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SEMANTICS AND SYNTAX OF PERFEKT AND FUTURE

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1. SEMANTICS FOR TENSES

1.1. Reichenbach (1947)

(1) The standard theory

<table>
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<tr>
<th>Tense</th>
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<td>Past</td>
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<td>E</td>
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<td>Future Perfect</td>
<td>S</td>
<td>&lt; R &amp; E &lt; R</td>
<td></td>
<td>S</td>
<td>Sigurd wird gewonnen haben</td>
</tr>
</tbody>
</table>

S: speech time, R: reference time, E: event time

1.2. Basic notions of tense semantics

Basic concepts

i: type of times, e: type of individuals, t: type of truth-values

s*: the time of utterance

Temporal propositions are predicates of time intervals: type <i,t> (:= p). (Modal propositions will depend on worlds. They are disregarded first.)

Recently, verbs are mostly represented in a Davidsonian way, having an event argument. This is not necessary for the examples discussed and would complicate the exposition.

Truth and Entailment

The proposition p is true at the interval t if and only if p(t) = 1. p is false at t if and only if p(t) = 0.
The proposition $p$ entails the proposition $q$ ($p \subseteq q$) iff $\forall t[p(t) = 1 \rightarrow q(t) = 1]$.

Time intervals are linearly ordered by $>$ “before” or $<$ “after”. They may overlap ($\cap$) and they might be included in another ($\subseteq$):

We distinguish between morphological tense (present, past) and semantic Tense (Present, Past). Semantic tense is dissociated from morphological tense at LF.

Our logical will represent verbs without Tense as non-finite forms.

1.3. **Semantic for simple tenses**

Standard interpretation: tenses are existential quantiers of type $\langle p, p \rangle$.

(2) German **Präsen** (Präss)

\[ \| \text{Präss} \| \langle p \rangle(t) = 1 \iff \exists t'[t' \nless s^* \& p(t') = 1] \]

(3) English **Present** (Pres)

\[ \| \text{Present} \| \langle p \rangle(t) = 1 \iff \exists t'[t' = s^* \& p(t') = 1] \]

Many variants, e.g. $\exists t'[s^* \subseteq t' \& p(t') = 1]$ (Fabricius-Hansen (1986), Klein (1994)). Most of the time, I will assume the simpler semantics Present also for German.

(4) Sigurd gewinnt

**Präss win**(Sigurd)

$\exists t[t = s^* \& \text{Sigurd wins at } t]$ OK

$\exists t[t > s^* \& \text{Sigurd wins at } t]$ *

Future interpretation of achievements/accomplishments possible.

(5) $\|\text{win}\|$ is that function $f \in D_{<^*,<^*,>^*,>^*} : \forall x \in D_x; \forall t \in D_t; f(x)(i) = 1 \iff x \text{ wins at } i$.

(6) Sigurd schläft

**Präss schlaha**

$\exists t[t = s^* \& \text{Sigurd sleeps at } t]$ OK

$\exists t[t > s^* \& \text{Sigurd sleeps at } t]$ *

**Problem:** No future interpretation of statives (Fabricius-Hansen (1986)). Unclear how this is derived.
(7) **Past**
\[\| \text{Past} \| (p)(t) = 1 \text{ iff } \exists t' [t' < s^* \& p(t') = 1]\]

(8) a. Hans schlief
b. Past sleep(John)

### 1.4. Syntax of simple Tenses

(9) **LF**

```
AgrP
  /\                   
TP  Agr           TP  Agr
 /\                       /\                    
VP P  Past  VP P  Past
 /\        /\          /\        /\       
sleep(John) t, schlief sleep(John) t, schlief
```

Recall: \( p := <i, t> \)

(10) **SS**

```
AgrP
  /\                    
NP\(_1\)  Agr'         TP  Agr
 /\                       /\        
Hans  Agr'              TP  Agr
 /\                      /\      
VP P  Past              VP P  Past
 /\        /\            /\        
sleep(John) t, schlief sleep(John) t, schlief
```

The verb moves to Agr or checks features, depending on the newest state of your theory (Chomsky (1995)?). At LF, lexical material is reconstructed at the position where it is interpreted. To avoid the complications of Verb-Second (movement of the finite verb to Comp), we represent German sentences in the Verb-End configuration throughout.

**Principles of composition:**
a. Functional application: \( FA(||\alpha||,||\beta||) = FA(||\beta||,||\alpha||) = ||\alpha||(||\beta||) \), for \( \alpha \) of type \(<\sigma,\tau>\), \( \beta \) of type \( \sigma \).

b. Intersection rules such as:
\[
I(||\alpha||,||\beta||)(q) = ||\alpha||(q) \cap ||\beta||(q), \text{ if } \alpha,\beta \text{ are of type } <p,p> \text{ and } q \text{ is a proposition.}
\]
\[
I(||\alpha||,||\beta||)(x)(t) = 1 \text{ iff } ||\alpha||(x)(t) = ||\beta||(x)(t) = 1, \text{ if } \alpha,\beta \text{ are of type } <e,p>, x \in D_e, t \in D_i.
\]
\( I(t,t') = t \cap t' \) for time \( t, t' \) (mereological intersection).

c. \( \lambda \)-Abstraction: Let \( x \) be a variable of type \( \sigma \) and let \( \alpha \) be an expression of type \( \tau \). Then \( ||\lambda x[\alpha]|| \) is that function \( f \in D_{<\sigma,\tau>}: \forall x: f(a) = ||\alpha||^{[x/a]}, \text{ for any } a \in D_{\sigma}. \)


1.5. Future

(11) Future
\[
||\text{Fut}||((p))(t) = 1 \text{ iff } \exists t'[t' > t \land p(t') = 1]
\]

(12) Hans wird schlafen

This is not the extended now version we will discuss later. Most German semanticists interpret Future as a deictic tense, i.e., the reference time is shifted with respect to the speech time (Herweg (1990)). The usual reason is that there is no past indicative of the future:

b. Hans würde schlafen

There is, however, the Conditional I, which is best analyzed as a combination of “Zero-Tense” and our Fut. See Ogihara (1996), Abusch (1997). For a recent discussion of these constructions, see Fabricius-Hansen (1999).  

1.6. Perfekt

(14) Perfekt
|| Perf ||(p)(t) = 1 iff \( \exists t' [t' < t & p(t') = 1] \)

(15) Present Perfekt
Sigurd hat gewonnen
Pres Perf Sigurd gewonnen hat

Pres Perf win(Sigurd)

(16) Pluperfect
Sigurd hatte gewonnen
Past Perf Sigurd gewonnen hat

Past Perf win(Sigurd)

(17)

1.7. Future || and Double Perfekt

(18) Lola wird gerannt sein.
Double Perfekt
Ich habe das bereits abgegeben gehabt.
Präs Perf Perf VP

I.8. Status of the Supine

Following Bech (1955/57), grammarians of German call the non-finite verb supine (Supinum). The supine has 3 status (verb morphologies), which are selected by auxiliaries (status government).

(20) Status of supines
a. 1. status/0-infinitive: gewinnen win
b. 2. status/zu-infinitive zu gewinnen to win
c. 3. status/participle II gewonnen won

Following Stechow and Sternefeld (1988), I will assume that the three forms of the supine have the same meaning, viz. win. This assumption is not controversial for the first and second status. Many linguists assume however, that the participle II contains the perfect information, i.e., the meaning of gewonnen is win + Perfekt. The argument is that the attributive participle always has an anteriority meaning:

(21) der gewonnene Wettkampf the competition won
This form is not a supine, but an adjectival participle. Bech distinguishes 3 forms:

(22) **Status of (adjectival) participles**

a. 1. status/present participle: gewinnen-d-er, -d-e, -d-es
b. 2. status/gerundive zu gewinnen-d-er, -d-e, -d-es
c. 3. status/participle perfect gewonnen-er, -e, -es

The supine of 3. status and the adjectival participle of 3.status must not be confused. The supine carries no Perfect meaning, see for instance a passive construction:

(23) Dieses Problem wird viel diskutiert.

In other words, those who claim that the supine-3 carries the Perfekt have to say that the form is ambiguous. Another problem is that the adjectival passive does not only carry the Perfekt, but it is passivized at the same time:

(24) der von Renate gewonnenen Pokal *the by Renate won pot*

And it may express the adjectival passive:

(25) die seit zwei Tagen geöffnete Buchmesse *the since two days opened book exposition*

Another problem is this: Adjectival participles-3 are passives, while haben-Perfekts are actives. I know of no precise mechanism which derives the meaning of an active form from that of a passive one, though there might be one. My actual view is that adjectival participles are complicated and must be analysed separately (Stechow (1999)).

To be precise: I will assume that the Perfekt information is located in the auxiliaries while the supine is Tenseless. But the adjectival participle is not Tenseless, its semantics is much more complicated and the three status of it don’t have a unified semantics at all. I will call Perfekt and Future Tenses. These must not be confused with the aspects *perfective* and *prospective* to which I will come later.
2. **FRAME ADVERBS, NEGATION, ADVERB OF QUANTIFICATION**

2.1. **Plot**

The above tense semantics is trivial and this could perhaps be the end of the lecture. The interaction with modifiers is the difficult thing. The rest of the lectures will be about this. The first classical problem treats the interaction between **tense, frame adverbs** and **negation**. There is no agreement in the literature how these phenomena are treated best.

We will make the following points.

1. The negation must be under tense.
2. Under the negation, there is an obligatory adverb of quantification (QAdv), usually the existential quantifier “at a subinterval of” (Bäuerle (1979)).
3. QAdv modifies the VP, i.e., it is under Perfekt.
4. Frames like tomorrow, yesterday denote the entire days. They do not mean “There is a time in yesterday or tomorrow”.

2.2. **The Partee Puzzle**

(26) (Partee (1973))

I didn’t turn off the stove.
¬Past I turn off the stove
¬∃t[t < s* & I turn off the stove at t] too strong
∃t[t < s* & ¬I turn off the stove at t] too weak

Partee’s solution: Tenses are like pronouns. They refer to particular times.

(27) t < s* & ¬I turn off the stove at t, t the time the speaker has in mind

**Problem**: Achievements are punctual. The speaker cannot have in mind the precise time of the event. Partee’s verb semantics. Partee builds an existential quantification into the meaning of the Tenseless verb:

(28) Partee’s lexical meaning

∥ I turn off the stove ∥(t) = 1 iff ∃t’[t’ ≤ t & I turn off the stove at t’]

(29) **Negation**
¬ is of type \langle p, p \rangle. \| \neg \| (p)(t) = 1 \text{ iff } p(t) = 0.

Consequence: \| \neg \text{ I turn off the stove } \| (t) = 1 \text{ iff } \neg \exists t' [t' \subseteq t \& \text{ I turn off the stove at } t']. t \text{ might be a large time the speaker has in mind: } \text{“when I left the house”}.

Potential problems:

(30) It took her half a minute to turn off the stove.

He turned off the stove off three times.

2.3. Frame adverbs (FAdv) and negation

Implementation of Partee’s idea in several steps:

1. Indroduce frame adverbs (FAdv) like yesterday, tomorrow.
2. Assume that Partee’s definite time stretch is given by an invisible FAdv.
3. Separate Partee’s existential quantifier from the meaning of the verb.
4. Formulate the precise meanings and syntax of the details required.

First step: What is the meaning of yesterday?

(31) Er rief gestern an

Past yesterday he call

\text{Past Y call(he)}

(32) Standard meaning yesterday (e.g. Cresswell (1973), Kratzer (1978), Dowty (1979))

\| \text{Y} \| (p)(t) = 1 \text{ iff } \exists t'[t' \subseteq \text{the day before the day that contains } s^* \& p(t')]\n
Abbreviation: yesterday := the day before the day that contains s*. Thus, yesterday means “at a time in yesterday”. We will show that this cannot be correct.

(33) 1\textsuperscript{st} Prediction from (32)

\| \text{Past Y call(he)} \| = 1 \text{ iff } \exists t[t < s^* \& t \subseteq \text{ yesterday } \& \text{ he calls at } t] \text{ OK}

(34) 2\textsuperscript{nd} Prediction from (32)Er rief gestern nicht an

\| \neg \text{Past Y call(he)} \| \text{ iff } \neg \exists t[t < s^* \& t \subseteq \text{ yesterday } \& \text{ he calls at } t] \text{ OK}

\| \text{Past } \neg \text{Y call(he)} \| \text{ iff } \exists t[t < s^* \& \neg[t \subseteq \text{ yesterday } \& \text{ he calls at } t]] \text{ too weak}

\| \text{Past Y } \neg \text{ call(he)} \| \text{ iff } \exists t[t < s^* \& t \subseteq \text{ yesterday } \& \neg \text{ he calls at } t] \text{ too weak}

Conclusion 1: NEG seems to be above Tense
(35) Er rief gestern wieder nicht an.

(36) Meaning of again (Dowty (1979), Stechow (1996))
    again is of type \langle p, p \rangle.
    Assertion: \| again \| (p)(t) = 1 \iff p(t) = 1.
    Presupposition: \exists t' [t' < t \& p(t') = 1]

(37) Meaning wanted for (35):
    Assertion: \neg He called yesterday
    \neg \exists t [t < s* \& t \subseteq yesterday \& call(he)(t)]
    Presupposition: He called before yesterday
    \exists t [t < s* \& \forall t' [t' \subseteq yesterday \rightarrow t < t'] \& \neg call(he)(t)]

(38) Prediction from (32)
    Er rief gestern wieder nicht an
    \neg \text{Past Y again call(he)}
    Assertion: \neg \exists t [t < s* \& t \subseteq yesterday \& he calls at t] \quad \text{OK}
    Presupposition: ????? (We don’t know what the time of assertion is.) ???

Consequence: The scope of NEG must be narrow with respect to again:

(39) \text{Past Y again \neg call(he)}
    Assertion: \exists t [t < s* \& t \subseteq yesterday \& \neg he calls at t] \quad \text{too weak}
    Presupposition: \exists t [t < s* \& t \subseteq yesterday \& \exists t'[t' < t \& \neg he calls at t]] \quad \text{too weak}

Repair:
- Strengthen the meaning of yesterday to “at yesterday” = at the entire interval denoted by yesterday
- Give the verb Partee’s meaning, but add an extra quantifier in order to circumvent the problems mentioned in (30)

(40) AT is of type \langle t, <p,p>, \rangle,
    \| AT \| (t')(p)(t) = 1 \iff t = t' \& p(t) = 1

(41) yesterday revised:
\[\| Y \| = \text{the day before the day containing s*}.\]

\[\tag{42} \text{Bäuerle’s adverb of quantification (QAdv) cf. Bäuerle (1979)} \]
\[\| \exists_{\text{eq}} ||(p)(t) = 1 \iff \exists t'[t' \subseteq t \land p(t') = 1] \]

\[\tag{43} \text{Er rief gestern an} \]
\[\text{Past AT}(Y) \exists_{\text{eq}} \text{call(he)} \quad \text{OK} \]
\[\exists t[t < s* \land t = Y \land \exists t'[t' \subseteq Y \land \text{he calls at t'}] \]

We can now have NEG below TP, a standard assumption. (Giorgi and Pianesi (1998) given an overview of the position of NEG with respect to Tense. In the languages reviewed, NEG is under the highest Tense. NEG is above to in English and the authors claim that to is a Tense. This view is not compatible with what I said about the status of the non-finite verb.)

\[\tag{44} \text{Er rief gestern nicht an} \]
\[\text{Past AT}(Y) \neg \exists_{\text{eq}} \text{call(he)} \quad \text{OK} \]
\[\exists t[t < s* \land t = Y \land \neg \exists t'[t' \subseteq Y \land \text{he calls at t'}] \]

<> is used for representing presuppositions. For more elaborate techniques: Beaver (1992).

\[\tag{45} \text{Er rief gestern wieder nicht an} \]
\[\text{Past AT}(Y) \text{again} \neg \exists_{\text{eq}} \text{call(he)} \]
\[\text{Assertion: } \exists t[t < s* \land t = Y \land \neg \exists t'[t' \subseteq t \land \text{he calls at t'}] \]
\[\text{Presupposition: } \exists t''[t'' < Y \land \neg \exists t'[t' \subseteq t'' \land \text{he calls at t'}] \quad \text{OK} \]

Bäuerle’s problem (cf. Bäuerle (1979))

\[\tag{46} \text{Er rief heute nicht an} \]
\[\text{Past AT(today)} \neg \exists_{\text{eq}} \text{call(he)} \]
\[\exists t[t < s* \land t = \text{today} \land \neg \exists t'[t' \subseteq \text{today} \land \text{he calls at t'}] \quad \text{contradictory} \]

\[\tag{47} \| \text{today} \| = \text{the day which contains s*}. \]

We could try to assume an abstract preposition IN “is a part of”. But this would make the meaning too weak.

\[\tag{48} \text{Past IN(today)} \neg \exists_{\text{eq}} \text{call(he)} \]
Scoping the negation but runs into trouble for again-sentences.

(49) \( \neg \text{Past IN(today)} \exists t \text{ call(he)} \)
\( \neg \exists t [t < s^* \land t \subseteq \text{today} \land \exists t'[t' \subseteq t \land \text{call(he)}(t')]] \)

What we really want is this:

(50) \( \text{Past AT(today} \land t_c) \neg \exists \text{ call(he)} \).

\( t_c \) is that part of today which is before \( s^* \). For the time being, we leave the problem open.

2.4. The syntax of FAdv, QAdv, NEG and \( \exists \_ \)

- Frame adverbs are dominated by tense and dominate adverbs of quantification.
- The negation is under the frame adverbs but above adverbs of quantification.
- Each VP is obligatorily modified by exactly one QAdv, \( \exists \_ \) being the default.
- (51) LFs for negated sentences with simple tense

2.5. Negation and QAdv in Perfekt constructions

Where is the negation in perfect constructions? It is under Perfekt but above QAdv.

(52) Er hat gestern nicht angerufen.

a. \( \text{Pres Perf AT(Y)} \neg \exists \text{ call(he)} \)
\( \exists t [t = s^* \land \exists t'[t' < t \land t' = Y \land \neg \exists t''[t'' \subseteq t \land \text{call(he)}(t'')]]] \) OK

b. \( \text{Pres \neg Perf AT(Y)} \exists \text{ call(he) } \)
\( \exists t [t = s^* \land \exists t'[t' < t \land t' = Y \land \exists t''[t'' \subseteq t' \land \text{call(he)}(t'')]]] \) OK

Can (b) be ruled out?

(53) Er hat gestern wieder nicht angerufen
\textbf{Pres Perf AT(Y) again $\neg \exists_\s$ he call}

**Assertion:**
\[
\exists \{t = s^* \& \exists' [t' < t \& t' = Y \& \neg \exists'' [t'' \subseteq t' \& \text{call(he)}(t')]]\} \quad \text{OK}
\]

**Presupposition:**
\[
\exists \{t = s^* \& \exists' [t' < t \& t' = Y \& \exists''' [t''' < t' \& \neg \exists'' [t'' \subseteq t''' \& \text{call(he)}(t'')]]\} \quad \text{OK}
\]

We know that \textit{NEG} must be under \textit{again}. We reach the following

\textbf{Conclusion:} Negation \textit{may} be under \textit{every} tense (including Perfekt) but must be above $\exists_\s$.

\begin{itemize}
  \item (54) The syntax of complex TPs
  \begin{itemize}
    \item TP
      \begin{itemize}
        \item PerfP
          \begin{itemize}
            \item Tense
          \end{itemize}
        \end{itemize}
      \end{itemize}
    \end{itemize}
  \end{itemize}

2.6. \textit{Back to Partee}

(55) I turned off the stove, but I don’t remember when. \quad \text{Ogihara (1995)}

(56) *I didn’t turn off the stove, but I don’t remember when. \quad \text{Rathert (1997)}

Negative sentences have an invisible frame adverb (Kratzer (1978), Bäuerle (1979), Stechow (1991), Fintel (1994), Musan (1995)). Positive sentences not necessarily so. Here is my implementation of the idea.

(57) \textbf{Past AT t* $\neg \exists_\s$ I turn off the stove}
\[
\exists \{t < s^* \& t = t^* \& \neg \exists' [t' \subseteq t \& \text{I turn of the stove at } t']\} \quad \text{OK}
\]

(58) \textbf{Invisible frames}
\[
t^*_i \text{ is a variable of Type } t \text{ such that for any variable assignment } g \text{ the following constraint is satisfied: } g(t^*_i) = \text{the time the speaker refers to by } t^*_i.
\]

(59) Er hat nicht angerufen
Pres Perf AT \( t^* \sim \exists \_ \) he call
\[ \exists t \left[ t = s^* \& \exists t' \left[ t' < t \& t' = t^* \& \neg \exists t'' \left[ t'' \subseteq t' \& I \text{ turn off the stove at } t'' \right] \right] \right] \]

(60) Our LFs so far

The FAdv AT \( t^* \) restricts Past and and the FAdv AT \( t^* \) restricts Perf.

2.7. A solution of Bäuerle’s frame problem

Restrict today by and invisible frame meaning “the past time in today”.

(61) Er rief heute nicht an

\[ \text{Past AT (today } t^* \text{) } \sim \exists \_ \text{ call(he)} \]

Combine AT today and \( t^* \) by means of the intersection rule. Here is the precise syntax of the frame adverb:

(62)
ZP reminds of Stowell’s and Zeller’s Zeitphrase (Stowell (1996), Zeller (1994)).

Here is the calculation of the meaning:

For any proposition p and time t:

\[ \| \text{AT heute } t^* \| (p)(t) = 1 \]
iff
\[ t = \| [\text{ZP heute } t^*] \| \cap & p(t) = 1 \]
Mereological intersection

iff \( t = \text{today } \cap \text{g(t*)} \& p(t) = 1 \)

Caution: This does not entail that \( p(\text{today}) = 1 \)!

2.8. Notes on the literature

Does this semantics reconstruct Reichenbach? Hard to tell. The event time is presumably the truth interval of the VP. The reference time does not exist. It is hard to tell what is meant be reference time. Klein (1994) proposes the term topic time but this raises the question what is meant by that. We will use Abusch’s term local evaluation time: this is the time at which a proposition is evaluated at a particular stage of the computation.

No attempt is made to do justice to the literature. The formulation given here is basically Prior’s, but he does not interpret tenses deictically, i.e. with respect to the speech time. Our symbolisation of the deictic character is not entirely correct. A more precise formulation has tho use Kaplan’s notion of character, which denotes functions from contexts to intensions (Kaplan (1979)). Here are the rules for Past and Present in a Kaplanian framework.

(63) a. \( \| \text{Present} \| \) is that function \( f \) from contexts \( c \) into \( D_{p,p}: \forall p \in D_p: f(k)(p) \) is that proposition \( q \) such that for any \( t \in D_t: q(t) = 1 \iff p(t_c) = 1 \), where \( t_c \) is the time of \( c \) (our \( s^* \)).
b. \[ \text{Past } (c)(p)(t) = 1 \text{ iff } \exists t' [t < t' \& p(t) = 1] \]

In our notation, the contextual parameter is omitted or provided by special variable like \(s^*\) or \(C_i\). I will assume that nothing dangerous follows from this sloppiness.

The standard intensional approaches: with \(^-\) and \(^+\)-operator is Montague (1973): there, Present carries no meaning and no distinction is made between Past and Perfect. Ogihara (1989), Ogihara (1996) is like Montague. The approach given in this introduction is not essentially different from these.

As to DRT, the analysis of the interaction between frame adverbs and negation is found in Kamp and Reyle (1993) on 547.

(64) Mary did not write a letter on Sunday.

\[
\begin{array}{c}
\text{ntx} \\
\text{t < n} \\
\text{on Sunday(t)} \\
\text{Mary(x)} \\
\text{e} \\
\text{letter(y)} \\
\text{e \subseteq t} \\
\text{e: x write y}
\end{array}
\]

We identify events \(e\) with times and \(n\) with \(s^*\). Then this translates into our language as

(65) \[ \exists t' [t < s^* \& \text{AT(Sunday)}(t) \& \neg \exists t \subseteq t \& \exists y [\text{letter}(y) \& \text{write}(y)(\text{Mary})]] \]

Our intensional logical language expresses this as:

(66) \[ \text{Past AT(Sunday)}(\neg \exists e \text{ Mary write a letter}) \]

SECOND LECTURE: UTN READINGS

The standard theory cannot analyse correctly "universal" (U) perfect readings (Ich habe dich schon immer geliebt) as opposed to "existential" (E) readings (Ich habe dich geliebt). We show how an extended now (XN) theory can save the situation. data

3. U- VS. E-READINGS

Schipporeit (1971): There are perfect adverbs that have an up to now (UTN) reading, if they are modified by \text{schon/noch}. A similar observation for English is made in McCoard (1978). See also
Dowty (1979). An UTN-reading means that the Perfekt denotes an interval going up to the speech time – McCoard’s extended now (XN). English grammarians generally assume that XN includes the speech time (Dowty (1979), Anagnostopoulou, et al. (1997)). Schipporeit assumes that XN includes s* in German, too. Similarly Fabricius-Hansen (1986). Rathert (1999) argues that XN abuts the speech time. Fabricius-Hansen (1986), Abusch (1996) and Rathert (1997) assume that XN is infinite in length. Others (Abusch and Rooth (1990), Kamp and Reyle (1993), Stechow (1999)) assume that XN can be finite. The weakest assumption is that Perfekt delivers a time that is before the speech time or that abuts the speech time (Musan). In any case, the following data cannot be expressed by means of the Perfekt semantics given so far.

3.1. Terminology

The term existential Perfect/Perfekt (E-Perfect) covers the following distinctions:

(67) McCawley (1971)
   a. Experiental Perfect: Wolfgang has been to Pontrefact five times.
   b. Perfect of Result: I have lost my glasses.
   c. Perfect of Recent Past: John has just graduated from college.

A universal Perfekt (U-Perfekt) speaks about the entire XN.

(68) E-Perfekt
    Schiller hat gute Freunde gehabt. Schiller has good friends had
    ----[-----{---///////////-------}------------------------]S
    S = speech time
    { } = Schiller’s life time
    ///////// = ”Schiller have good friends”

(69) U-Perfekt
    *Schiller hat schon immer gute Freunde gehabt.
    ----[{///////////////////////////////////////////////}]S
    life time effect

(70) UE-Lesart
iSchiller hat immer gute Freunde gehabt.

---[-----{///////////////}------------------------]S

3.2. **German**

The following data are taken from Schipporeit (1971).

**Schipporeit’s Perfekt adverbs**

<table>
<thead>
<tr>
<th>UTN</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>schon lange</td>
<td>lange</td>
</tr>
<tr>
<td>already for long</td>
<td>for long</td>
</tr>
<tr>
<td>seit langem</td>
<td></td>
</tr>
<tr>
<td>since a long time</td>
<td></td>
</tr>
<tr>
<td>schon seit langem</td>
<td></td>
</tr>
<tr>
<td>already since a long time</td>
<td></td>
</tr>
<tr>
<td>schon drei Jahre</td>
<td>drei Jahre</td>
</tr>
<tr>
<td>already three years</td>
<td>three years</td>
</tr>
<tr>
<td>seit drei Jahren</td>
<td></td>
</tr>
<tr>
<td>since three years</td>
<td></td>
</tr>
<tr>
<td>schon seit drei Jahren</td>
<td></td>
</tr>
<tr>
<td>already since three years</td>
<td></td>
</tr>
<tr>
<td>German</td>
<td>English</td>
</tr>
<tr>
<td>--------</td>
<td>---------</td>
</tr>
<tr>
<td>schon tagelang</td>
<td>tagelang for days</td>
</tr>
<tr>
<td>schon wochenlang</td>
<td>wochenlang for weeks</td>
</tr>
<tr>
<td>schon jahrelang</td>
<td>jahrelang for years</td>
</tr>
<tr>
<td>seitdem, seither</td>
<td>since then</td>
</tr>
<tr>
<td>noch</td>
<td>still</td>
</tr>
<tr>
<td>noch immer</td>
<td>still always</td>
</tr>
<tr>
<td>immer noch</td>
<td>always still</td>
</tr>
<tr>
<td>noch lange</td>
<td>still for long</td>
</tr>
<tr>
<td>noch nie</td>
<td>nie never</td>
</tr>
<tr>
<td>schon oft</td>
<td>oft often</td>
</tr>
<tr>
<td>schon immer</td>
<td>immer often</td>
</tr>
<tr>
<td>schon einmal</td>
<td>einmal, je once, ever</td>
</tr>
</tbody>
</table>

(71) **lange/schon lange**
a. So einen Pelzmantel habe ich mir schon lange gewünscht! p. 96, UTN
   Such a fur coat have I me already for long wanted

b. Ich habe es lange Zeit nicht für möglich gehalten eine Passende zu finden. (Aber
gerdas Anblick gab den Ausschlag. I sah sofort, daß sie die einzige sei... )
p. 108, EP
   I have it long time not for possible held a suiting one to find.

c. Noch gestern abend im Bett habe ich lange darüber nachgedacht und hatte ein ganz
   sonderbares Gefühl dabei... (Buddenbrocks) p. 109, E

d. Dich kenne ich schon ein halbes Leben lang, du kannst mir gar nichts. p. 18, UTN

(72) immer/schon immer/noch immer

a. Paul ist schon immer ein Unglücksrabe gewesen. p. 134, UTN
   Paul is already always an misfortune raven been

b. Joachim hat schon immer Arzt werden wollen (*,aber dann hat er sich entschlossen,
   Ingenieur zu werden) p. 140 , UTN

c. Joachim hat immer Arzt werden wollen, aber dann hat er sich entschlossen,
   Ingenieur zu werden. ibidem, E

d. Das versuchen Sie mal! Ich beweise glatt, daß Sie die Firma bestohlen haben, und
   zwar schon immer. ibidem, UTN

e. Mit der Anbetung eines Esels hat es noch immer angefangen. p. 147,

(73) *Ich wünschte mir schon immer ein Fahrrad.

(74) oft/schon oft/noch oft
a. Ich habe ihn schon oft besucht p. 135, UTN
I have him already often visited

---[---/-----/------/------/------/------/------/------/------/------/------/---]S-------

b. Ich habe ihn oft besucht.
I have him often visited E

-[-[---/-----/------/------/------/------/------/------/------/------/------/---]}---------------------]S------

c. Ich habe Gerti schon oft gesagt:”Mach dich nicht unglücklich, Gerti, und den Dieter dazu.” p. 135 E

d. Ihr seliger Vater hat mir oft gegenüber gesessen. E

e. „Ich habe noch oft, über ein Jahr lang Gelegenheit gehabt, den Angeklagten beten und trommeln zu sehen, denn er machte nicht gegen ein großes Gehalt zu seinem Reisebegleiter, nahm mich auf seine Tourneen mit....“ p. 177 E

(74) seems to be a counter example to the classification of noch oft.

(75) nie/noch nie

a. Goethe ist nie in Amerika gewesen. p. 134 E
Goethe is never in America been

b. *Goethe ist noch nie in Amerika gewesen. U
Goethe is still never in America been

c. Er hat nie rausgekriegt, wem er die Sache verdankte. p. 175, E

d. Das ist mir noch nie passiert. p. 154 U

e. Zu einer Versöhnung ist es nie gekommen. p. 175 E


h. Betty ist vegetarisch und edel, weil sie nur das Körperlose, Reine und Geistige will, aber ich habe noch nie jemand gesehen, der sich derart ununterbrochen mit seinem Körper beschäftigt, wie diese Vegetarierin. p. 156 U

i. Die Ärzte hoffen, daß sie gesund wird, aber wir haben noch nie gehört, daß Krebs geheilt worden ist. p. 159 U

j. Ich habe noch nie Pferde stöhnen gehört und kann es kaum glauben. p. 174 U

(76) seitdem
(Christa stieg in die Straßenbahn und winkte noch einmal zurück.)

Seitdem habe ich sie nicht wiedergesehen.

Since then have I her not again seen

Seitdem Marie weg ist, bin ich manchmal aus dem Rhythmus geraten, habe Hotel und Bahnhof miteinander verwechselt,... p. 137 U

(77) schon einmal

Haben Sie schon einmal von jemandem gehört, der aus Alabama kam und so viele Menschen auf die Beine brachte? p. 138 U

3.3. Russian-Ukrainian

Russian and Ukrainian data from Alla Paslawska, pers. com.

(78) Wir haben schon lange auf eure Nachricht gewartet.

UTN

---------[---------------------------]S

a. Ukr. My dovho ˇcekaly na va´se povidomlenn´a
   we for long wait-ipfv-past-pl for your message

b. Russ. My dolgo ˇzdali va´se soob´s´cenije.

UTN goes together with imperfective aspect.

(79) Wir haben lange auf eure Nachricht gewartet.

E

---------[-------------------]S

   we for long wait-pfv-past-pl for your message

b. Russ. My dolgo proˇzdali va´se soob´s´cenije.

E-readings require the perfective aspect (≠ Perfect).

(80) In diesem Jahr habe ich ihn schon oft besucht.

UTN
According to the Russian participants Olga Barik, Svetlana Poljakova and Mascha Averintseva (81b) is out. We have to investigate the data more carefully. To visit is not a good verb, because it means something like “to be on visit”. Take a genuine achievement/accomplishment like to call and form examples like: “Last week he called often”.

(82) Er ist noch nicht gekommen. (UTN)

a. Ukr. Vin sˇce ne pryjˇsov. (pfv)
   he still not pfv-come-past-m
b. Russ. On jeˇsˇce ne priˇsel. (pfv)
   Not: [------/------]S

c. Russ. On jeˇsˇce ne prichodil. (ipfv)

It is not quite clear what the difference in meaning between the last two is.

3.4. Modern Greek, Bulgarian

Data from Anagnostopoulou, et al. (1997).

(83) Modern Greek
a. Extisa ena spiti (se ena chrono/*jia ena chrono)
   build-past-pfv-1sg (in one year/*for one year)

b. Extiza ena spiti (*se ena chrono/jia ena chrono)
   build-past-ipf-1sg (*in einem Jahr/ein Jahr lang)

This is like Russian/Ukrainian.

(84) a. *Exo panta zisi stin Athina.
   have-1sg always lived-PFV in Athens
b. O Jannis exi agapisi tin Maria.
   have-3sg loved-PFV the-A Maria
   „John fell in love with Mary“

This is not like in German. According to Anagnostopoulou, et al. (1997), the Greek participle is (invisibly) perfective.

(85) Bulgarian
    Marija (*vinagi) e obiknala Ivan (*ot 1980 nasam)
    Maria (*always) is loved-PFV-part Ivan (from 1980 up to now)
    „Mary always fell in love“

No U-reading with perfective participles. But U-readings with imperfective participles.

(86) Marija vinagi e obi˘cala Ivan.
    Maria always is loved-IPV-part Ivan
    „Maria has always loved Ivan“

3.5. English

Data from Mittwoch (1988) (Richards (1982), Heny (1982)).

(87) Sam has been in Boston for 20 minutes. U/E
(88) For 20 minutes John has been in Boston. U (Dowty (1979))
(89) Sam has been to Boston since 7.00. E
(90) John has wanted to be a doctor/owned a house since 1980. U/E?
(91) ?John has run since 7.00. E

(92) John has been running since 7.00. U

Anagnostopoulou, et al. (1997) observe that adverbs can have modifiers that affect their selection properties:

(93) a. *He has danced ever since this morning.
    b. He has danced since this morning.
    c. *He has drawn a circle ever since this morning.
    d. *He has drawn a circle since this morning.

*ever since this morning* combines with statives only.

4. ANALYSIS

4.1. Failure of the classical Perfect semantics

(94) Sigurd ist schon seit 3 Stunden gerannt. U

Sigurd is already since 3 hours run

Wanted: \( \exists t [t > s^* & \text{dur}(t) = 3h & \text{Sigurd runs at } t] \)

The simplest meaning rule (inadequate because equivalent with” for”).

(95) since\( _m \) “since” is of type \(<m, <p,p>>\), \(m\) the type of measures.

\[ \| \text{since}_m \| (z)(p)(t) = 1 \text{ iff } \text{dur}(t) = z & p(t) = 1. \]

Predictions:

(96) a. Pres Perf since 3 hours VP

\[ \exists t [t < s^* & \text{dur}(t) = 3h & \text{Sigurd runs at } t] \]

b. Pres since 3 hours Perf VP

\[ \exists t [t = s^* & \text{dur}(t) = 3h & \text{Sigurd runs at } t] \]

(94b) stretches the speech time. This makes no sense and does not capture the meaning. (94a) doesn’t capture the UTN reading. The running is before \( s^* \).
4.2. Extended Now

McCoard’s attributes Pickbourn (1789) the idea that the Perfect delivers an extended now (XN), which is a time stretch of indefinite length and extends up to now, the local evaluation time. For English, it is widely assumed that s* is included in XN. For German, Rathert (1999) has argued that s* is not included in XN if we are considering the present perfect.

(97) ...bei dieser Gelegenheit bekennen wir öffentlich, was wir schon oft im stillen ausgesprochen haben... (from Schipporeit)
   “At this occasion we say publicly what we have said already often in silent”

We are not speaking in silent at s*.

(98) Ein solches Projekt hat uns in Ludwigshafen schon immer gefehlt, ist der Dozent überzeugt. (Rathert)
   “We have already always needed such a project in Ludwigshafen...”

We are no more missing the project.

(99) Diesen roten Mercedes habe ich schon einmal gesehen. (Rathert)
   “This read Mercedes have I already once seen”

If s* were in XN, we should say zweimal “twice”.

(100) Wir haben schon lange auf eine Bericht über das Papsttum von Ihnen gewartet. Nun ist er da! Spiegel 21/69; Schipporeit p. 8
   We have already for long for a report about papacy by you waited. Now is it there!

We are not waiting anymore.

4.3. First Revision of the Perfect rule

Notation:

(101) a. \( t \) abuts \( t' \) (\( t > < t' \)) iff \( t < t' \) with exception of the border point.

   \[ \begin{array}{c}
   \text{----------} \\
   \text{t} \\
   \text{----------} \\
   \text{t'} \\
   \end{array} \]

b. \( t |< t' \) iff \( t < t' \) or \( t >> t' \).

A minimal change of the Perfekt semantics:
Revision 1: Take $<$ instead of $\prec$.

$\| \text{Perf} \| (p)(t) = 1 \text{ iff } \exists t' \left[ t' \prec t & p(t') = 1 \right]$

(103) Sigurd ist schon seit 3 Stunden gerannt.

Pres Perf since 3 hours VP

$\exists t \left[ t \prec s^* & \text{dur}(t) = 3h & \text{Sigurd runs at } t \right]$ (by revision 1)

Problem 1: This is not exactly what we want. The meaning of schon requires that $t$ abuts $s^*$. The meaning rule

$\| \text{schon} \| (p)(t) = 1 \text{ iff } s^* \succ t$ (too weak)

would add the information, but it would not work for the Past Perfect. This problem will be solved below.

(105) Um 9 war Sigurd schon seit 3 Stunden gerannt.

At 9 was Sigurd already since 3 hours run

Wanted: $\exists t \left[ t < s^* & t = 9 & \exists t' \left[ t' > t & \text{dur}(t') = 3h & \text{Sigurd runs at } t' \right] \right]$

Rule (104) cannot express this.

Problem 2: schon seit 3 Stunden forms one constituent.

(106) [Schon seit 3 Stunden], bin ich jetzt t, gerannt.

This is not easily derived from the D-structure

(107) Pres Perfect [seit drei Stunden [schon VP]]

This problem will not be solved. Sometimes adverbials form one constituent:

(108) [Von Potsdam über Berlin nach Konstanz] bin ich gestern gereist.

Problem 3: Furthermore, this complex adverb selects the Perfect. The standard assumption is that selection requires C-command. The literature assumes that these adverbs are perfect level adverbials and above the Perfect. An English standard example is since Tuesday. According to Mittwoch (1988), p. 207, this adverb is attached to have (= Perf). This selection problem is not solved either. If each projection would combine with exactly one adverb, a Kaynian structure might help (cf, Kayne (1993)):

(109) A Kaynian structure
If we take that move, the head must have be a two-place relation, i.e., it must be of type \(<p,<<p,p>,p>>\), and the meaning of Perf would be \(\lambda p \lambda M \exists t'[t' < t \& M(p)(t') = 1]\), where \(M\) is the type of the adverb. This would work but is a type-lifting rule and therefore complicates the semantic composition. Here, the perfect-level adverb does not select the perfect, but the perfect selects its adverbl

(110) Sam has been in Boston since Tuesday

\textbf{Pres Perf since, Tuesday VP}

Roughly wanted: \(\exists t[t > s^* \& \text{beg}(t) \subseteq \text{Tuesday} \& \text{VP}(t)]\)

(111) since\(\), is of type \(<i,<p,p>>\) \(\|= \text{since}\), \(\|= (z)(p)(t) = 1 \iff p(t) = 1 \& \text{beg}(t) \subseteq z\). (too special)

This adverb cannot attach to PerfP. Mittwoch (1988), p. 219 gives a syncategorematic rule which has the following effect:

(112) \(\|= \text{since}^U \text{Tuesday}^U (\text{Have}^U (\text{VP})) \|= (t) = 1 \iff \|= \text{Perf since}, \text{Tuesday VP} \|= (t) = 1\).

This is not a scope solution because the syncategorematic semantics simply reorders the constituents.

It is not at all obvious how Revision 1 can deal with the facts discussed so far in a compositional framework. Here is another recent account.

4.4. \textit{Second Revision: Rathert (1999)}

4.4.1. Semantics

Extended-Nows (XNs) are left-infinite intervals \((-\infty, m] = \{n \mid n \leq m\}\), for points of time \(m, n\). These are perfect intervals: variables \(u, u_1\) etc. Future intervals are right-infinite and have the form \([m, \infty) = \{n \mid m \leq n\}\). Variable \(v\). Time intervals of finite length are denoted by \(t, t'\) etc. The XNs are as in Abusch (1996).

4.4.2. Architecture

The Perfect rule follows McCoard (1978):
Every sentence has exactly one adverb of quantification (QAdv) wie once, twice, the default being ∃t (Bäuerle (1979)). QAdv is between PerfP and VP. Durative adverbials/border adverbials (bis XP, seit XP) have scope with respect to QAdv. This explains the E/U-ambiguity.

4.5. bis-adverbials

(118) \[ \| (z)(p)(t) = 1 \text{ iff } \exists t'[\text{end}(t') \subseteq z \land z \subseteq t \land p(t') = 1] \]

(119) Charlie ist bis gestern gerannt.
Charlie has run until yesterday

(120) U: \textbf{Pres Perf} \exists_u \textbf{until} Y VP

\[ \exists u[u > s^* \wedge \exists t \subseteq u \wedge \textbf{until} Y(\text{VP})(t) = 1] \]

\[ = \exists u[u > s^* \wedge \exists t \subseteq u \wedge \exists t'[\text{end}(t') \subseteq Y \wedge Y \subseteq t \wedge \text{VP}(t') = 1] \]

\[ \neg \{ \text{------------------------} \} \neg \] 

E: \textbf{Pres Perf until} Y \exists_e \textbf{VP}

\[ = \exists u[u > s^* \wedge \exists t'[\text{end}(t') \subseteq \text{gestern} \wedge \text{gestern} \subseteq u \wedge \exists t'[t' \subseteq t \wedge \text{VP}(t') = 1] \]

\[ \neg \{ \text{------------------------} \} \neg \]

(121) Die Bombe ist bis gestern explodiert.

The bomb is until yesterday exploded

Only E-reading for semantic reasons.

\textit{4.5.1. seit-adverbials}

A. Time-individual-seit

Only these adverbs show the E/U-ambiguity.

(122) a. Charlie ist seit gestern gerannt

b. E: \textbf{Pres Perf} since_{perf} Y \exists_e \textbf{VP}

c. U: \textbf{Pres Perf} \exists_e \textbf{since}_{perf} Y \textbf{VP}

(123) \textit{seit}-rule for Perfekt:

\[ \| \textit{seit}_{\text{perf}} \| (z)(p)(t) = 1 \text{ iff } \exists t'[\text{beg}(t') \subseteq t \wedge \text{beg}(t') \subseteq z \wedge \text{end}(t') \subseteq t, p(t') = 1] \]

(124) \[ \exists u[u > s^* \wedge \exists t \subseteq u \wedge \exists t'[\text{beg}(t') \subseteq t \wedge \text{beg}(t') \subseteq Y \wedge \text{end}(t') \subseteq t, \text{VP}(t') = 1]] \]

Example for \textit{t,} \textit{s^*}:

(125) [Tod 10 Tage zurück] Der tot Aufgefundene hat ... seit 1970 regelmäßig das Eros-Center besucht. [Latzel (1977, S. 160)].

The dead has...since 1979 regularly the Eros-Center visited.

(126) Charlie rennt seit gestern.
Charlie runs since yesterday

(127) \[ \| \text{since}_{\text{pras}} \| (z)(p)(t) = 1 \text{ iff } \exists t'[t \subseteq t' \land \text{beg}(t') \subseteq z \land \text{end}(t') \subseteq t_c \land p(t') = 1] \]

(128) a. E: Präs since_{pras} Y \exists Y VP
b. U: Präs \exists \text{since}_{pras} Y VP

Problem: The Non-existence of the E-reading is not derived. Assume: \( t_c = r \)

(129) \( \exists r[s^* \subseteq r \land \exists o[r \subseteq o \land \text{beg}(o) \subseteq Y \land \text{end}(o) \subseteq r \land \exists e[e \subseteq o \land \text{VP}(e) = 1]] \)

(130) seit-rule revision:

\[ \| \text{since}_{\text{pras}} \| (z)(p)(t) = 1 \text{ iff } \exists t'[t \subseteq t' \land \text{beg}(t') \subseteq z \land \text{end}(t') < \text{end}(s^*) \land p(t') = 1] \]

(131) Präs \exists \text{since}_{\text{pras}} Y VP

\[ \exists t[t \subseteq s^* \land \exists t'[t \subseteq t' \land \text{beg}(t') \subseteq Y \land \text{end}(t') < \text{beg}(s^*) \land \text{VP}(t') = 1]] \]

Problem: QAdv takes a past part of the Präs-interval.

(132) a. Angelika niest.
   b. Präs \exists Y VP

(133) #Das Haus brennt seit gestern, aber jetzt brennt es nicht mehr.

   The house is on fire since yesterday, but now it is not on fire anymore.

(134) Rathert Seit as modifier of time individuals

\[ \| \text{since}_{\text{st}} \| (z)(p)(t) = 1 \text{ gdw. } \exists t'[t \subseteq t' \lor \text{beg}(t') \subseteq t] \land \text{beg}(t') \subseteq z \land \text{end}(t') \subseteq t_c \land t' \in p] \]

Disjunctions are not allowed in meaning rules!

B.Time measure-\textit{bis}

(135) Charlie ist seit 3 Stunden gerannt.

   Charlie is run since 3 hours

(136) \[ \| \text{since}_{\text{st}} \| (z)(p)(t) = 1 \text{ gdw. } \exists t[t \subseteq t' \land \text{dur}(t') = z \land \text{end}(t') \subseteq t_c \land p(t') = 1] \]

(137) U: Pres Perf \exists \text{since 3 hours} Y VP

33
\[\exists u [u \prec s^* \& \exists t [t \subseteq u \& \exists t' [t \subseteq t' \& |t'| = 3 \text{ hours} \& \text{VP}(t') = 1]]] \]

The representation of the E-reading is nonsense:

(138) \[\exists u [u \prec s^* \& \textbf{since 3 hours} \lambda t \exists e [e \subseteq t \& \text{VP}(e) = 1](u)]\]

\[= \exists u [u \prec s^* \& \exists t [u \subseteq t' \& \text{dur}(t') = 3 \text{ hours} \& \exists e [e \subseteq t' \& \text{VP}(e) = 1]]\]

u is infinite and cannot be part of a final interval. Non-finiteness of u essential for the theory!

**Problem:** The explanation of the non-existence of the E-reading is different for ZM-adverbs and ZI-adverbs.

4.5.2. "schon immer" etc.

(139) The QAdv 

\[\| \text{schon} \| (p)(t) = 1 \text{ iff } t \prec s^* \& p(t) = 1.\]

(140) Ich habe mir schon immer einen Pelzmantel gewünscht.

I have me already always a fur coat wanted

Pres Perf schon always VP

\[\exists u [u \prec s^* \& u \mid< s^* \& \forall t [t \subseteq u \rightarrow \text{VP}(t) = 1]]\]

(141) \[\| \text{always} \| (p)(t) = 1 \text{ iff } \forall t' [t' \subseteq t \rightarrow p(t') = 1]\]

The condition \(u \mid< s^*\) is trivial but eliminates the possibility that we existentially quantify over a proper subpart of u. This is a vacuous adverb of quantification.

**Problem:** The reading in (140) is too strong, because u is infinite. We cannot restrict u by an invisible FAdv AT(t*) because u cannot be identical to a finite time t*. So somehow we need \(\exists_{\sim}\), but schon is in complementary distribution with \(\exists_{\sim}\).

(142) Ich habe schon gegessen

Ho già mangiato.

I have already eaten

This is a different schon which attaches between TP and PerfP (Löbner (1988)).
Rather disputes the existence of an E/U-Ambiguity.

(143) Charlie ist drei Stunden lang gerannt

Charlie is three hours long run

(144) **Pres Perf** $\exists_{\subseteq} for 3$ hrs VP

(145) Dowty (1979)

\[
\| \text{for}_{m} \| (z)(p)(t) = 1 \text{ iff } \text{dur}(t) = z & \quad \forall t' [t' \subseteq t \rightarrow p(t') = 1]
\]

(146) **Pres Perf** for 3 hrs $\exists_{\subseteq} VP$

(146) is nonsense. It says of u that it has a final length. Essential exploitment of infinity of the perfect interval.

Problems for Dowty’s semantics for **for**: Adverbs of duration combine with adverbs of frequency:

(147) Charlie hat drei Wochen lang selten/oft/jeden Sonntag telefoniert.

UTN-reading can be represented by means of **schen**:

(148) Charlie ist schon drei Stunden lang gerannt.

Charlie is already three hours long run

Pres Perf schon for(three hours) VP

### 4.6. E/U in the literature

Fabricius-Hansen (1986)

(149) a. PRÄS seit gestern PERF es regnen $\implies (88b)]$

b. PRÄS PERF seit gestern es regnen $\implies (88c)]$

(149a): *seit gestern* is the set of intervals that start in yesterday and end somewhere in the future. PRÄS is redundant in this constellation. Perfekt is the set of intervals that are (a) in the Extentend Now and (b) that are part of a seit-gestern-interval. One of these must be a raining interval. This is the E-reading.
PERF is a frame advberb that establishes the Extended Now. *Seit gestern* cuts all the subintervals that start in yesterday and include the speech time t₀. One of these must be a raining interval. This is the U-reading.

Fabricius-Hansen’s account seems to be a scope solution working with perfect level adverbial. But the Perfekt semantics is not “context free”. The E reading requires that PERF takes the subintervals of the Extended Now and intersects them with subintervals of the seit-interval. For the U reading, PERF denotes the entire Extended Now. There is no unified semantics for the perfect.

Kamp and Reyle (1993) stipulate that HAVE delivers the E-reading in the configuration \([_VP\ HAVE\ VP]\). If we are given the constellation \([_VP\ HAVE\ VP\ AdV]\), we get the U-reading. There is no unified semantnics for the Perfect. The first perfect rule could be written as:

\[\text{HAVE}(VP)(s) = 1 \text{ iff. } \exists e \exists s'[e \succ s \land \text{end}(s') = e \land \text{VP}(s') = 1]\]

The second perfect rule is:

\[\text{HAVE}(VP,Dur)(s) \text{ gdw. } \exists e \exists s'[e \succ s \land \text{beg}(s') = e \land \text{Dur}(s') \land \text{VP}(s') \land \neg \exists e'[e' \leq n \land e' = \text{end}(s')]\]

There are more perfect rules. And the adverb for x hours is not treated in a uniform way either.

An even more complicated context sensitive (syncategorematic) solution is found in Hitzemann (1998 (?)) as well.

A contextfree account is tried in Abusch and Rooth (1990).

(150)  \(E: xnow(t_{2},u) \land \exists e_{1}[e_{1} \subseteq t_{2} \land \exists t_{2}[2\ \text{weeks}(t_{2}) \land t_{2} \subseteq e_{1} \land \forall i[i \subseteq t_{2} \rightarrow \text{VP}(i)]\]]\)

tₜ is a free variable denoting a finite extended now. The U-reading is obtained by scoping 2 weeks:

(151)  a. two weeks_{2} HAVE(2,u) John been in Boston for t₂

b. \(\exists t_{2}[t_{2} = \text{two weeks} \land xnow(t_{2},u) \land \forall i[i \subseteq t_{2} \rightarrow \text{VP}(i)]\]]\)

The idea is that two days can bind the extended now. This is a totally different idea. Note that “for z” is not a perfect level adverb but under HAVE, i.e., the difference does not come from scoping the durative adverb. The binder is inside the adverb. I find the idea attractive and my proposal is along these lines. It requires a different ontology for perfect intervals: they are finite.

Richards (1982) interprets HAVE as „There is a subinterval of“. The ambiguity is represented as:
a. E: Pres HAVE for 20 minutes VP  
b. U: Pres for 20 minutes HAVE VP

(152a) means that the speech time has a subinterval of 20 minutes length which is a VP-interval. (152b) means that duration of s* is 20 minutes and each subinterval includes a VP-interval. The speech time stetches and we have no anteriority effect.


LECTURE THREE: STILL XN

5. A SIMPLE PERFECT RULE

We will not commit ourselves to the view that XNs must be non-finite intervals. The simplest Perfect rule will be one that says “At a time abutting the local evaluation time”

(153) \[ \| \text{Perf} \|(p)(t) = 1 \text{ iff } \exists t'[t' > < t & p(t') = 1] \]

(154) a. So einen Pelzmantel habe ich mir immer gewünscht. E  
b. So einen Pelzmantel habe ich mir schon immer gewünscht U  
c. So einen Pelzmantel habe ich mir immer schon gewünscht U

(155) a. Pres Perf \( \exists \) always VP  
   \( \exists t_1[t_1 = s* \& \exists t_2[t_2 > < t_1 \& \exists t_3[t_3 \subseteq t_2 \& \forall t_4[t_4 \subseteq t_3 \rightarrow \text{VP}(t_4) = 1]]] \)  
b. Pres Perf schon always VP  
   \( \exists t_1[t_1 = s* \& \exists t_2[t_2 > < t_1 \& \exists t_3[t_3 \subseteq t_2 \& \forall t_4[t_4 \subseteq t_3 \rightarrow \text{VP}(t_4) = 1]]] \)  
c. Pres Perf always schon VP  
   \( \exists t_1[t_1 = s* \& \exists t_2[t_2 > < t_1 \& \forall t_3[t_3 \subseteq t_2 \rightarrow t_3 \mid < s* \& \text{VP}(t_3) = 1]]] \)

schon is a QAdv, immer is a frequency adverb (FQAdv).

(156) \[ \| \text{always} \|(p)(t) = 1 \text{ iff } \forall t'[t' \subseteq t \rightarrow p(t') = 1] \]

(157) a. Ich habe lange auf dich gewartet
Pres Perf $\exists_\infty$ for-long VP

b. Schon lange bin ich dem Gang Ihres Geistes gefolgt (Goethe to Schiller)
Pres Perf schon for-long VP

(158) $\parallel$ for-long $\parallel(p)(t) = 1$ iff dur(t) is long with respect to a p-instance & p(t) = 1.

(159) Fritz hat drei Wochen lang jeden Sonntag angerufen.

every Sunday is QRed. We have two QAdvs!

(160) Pres Perf $\exists_\infty$ for (3 weeks) every Sunday $\lambda t AT(t) \exists_\infty$ VP

$\exists t_1[t_1 = s^* & \exists t_2[t_2 > t_1 & \exists t_3[dur(t') = 3 \text{ weeks} & \forall t_4[t_4 \subseteq t_3 & \text{Sunday}(t_4) \rightarrow \exists t_5[t_5 \subseteq t_4 & VP(t_5) = 1]]]]$

(161) a. Sunday is of type $<i,p>$. $\parallel$ Sunday $\parallel(t')(t) = 1$ iff $t' \subseteq t$. & $t'$ is a Sunday.

b. every is of type $<e,p>$, $<e,p>,p>$ (standard) or $<e,p>$, $<e,p>,p>$ (temporal).

$\parallel$ every $\parallel[(P)(Q)(t) = 1$ iff $\forall x[P(x)(t) = 1 \rightarrow Q(x)(t) = 1]$, P, Q both of type $<e,p>$, or both of type $<i,p>$. If we did not relativize Sunday or every to the local evaluation time, we would face a problem discussed recently by Ogihara (SALT):

(162) John called every Sunday
The first formula says that every Sunday contains a time before the speech time. In the second formula, Past doesn’t bind a time.

Adverbs of frequency: **oft** (oftern), **selten** (seldom), **jeden Sonntag** (at each Sunday). These combine with **3 Wochen lang**.

Adverbs of quantification: **einmal**, **zweimal**. These do not combine with **3 Wochen lang**.

**Problem**: How can this restriction be expressed?

    b. *Fritz hat drei Wochen lang einmal/zweimal angerufen.
    c. Fritz hat drei Wochen lang an jedem Tag zweimal angerufen

6. **FUTURE**

The future rule is the mirror image of the perfect rule.

(164) \[\text{Fut}((p)(t)) = 1 \text{ iff } \exists t'[t' > t' & p(t') = 1]\]

(165) a. Ich werde zwei Wochen fort sein.
    b. Pres Fut for(2 weeks) be I away U
    c. Pres Fut \[\exists_\infty\text{ for(2 weeks) I be away E/U}\]
    d. *Pres Fut for(2 weeks) \[\exists_\infty\text{ I be away}\]

(d) is bad for the unexplained reason mentioned above.

(166) a. Fritz wird bis morgen anrufen. E
    b. Pres Fut until(tomorrow) \[\exists_\infty\text{ Fritz call}\]

(167) a. Ich werde bis morgen schlafen U
    b. Pres Fut \[\exists_\infty\text{ until(tomorrow) I sleep E/U}\]
    c. Pres Fut until(tomorrow) I sleep U

The easiest way of accounting for the U reading of statives/activities is to leave the adverb of quantification away.
7. ASPECT

Russian/Ukrainian have two forms for each verb, a **perfective** one and an **imperfective** one.

(168) Russ. ˘zdat’ (imperfective) — pro˘zdat’ (perfective) “wait for”

These are **aspects** and must not be confused with tense. In particular, the perfective form has nothing to do with the perfect and the imperfective form has nothing to do with the preterite though in German school grammar, we call the preterite “Imperfekt”.

In English, we have the distinction progressive vs. non-progressive. The **progressive** is a special case of an imperfective aspect.

(169) Wolfgang is working on his tense paper.

In German we have the “Rheinische Verlaufsform”.

(170) Wolfgang ist seinen Aufsatz am schreiben.

There is no agreement what aspects mean. An recent survey is given in Klein (1995), Usually it is said that the imperfective aspect expresses that an action/event is incomplete, unbounded or viewed from inside. The perfective describes an action as uncompleted, bounded or viewed from outside. There are tons of literature about this in the slavic literature.

Klein (1994) finds these notions unprecise and wants to replace them by purely temporal relation. He says that an aspect relates the topic time (= the reference time) with the event time/time of the situation.

(171) Aspects according to Klein (1994)

a.  \[ \text{Perfective}(p)(t) = 1 \text{ iff } \exists t' [t' \subseteq t \& p(t') = 1] \]

b.  \[ \text{Imperfective}(p)(t) = 1 \text{ iff } \exists t' [t \subseteq t' \& p(t') = 1] \]

(172) Ma˘sa napisala pismo (pfv)
\[\exists [t < s^* \& \exists t' [t' \subseteq t \& \text{Masha writes a letter at } t']]\]

\[------[---/\\\\///---]-------S\]

[ .....] Past – Interval

\\\\/// event-time

We could accept the definition of perfectivity (though Klein’s is somewhat more complicated), but the definition of the imperfective is too simple. The semantics of the first sentence implies that Masha finished the letter in the past. But, in fact, she was interrupted and never finished it. Klein’s definition of the imperfective is essentially the same as the one found in Bennett and Partee (1972), and it has been criticized with this argument in Dowty (1979).

The verb write is a verb of creation with a difficult semantics because the object comes into existence by the very act of writing. Let us ignore the difficulty for a moment and let us assume that the two semantics rules are correct. Here is then the architecture of the English clause.

(174) He might have been helping them. Radford (1997), p. 180ö

The tree closely follows Chomsky (1957). The tree shows that we have to distinguish the morphology from the semantics. helping is a non-fined form morphologically marked as a progressive form. But the semantic Progressive (= imperfective) is not there. It is locate in the
non-finite form **been**, a participle II. This form is a non-finite form as well and carries the Progressive information. The Perfect is expressed by the 0-infinitive **have**. Morphologically, this form is tenseless. **might** is, pace Radford, not a past form, but a present form. And the Present is not located there. If we convert this tree into our framework, it is something like this:

(175)

```
TP
  T
  Pres
  Auxp
    Aux
      might
    PERF
      PERF
      PROGP
      been
      VP
        D
        he
        helping them
```

We cannot indicate the interpretation because the modal **might** requires the introduction of the word-parameter. Here is the full English verbal paradigm, which follows Freidin (1992):

(176)  a. One auxiliary

   i. Wolfgang will work on his tense paper.
   ii. Wolfgang was working on his tense paper.
   iii. Wolfgang had worked on his tense paper.

   b. Two auxiliaries

   i. Wolfgang will be working on his tense paper.
   ii. Wolfgang will have worked on his tense paper.
   iii. Wolfgang had been working on his tense paper.

   c. Three auxiliaries

   Wolfgang will have been working on his tense paper.

Here is the German paradigm:
(177) a. One auxiliary
   i. Wolfgang wird sein Tempuspapier schreiben.
   ii. Wolfgang war sein Tempuspapier am schreiben.
   iii. Wolfgang hatte sein Tempuspapier geschrieben.

b. Two auxiliaries
   i. Wolfgang wird sein Tempuspapier am schreiben sein.
   ii. Wolfgang wird sein Tempuspapier geschrieben haben.
   iii. Wolfgang war sein Tempuspapier am schreiben gewesen.

c. Three auxiliaries
   ?Wolfgang wird sein Tempuspapier am schreiben gewesen sein.

(178)

In the system of Bech, the form **am schreiben** would be a supine of 4th status or *am*-infinitive. The QAdv is omitted.

This is the Greek systems (thanks to A. Alexiadou):

(179) Gr. Tha xtiso (pfv) ena spiti “I will build a house”
The form *xtiso* has the features 1. person singular, perfective. The form *xtizo* has the features 1. person singular, imperfective. Semantically, the forms are aspect less and tense less.

(180) Tha exo xtisi ena spiti  "I will have built a house"

The form *xtiisi* is + perfective and is a participle II. It is a supine.

And here is Russian.
citaet has the features pres and imperfective.

Alla pro˘citaet pismo “Alla will read a letter”

The form scitaet has the feature 3. singular, perfective, Future and Present.

Alla budet citat’ pismo
Observation: Languages that express aspect do it directly at the VP. The standard assumption is that aspect is under all tenses. Some people call Fut and Perfect aspects as well. The future auxiliary *werden/will* is often called a modal. The Greek future particle tha (< thelo na “I want that”) is called a mood. This terminology has nothing to do with the semantics introduced here. As to aspects, the only distinction that matters for us the perfective/imperfecfective distinction.

8. POSSIBLE WORLDS AND MODALITY

The progressive is a modal operator. We have to complicate the semantics be introducing possible worlds, more appropriately, possible world histories. We assume the type <s> for possible worlds. Propositions are now functions of type <i, <s,t>>. We will use p for this type. But recall that p is now a more complicated type. Everything is as before. In particular, we say:

(185) a. The proposition p is **true** in the world w at time t iff p(t)(w) = 1.
   b. p **entails** q iff \( \forall w \forall t [p(t)(w) = 1 \rightarrow q(t)(w) = 1] \)
   c. p is **compatible** with q iff \( \exists w \exists t [p(t)(w) = 1 \land q(t)(w) = 1] \)

A proposition is **standing** if the time argument is satisfied. Standing propositions are of type <s,t>. Entailment is inclusion between sets of worlds in this case.

The meaning rule must be slightly modified:

(186) a. **win** is of type <e, <i, <s,t>>>. \| **win** \|(x)(t)(w) = 1 iff x wins in w at t.
b. Past is of type <p,p>. \( \| \text{Past} \|(p)(t)(w) = 1 \iff \exists t [t < s^* \& p(t')(w) = 1] \)

c. \( \| \text{Perf} \|(p)(t)(w) = 1 \iff \exists t' [t' > t \& p(t')(w) = 1] \)

and so on.

We can now express the meaning of modals.

(187) a. Sigurd kann in Berlin sein.
    Pres can be Sigurd in Berlin

b. Sigurd mußte in Berlin sein.
    Past must Sigurd in Berlin.

We ignore the copula.

(188) An epistemic background assigns to a world and a time everything that \( s^* \) believes in that world at that time. This is a standing proposition.

\( B(t)(w) = \text{what} \ s^* \text{ believes in} \ w \text{ at} \ t. \)

(189) a. \text{can} is of type <p,p>. \( \| \text{can} \|(p)(t)(w) = 1 \iff B(t)(w) \text{ is compatible with} p(t). \)

b. \text{must} is of type <p,p>. \( \| \text{must} \|(p)(t)(w) = 1 \iff B(t)(w) \text{ entails} p(t). \)

(190) \( \| \text{Pres can Sigurd in Berlin} \|(t)(w) = 1 \iff \exists t [t = s^* \& B(t)(w) \text{ is compatible with} \| \text{in} \ (\text{Berlin})(\text{Sigurd}) \| \| (t) ] \)

\( \iff \exists t [t = s^* \& \exists w' [B(t)(w)(w') = 1 \& \text{Sigurd is in Berlin in} \ w' \text{ at} \ t] \)

(191) \( \| \text{Past must Sigurd in Berlin} \|(t)(w) = 1 \iff \exists t [t < s^* \& B(t)(w) \text{ is entails} \| \text{in} \ (\text{Berlin})(\text{Sigurd}) \| \| (t) ] \)

\( \iff \exists t [t = s^* \& \forall w' [B(t)(w)(w') = 1 \rightarrow \text{Sigurd wins in} \ w' \text{ at} \ t] \)

Note that the lexical semantics transmits the local evaluation time to the infinitival. Classics for the semantics of modals are Kratzer (1978) and Kratzer (1981).

\textbf{Homework}: Show that \textit{Sigurd kann gestern in Berlin sein} is contradictory, while \textit{Sigurd kann gestern in Berlin gewesen sein} is good.

9. \textbf{IMPERFECTIVE AS A MODAL}

(192) John is crossing the street.
Dowty’s idea (Dowty (1979)) is that the sentence is true in w at t iff *in the normal course of events*, there will be a larger interval t’ such that *John cross the street* is true at t’. If something unexpected happens, John will not cross the street completely. Then *John cross the street* is not true at a superinterval of t, though John is crossing the street is true at the smaller interval t.

(193) w’ is an inertial continuation of w at time t, w’ ∈ INERT(t)(w), if w’ coincides with w up to and including t and w’ is a normal continuation of w for the time to come after t, i.e., nothing unexpected happens.

(194) Prog is of type <p,p>. \[ || \text{Prog} \|(p)(t)(w) = 1 \text{ iff } \forall w’[w’ ∈ \text{INERT}(t)(w) \rightarrow \exists t’[t \subseteq t’ \& t \text{ is not a final part of } t’ \& p(t’)(w’) = 1]] \]

(195) \[ || \text{Pres Prog John cross the street} \|(t)(w) = 1 \text{ iff } \exists t[t = s^* \& \forall w’[w’ ∈ \text{INERT}(t)(w) \rightarrow \exists t’[t \subseteq t’ \& t \text{ is not a final part of } t’ \& \text{John cross the street in } w’ \text{ at } t’]] \]

This semantics is vague and has been criticised. An attempt to make it more precise is made in Landman (1992). Landman’s revision keeps the essential idea, namely that an action in progression need not be completed. He analyses Prog as a modal as well.

Proposal: Take Dowty’s Prog as on possible reading for the Ipfv in Russian and other slavic languages.

Exercise: Analyse the imperfective sentences given in the first section by means of the extended semantics.

LECTURE 5

10. PERFECTIVE AS A MODAL & AKTIONSARTEN

The idea is that Pfv expresses completeness. An action is complete if it is not possible to do it for some more time. A proposition will be complete in a world at a time if there is no inertial world where the proposition is true at some longer time.

(196) Perfective
Pfv is a symbol of type $<p,p>$. $p := <i, <s,t>>$. $|| Pfv ||(p)(t)(w) = 1$ iff

(a) Assertion: $p(t)(w) = 1$

and

(b) Presupposition: $\neg \exists w'[w' \in \text{INERT}(t)(w) \& \exists t'[t \subseteq t' \& t \text{ is not a final subinterval of } t' \& p(t')(w') = 1]]$

Note: The presupposition is the contrary to the meaning of the Imperfective. This the semantics that Rapp and Stechow (1999) assume for the German adverb fertig/ganz in:

(197) Melina mahte den Rasen ganz.

(198) Alla pročitala pismo

$\| \text{Past} \exists x. \text{Pfv read}(x)(\text{Alla}) \| (t)(w) = 1$ iff

(a) $\exists t[t < s^* \& \exists t'[t \subseteq t \& \exists x[\text{letter}_w(x) \& \text{read}_w(x)(\text{Alla})]]$ Assertion

and

(b) $\exists t[t < s^* \& \exists t'[t \subseteq t \& \exists x[\text{letter}_w(x) \& \neg \exists w'[w' \in \text{INERT}(t)(w) \& \exists t'[t \subseteq t' \& t \text{ is not a final subinterval of } t' \& p(t')(w') = 1]]]]$ Presupposition

The highlighted part does not belong to the presupposition proper.

Questions to investigate: pismo presumably has wide scope with respect to Pfv. What happens, if we allow that the nominal as narrow scope with respect to Pfv?

The prediction is that certain Aktionsarten cannot be perfectivized, statives and activities without goal. Here is a classification of Aktionsarten in temporal terms (Dowty (1979), Krifka (1989)).

(199) a. $p$ is cumulative iff for any $t$, $t'$ such tat $t << t'$ and word $w$: If $p(t)(w) = 1 \& p(t')(w) = 1$, then $p(t \cup t')(w) = 1$.

b. $p$ is divisive iff for any $w$ and $t$, $t'$: If $p(t)(w) = 1 \& t' \subseteq t'$, then $p(t')(w) = 1$.

c. $p$ is quantized (Krifka’s term) if $p$ is neither cumulative nor divisive.

Activities without goals are cumulative, statives are divisive (and cumulative), and accomplishments/achievements are quantizes.

(200) Vendler’s “aspectual classes” in temporal terms (Vendler (1957))
Statives:  Svetlana happy, The coloss weigh 100 tons, Norbert asleep  divisible
Activity:  Lola run, Olga dance, Manfred drink beer  cumulative, not entirely divisive
accomplishment:  Lola run to the bank, Alla read the book, Manfred drink the beer  quantized
achievement:  Susi find the solution, Ole reach the top  quantized

Verbs do not express Aktionsarten as such. Entire VPs express Aktionsarten.

Prediction of the Perfectivity semantics: Only quantized Aktionsarten can be perfectivized.

(201)  Klein (1995)
Kolos vesil sto ton  (ipfv)
The coloss weighed (*was weighing) hundred tons
|| Pfv The coloss weigh 100 tons || is always undefined, whereas it is no problem to have the VP with an Imperfective. The unacceptability of the progressive in the English example does not follow from Dowty’s semantics yet.

The use of the imperfective in the example is a problem for any analysis of aspects in purely temporal terms. Klein gives a temporal analysis of the aspect that is just made for these cases. We derive the facts semantically.

The prediction is that activities cannot be perfectivized. In fact, the perfective form of an activity or stative verb always seem to change the Aktionsart to a quantized one. I am not prepared for Russian data. Here are German analogues:

(202)   a. Fritz wachen  (divisive)
       b. Fritz aufwachen  (quantized)

(203)  a. Die Rose blühen  (divisive)
       b. Die Rose verbühen  (quantized)

(204) a. Lola rennen  (cumulative)
       b. Lola zur Bank rennen  (quantized)

(205) a. Mascha müde  (divisive)
       b. Mascha ermüden  (quantized)

(206) a. Manfred Bier trinken  (cumulative)
b. Manfred ein Bier trinken (quantized)

The prediction is that only the (b)-meanings can be perfectivized. The Russian perfective morphology must, in many cases reconstructed as involving two different operations: one changing a stative/activity into an accomplishment/achievement; the second is our Pfv. Here is an example:

(207) Olga ustala  \textit{Olga got tired} (pfv)
\begin{align*}
\text{Past } \exists \subseteq \text{Pfv BECOME Olga tired}
\end{align*}

(208) Olga ustavala  Olga was getting tired (ipfv)
\begin{align*}
\text{Past } \exists \subseteq \text{Ipfv BECOME Olga tired}
\end{align*}

(209) \| \text{BECOME} \|(p)(t)(w) = 1 \text{ iff } p(\text{beg}(t))(w) = 0 \& p(\text{end}(t))(w) = 1; \text{ p is undefined for the other subintervals of t. (Dowty (1979))}

(210) a. ustala(x) := \text{BECOME tired}(x) [+ Pfv] [3.sing. fem.] [+ Past]

b. ustavala(x) := \text{BECOME tired}(x) [+ Ipfv] [3.sing. fem.] [+ Past]

1. Don’t confuse perfectivity with quantization. The latter is a temporal characterisation of the “telic” Aktionsart. \text{BECOME} makes an Aktionsart telic (accomplishment, achievement). \text{BECOME} is a temporal notion. Aspects are modal operators. Russian has two obligatory aspects. English has the progressive, German marginally has a Verlaufsform.

2. Don’t try to derive the imperfective form from the perfective form or viceversa. The two aspects are in complementary distribution. The so-called secondary imperfectivization is a morphological thing. The “embedded” perfective morphology merely makes the Aktionsart telic.

3. The perfective and imperfective form of the verb mean exactly the same. They contain different semantic features that have to be checked. These bring out the difference in meaning.
(212) Ass: ∃[t < s & ∃'[t' ⊆ t & BECOME tired(Olga)(t)(w)]]
Pres: ∃[t < s & ∃'[t' ⊆ t & for no prolongation t’’ of t and inertial world w’ w.r.t. w we have it: BECOME tired(Olga)(t’)(w’) = 1]]

(213) Ass: ∃[t < s & ∃'[t' ⊆ t & In every inertial world w’ w.r.t. w there is superinterval t’ for t such that BECOME tired(Olga)(t’)(w’) = 1]}

The classic for the theory of actionsarten is Dowty (1979). As to the interaction of aspect and tense, consider Comrie (1976, Comrie (1981, Comrie (1985) (no semantics). Decomposition of the verb in order to get the Akitionsarten right can be very complicated and above all messy. See, e.g. Stechow (1996) or Stechow and Rapp (1999).

**LITERATURE**


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