relations. In (1) and (6), the acquaintance relations 115
establish a perceptual or causal link between the individual and the *res* in the base 116
worlds, but no such relation is available for (5). In the future-shifted example, the *res* 117
time t_2 is a future time with respect to the matrix attitude time, and does not stand 118
in a perceptual nor causal relation to the holder of the attitude at the belief-time in 119
the evaluation world. 120

Abusch's hypothesis is that acquaintance relations have to be either causally or 121
perceptually grounded, ruling out future-shifted readings for embedded past. 122

As we will see in section "The upper limit constraint", a further series of 123
problematic examples eventually leads Abusch to conclude that constraints on 124
acquaintance relations in *de re* attitudes are not sufficient to explain constraints 125
on the interpretation of embedded tenses. However, the idea that we can shed 126
light on temporal interpretation by examining the kind of descriptive content that 127
seeps into composition when we refer to times remains an exciting and promising 128
aspect of Abusch's proposal. It opens the door to empirical research on the types of 129
acquaintance relations that are available to resolve reference across modal contexts, 130
as well as characterizing times as an empirical base for testing hypotheses about 131
how such descriptive content is identified and manipulated in composition. 132

While Abusch (1997) did not take properties of a *de re* analysis to provide 133
an explanation for the absence of forward-shifted readings for embedded past, a 134
de re construal remained an open possibility (indeed, as we will see in section 135
"Present-under-past", the only possibility for present under past as in (3)). Past 136
under past examples like *Mary believed it was raining* were considered structurally 137
ambiguous, allowing embedded past to be interpreted as dependent on the matrix 138
past or *de re*. More recent literature has explored this as a possible locus for 139
variation, across and within language. Ogihara and Sharvit (2012), for example, 140
establish differences between English, Japanese, Russian and Hebrew on the basis 141
of differences in how movement is regulated to derive the LFs leading to *de re* 142
interpretations (see also Bar-Lev, 2015); Grønn and von Stechow (2010) consider 143
that factive verbs in Russian obligatorily receive a *de re*-style interpretation while 144
other embedding verbs do not. 145

The Upper Limit Constraint 146

Abusch discusses three main types of data that militate against the view that 147
constraints on acquaintance relations in *de re* attitudes explain the absence of 148
future-shifted readings for embedded past. One is the observation that future shifted 149

readings are not obtained even in cases in which the anaphoric antecedent for past
is found within the belief context:

(7)　a.　Last Monday John $Past_2$ believed that he $Past_3$ was in Paris on
　　　　　Tuesday$_3$.

　　　b.　John $Past_2$ believed he $Past_3$ was in Paris at some time$_3$. (Abusch
　　　　　1997: 16, 17)

(7a) lacks a forward-shifted reading in which *Tuesday* is interpreted as following
the believing time last Monday (even though in principle *Tuesday* can refer to future
times, as in *I will be in Paris on Tuesday* (Abusch 1997: 16)). A similar point arises
with (7b). Abusch's concern is that in these examples the temporal adverbial is part
of the attitude, and not a characterization ascribed by the speaker. A *de re* analysis
of the adverbials does not seem the right way to go, and so the constraints on the
acquaintance relation between the time (t_3) and the holder of the attitude that had
been claimed to rule out (5) would not be expected to be relevant. A second type of
data, which in a sense mirrors (7), concerns examples like (8):

(8)　Leo will go to Rome on the day of Lea's dissertation. Lia$_i$ believes [that
　　she$_i$ will go to Rome with him then.] (Abusch 1997: 26)

In the salient reading, *then* is anaphoric to *the day of Lea's dissertation*. As a case
of anaphora in intensional context, Abusch posits that *then* should receive a *de re*
reading in this example.[6] But this would require allowing an acquaintance relation
between the holder of the attitude and the future time referred to by *then*. This
should not be possible assuming the constraint on acquaintance relations barring
acquaintance with future times.

　　A third set of data, maybe more worrying, corresponds to examples like (9):

(9)　Sue $Past_3$ believed that she $Past_3$ would marry$_2$ a man who $Past_2$ loved her.

We interpret the t_2 'marrying' time in (9) as later than the t_3 'believing' time, and
undetermined relative to the speech time. In the salient interpretation, loving is
simultaneous with marrying. Even though tense in the relative clause is past ($Past_2$),
loving is not ordered in relation to the speech time at all. The independent theory
does not seem able to account for this.

　　Problems like the ones noted above led Abusch to abandon the independent
theory of tense and the view that constraints on the interpretation of embedded past
tense comes from properties of acquaintance relations. Abusch's new solution to
block forward-shifted readings, however, appeals to an intuition that she considers
rather similar (but only briefly sketches): time branches towards the future and
the times towards the future of the now of an attitude holder are not sufficiently
'determinate' to refer to (in contrast with what happens in the past). This intuition
is cashed out in the *Upper Limit Constraint* (ULC), which states that the local

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[6] For a discussion of the role of adverbials in shifting the interpretation of embedded tense from a
cross-linguistic perspective, see Ogihara and Sharvit (2012).

evaluation time serves as an <u>upper limit</u> for the evaluation of tenses (Abusch 1997: 184
25).[7] The reason why Past$_2$ in (5) cannot be shifted to the future of Past$_3$ (the 185
'thinking' time) is that the 'now' corresponding to the epistemic alternatives relevant 186
for the interpretation of *think* serves as an upper limit for the denotation of the 187
embedded tense.[8] 188

In spite of concerns regarding the justification of the ULC, it has become a 189
standard point of reference in the literature and continues to be a focus of debate. 190
It has been evaluated from a cross-linguistic perspective by Ogihara and Sharvit 191
(2012), who adopt the ULC and incorporate it into a modified analysis; it has been 192
re-examined in light of challenging data from attitude verbs like *hope*, e.g. *Bill* 193
hoped it rained, which has led some authors to reject the stipulation of the ULC 194
as a uniform principle (e.g. Altshuler & Schwarzschild, 2013; Klecha, 2016), and 195
it has been part of debates regarding the interpretation of present-under-past (to be 196
addressed in section "Present-under-past"). 197

Capturing Tense Dependencies 198

As Abusch notes, the ULC solves only part of the problem raised by tenses 199
in intensional contexts. Designed to account for the absence of forward-shifted 200
readings of embedded past, the ULC does not explain cases in which the reference 201
of past tense does not seem to lie in the past at all. Abusch offers (10), after a famous 202
French example by Kamp and Rohrer (1984): 203

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(10)　John Past$_3$ decided a week ago that in ten days at breakfast he Past$_3$ would
　　　say$_4$ to his mother that they Past$_4$ were having their last meal together. 205
　　　(Abusch 1997:27)

The most deeply embedded past in (10) (Past$_4$) does not precede the speech time (or 206
any other salient reference time). 207

Examples like this motivate the view that tense morphology can dissociate from 208
semantics: there are instances of past tense morphology that do not univocally 209
associate with a past meaning. They are instead the reflection of another past tense. 210
In Abusch's theory, the dissociation is facilitated by the fact that tense information 211
encompasses a variety of ingredients: a temporal variable that refers to a time, 212

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[7] In her discussion of Abusch's work, Heim (1994) spells out a presuppositional account of the
ULC, which is endorsed by Abusch (1997). Tense nodes are claimed to carry the presupposition
that the interval they refer to does not come after the local evaluation time. This presupposition
is added to other constraints on reference coming from tense itself. See also related constraints
termed *Abusch's Constraint* in von Stechow (1995), Kratzer (1998).

[8] Shifting towards the future in embedded clauses is possible with *will/would*. However, Abusch
considers that these forms spell out both tense and an intensional operator (see section "Capturing
tense dependencies" for some discussion).

a relation between the reference of that variable and a local evaluation time, a constraint on relations between times (either *precedence* or *non-precedence*), and a specification of the relations that can be affected by that constraint. Sequence of tense effects are captured in terms of a tense transmission mechanism that makes higher tenses 'visible' (accessible) to tenses in attitude complements, allowing the temporal relations corresponding to higher tenses to interact with temporal constraints associated with tenses below. The transmission mechanism depends on intensionality, with the arguments of intensional operators characterized as properties of times. A temporal binder in the embedded clause binds a time that corresponds to the 'now' of the attitude holder and serves as the local evaluation time for the embedded tense (in matrix contexts, this is the speech time).[9]

Abusch's transmission-account aims to capture the fact that in examples like (10), $Past_4$ is legitimate in the embedded clause even if the time of the meal is not past with respect to the local evaluation time (or the speech time). This is because that embedded past is taken to inherit the temporal relations from higher tenses, and the precedence constraint associated with $Past_4$ can be fulfilled by one of those other temporal relations (e.g. the one corresponding to the matrix tense). In principle, this allows the embedded tense variable to be interpreted as simultaneous with the saying time (identified with the local evaluation time) while the temporal constraints associated with past are fulfilled via tenses higher up in the clause. In the case of past-shifted readings of embedded past, the relation between the embedded tense variable and its local evaluation time is one of precedence (Abusch 1997 does not work out such an example, but points in this direction on page 39).

While Abusch (1997) presents several examples illustrating the types of structures and the transmission mechanism she has in mind, there is considerable vagueness regarding aspects of the implementation. This has been critically taken up in literature in comments such as Heim (1994) and von Stechow (1994), which offer alternative exegeses that have been very influential in subsequent work. Heim (1994), for example, spells out a reformulation of Abusch's account that does not rely on transmission of relations. Heim's proposal introduces instead a Tense Licensing Condition that allows past morphemes to be licensed if they are in the domain of at least one affix encoding precedence. This allows several instances of past morphology to be licensed by a single 'semantic' past (see also Stowell, 1993).

In Abusch (1997), the transmission of temporal relations is mediated by intensional operators that take properties of times as arguments. This includes propositional attitude verbs like *believe*, but also *will/would* and nouns describing psychological states such as *desire*. Illustrations are provided in (11) and (12) below. Sequence of tense effects are not observed in extensional contexts, with an example by Abusch in (13):

(11) a. She will marry a man she met recently. (Dowty, 1982)
      b. He will buy a fish that is alive. (Ogihara, 1989, 1996)

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[9] See discussion in von Stechow (1995), Kratzer (1998), also Ogihara (1989, 1996).

The temporal interpretation of the relative clauses in (11) is shifted towards the future, with a meeting time that precedes the (future) marriage time in (11a), and a fish alive at the (future) time of purchase in (11b). *Will* is responsible for this shift. Even though she does not provide a semantic proposal, Abusch considers *will* as the morphological spell out of PRES + *woll*, where *woll* is an intensional operator and thus gives rise to sequence of tense effects via transmission. As we have seen, e.g. (9), (10), *would* (PAST + *woll*) also gives rise to sequence of tense effects, noted also in a past version of (11b): *He said he would buy a fish that was alive* (see Ogihara, 1989, 1996). The example in (12) illustrates a case of sequence of tense effects associated with the temporal argument of a noun:

(12)   I know that Mary was a strange child. But her desire to marry a man who resembled her is really bizarre. (Ogihara, 1996, attributed to I. Heim)

The context in (12) sets up the temporal location of Mary's desire in the past, and this is sufficient to license past morphology in the relative, allowing us to interpret the common resemblance as contemporary with the (future) marrying time. In the extensional example in (13), however, both instances of past morphology are associated with past semantics, with the corresponding eventualities ordered before the speech time, and unordered with respect to each other.

(13)   Last week John met a woman who was in the next room (#now). (Abusch 1997: 29)

The restriction of tense transmission to intensional contexts is an important feature of Abusch's theory. With variation, alternative (more or less) contemporary accounts such as Enç (1987), Ogihara (1989, 1996), Stowell (1993, 1996, 2007), von Stechow (1995, 2009), Kratzer (1998), Kusumoto (1999, 2005), and Schlenker (1999, 2003) defended views linking sequence of tense effects more clearly to structural configurations rather than to a (purely) semantic characterization of the environment[10] (it is interesting to see that in his brief introduction to the problem, Ogihara (1996: 71ff.) remarks on a similar dichotomy already present in traditional grammars). A comparison between the two types of perspectives depends on how intensional operators are identified, and on views about the nature and role of temporal arguments associated with syntactically tenseless predicates (e.g. the noun in (12)). While Abusch does not offer independent discussion of such matters, some issues have been taken up in subsequent literature. For example, a discussion of similarities/differences in the temporal arguments associated with verbs vs. other categories can be found in Kusumoto (1999, 2005) (for a discussion of temporal arguments of nouns more generally see a.o. Enç (1986), Musan (1995)). As noted earlier, the technicalities of Abusch's transmission proposal raised concerns, with

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[10] I will not be able to do justice here to the tradition that provides analyses of sequence of tense effects on the basis of more specifically syntactic theories, without a main focus on compositional interpretation. In addition to cited work by Enç and Stowell, syntactically-oriented accounts include a.o. Zagona (1990, 2014), Uribe-Etxebarria (1994), Demirdache and Uribe-Etxebarria (2004), and Hornstein (1990).

alternative accounts often appealing to more familiar mechanisms: Ogihara (1989, 1996) and von Stechow (1995), for example, appeal to a tense deletion rule Stowell (1993, 1996, 2007), spells out syntactically-based analyses that build on the idea of polarity as relevant for licensing Kusumoto (1999, 2005), spells out a semantic theory building on Stowell's polarity proposal, and Kratzer (1998) and Schlenker (1999) appeal to morphological feature agreement. Subsequent literature has also re-examined the scope of the problem, both in terms of the types of elements that enter into a dependency and the characterization of the domain.[11] Both Kratzer (1998) and Schlenker (1999, 2003), for example, have provided unified accounts of 'transmission' across temporal and pronominal domains in terms of features and logophoricity, with Schlenker arguing for 'sequence of person' and 'sequence of mood' effects analogous to sequence of tense. Sharvit (2003, 2004, 2008) has pointed to parallelisms between sequence of tense in embedded clauses and tense behaviour across sentential boundaries in Free Indirect Discourse, suggesting that the latter may be explained by means of an operator functioning similarly to an attitude verb.

It seems worthwhile to make two more points here. One is that Abusch (1997) is not concerned with cross-linguistic variation, examining exclusively data from English. Sequence of tense effects, however, are known to vary robustly across languages and in order to arrive at a complete picture, Abusch's proposal would need to be re-examined in light of a broader empirical base. As an illustration, two examples from languages that have traditionally been claimed to lack sequence of tense effects are presented below, and can be compared with the English example in (6). In these cases, the simultaneous reading that we noted for embedded past in (6) is obtained with an embedded present tense:

(14) Japanese
    Bernhard-wa Junko-ga byooki-da-to it-ta
    Bernhard-TOP Junko-NOM be-sick-PRES say-PAST
    'Bernhard said that Junko was sick' (Kusumoto, 1999)

(15) Russian
    On skazal, čto živet pod Moskvoj.
    He say-PAST-PF that be-PRES around Moskow
    'He said he was living just outside Moscow' (Grønn & von Stechow, 2010)

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[11] There are accounts in the literature that have actually moved away from analyzing sequence of tense effects in terms of structural properties properly associated with embedded tense (e.g. Altshuler, 2008 for Russian). Some recent proposals have argued that pragmatic considerations actually play a central role in our interpretation of tense in such contexts, e.g. Altshuler and Schwarzschild (2012, 2013), Klecha (2018), with Gennari (2003) an early exponent of this view. Concerns have been raised, however, regarding how pragmatics handles cross-linguistic variation (e.g. Ogihara & Sharvit, 2012; Smirnova, 2009; Kusumoto, 1999). See also Bochnak (2017) for discussion of sequence of tense effects in Washo, an optional tense language, that supports a structural rather than pragmatic account.

Proposals that tackle cross-linguistic data have accounted for variation in several 318
ways, including cross-linguistic differences in tense deletion rules, in the character- 319
ization of the original tense inventory, in terms of constraints on tense movement, 320
etc. 321

A related second point is that a cross-linguistic perspective has led to a more 322
fine-grained picture of sequence of tense effects, which is arguably pertinent for our 323
understanding of English data as well (see e.g. Ogihara & Sharvit, 2012; Sharvit, 324
2003). The domains relevant for sequence of tense effects have been shown to 325
vary significantly across languages, as well as the range of interpretations available 326
to the different members of the tense inventory. Substantial differences have been 327
found, for example, in cross-linguistic comparisons that have examined both tenses 328
embedded in attitude complements and in temporal adjunct clauses (a.o. Arregui & 329
Kusumoto, 1998; Kubota et al., 2009; Grønn & von Stechow, 2013; Sharvit, 2014), 330
as well as in relative clauses (e.g. Ogihara & Sharvit, 2012; Grønn & von Stechow, 331
2013). English data has become part of a more ambitious conversation. 332

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Present-Under-Past 333

The interpretation of present tense clauses embedded under past tense intensional 334
operators is known to raise a number of intricate issues, and Abusch's solution relies 335
on bringing together the different strands in her work.[12] Abusch's original example 336
is provided in (16): 337

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(16)   John believed that Mary is pregnant. (Abusch 1997: 39) 339

(16) has been associated with the intuition that Mary's pregnancy overlaps both the 340
past time of John's belief <u>and</u> the speech time, leading to the term *double access* 341
reading (DAR). There is more to it than that. The sentence can be true even if there 342
is no actual pregnancy overlapping both times. Here is an alternative version: 343

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(17)   John said two weeks ago that Mary is pregnant but actually she has just
       been overeating for the last three months. (Abusch 1997: 40) 345

When John made the assertion reported in (17), his commitment was only regarding 346
what was going on at that time, not at the future time when (17) is uttered. The 347
truth of (17) requires a link to the speech time thus not predicted in terms of John's 348

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[12] An early description of the puzzle can be found in Smith (1978), who noted a distinction between
factive verbs/verbs of saying vs. other kinds. In Smith's terms, the descriptive generalization for
the first group is that when present is embedded under past, the speaker is 'responsible' for the
complement being true or relevant at the speech time (Smith, 1978: 66). See also Enç (1987) for a
mix of examples with factive verbs and verbs of saying/hearing.

original commitment. In Abusch's words: *What seems to license the Pres\Past in this* 349
example is that the speaker is interested in the explanation for Mary's symptoms in 350
an interval spanning the two times. In fact, [(16)] seems inappropriate if Mary's 351
symptoms, her big belly, and so forth, do not persist at the utterance time (Abusch 352
1997: 40). 353

Importantly, DAR is the only reading available for this type of examples. It is 354
forced, in Abusch's system, by the interaction between the tense transmission mech- 355
anism operative in intensional contexts and the temporal constraints associated with 356
present. When tense is present, the associated non-precedence constraint affects all 357
accessible temporal relations. None of them can be precedence relations.[13] Since 358
this constraint is incompatible with the relation inherited via tense transmission from 359
the matrix past, the immediate prediction is that present tense will not be possible 360
in its base position within the complement clause. The solution is to appeal to *res* 361
movement, placing the embedded present tense in a syntactic position within the 362
scope of the attitude verb but outside the scope of the binder in the embedded clause 363
(and leaving behind a simple trace). In this configuration, present does not inherit 364
the temporal relation of the matrix past, and the non-precedence constraint does 365
not lead to contradiction. Having broken the binding relation, the interpretation 366
of present in this structure will be established in relation to the local evaluation 367
time of the matrix (the speech time), with (16) receiving a structure as sketched in 368
(18) (including *res* movement and the λt_0 binder associated with the argument of 369
believed corresponding to the believer's 'now'): 370

(18)   [John $Past_1$ believed [[$Pres_2$] $\lambda t_2[\lambda t_0$[Mary t_2 is pregnant]]]]] 371

The non-precedence constraint will ensure that the reference of present overlaps 372
the speech time (the local evaluation time for the matrix clause). Why do we have 373
the intuition that it also overlaps John's $Past_1$ belief-time? The answer, suggests 374
Abusch, lies in the acquaintance relation that identifies the *res* time in John's 375
belief worlds. A plausible acquaintance relation picks out the maximal interval 376
overlapping John's 'now' in which Mary has pregnancy symptoms (like a big belly). 377
For (18) to be true, the *de re* analysis requires that in all the centered worlds $<x_{self}$, 378
t_{now}, w> compatible with John's beliefs at the $Past_1$ belief-time in the base world, 379
Mary be pregnant in w at the maximal interval overlapping t_{now} at which Mary 380
has pregnancy symptoms (note: (i) no commitment regarding the speech time, (ii) 381
according to Abusch, the ULC blocks future-shifted acquaintance relations which 382
could identify times in John's belief worlds that completely follow John's 'now'). 383
The *de re* analysis also imposes a constraint on the evaluation world: the $Pres_2$ 384
res time is the maximal interval overlapping John's $Past_1$ belief-time (counterpart 385
of John's 'now' in his belief worlds) in which Mary has pregnancy symptoms. 386
The interpretation of $Pres_2$ is thus subject to two temporal constraints: overlap 387

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[13] There is an asymmetry in this respect regarding past tense, which simply requires that at least
one accessible relation be of precedence.

with the speech time (non-precedence) and overlap with John's past belief-time (acquaintance relation), giving rise to the double access reading.[14]

In Abusch's proposal, the *res* of belief in present-under-past cases is a temporal interval and constraints on the evaluation world (e.g. that Mary's symptoms persist throughout a time that overlaps both the speech time and John's past belief-time) are derived via the salient acquaintance relation. Ogihara (1989, 1995, 1996, 1999) has independently argued for a *de re* analysis of present under past examples, with the view that the *res* of belief is not a time but a state (see Abusch, 1997b for a reply to Ogihara 1995; see also Kratzer, 1998 for a discussion of double access readings in terms of *de re* attitudes towards eventualities).

Double access readings continue to prove fertile ground for debate. Amongst recent proposals, a line of research has focused on the role of pragmatics in generating such readings, arguing that our theories of tense in these contexts could actually be simplified once pragmatic considerations were taken into account (e.g. Altshuler & Schwarzschild, 2013; Klecha, 2018; see Smirnova, 2009 for a comparison on the basis of Albanian). Current discussions of double access readings have also called into question the empirical adequacy of the ULC, with sentences like *The stewardess told me you have my bags* counting as the report of an original statement *The assistant at the baggage counter will have your bags* (Altshuler & Schwarzschild, 2013; Bary & Altshuler, 2014). Flipside examples can be found in Anand and Hacquard (2008), who discuss cases in which presents embedded under past need not refer to the speech time, such as *The medieval monarch King Richard said that he would let his daughter marry any knight who comes back from the Third Crusade*. Finally, let me note that double access readings are hard. Ogihara (1995, 1996) provides extensive discussion of the special conditions in which present-under-past readings are appropriate. Bary et al. (2018) present experimental research designed to test the conditioning of present under past reports.

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[14] I hope to have provided a faithful short overview of Abusch's main ideas about DAR here. The technical presentation in Abusch (1997) is rather brief regarding some of these issues. The reader is also referred to the reconstruction provided in Heim (1994), as well as comments in von Stechow (1994).

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