A semantics for durative adverbs

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This paper treats the universal/existential (u/e-) ambiguities occurring with German Perfect sentences containing durative adverbs. Adverbs like *bis* 'until' or *seit* 'since' give rise to the complex u/e-ambiguity, while *lang* 'for' gives rise to the simple u/e-ambiguity.

It is argued that the complex ambiguity is a scope ambiguity. The durative adverb may have narrow or wide scope with respect to a phonetically empty quantificational adverb. Contrary to what is said in the literature, it is shown that the complex ambiguity has nothing to do with the meaning of the Perfect.

The simple ambiguity gets an analysis in terms of underspecification.

1. The data

German Perfect sentences containing durative adverbs are ambiguous between a universal (or 'u') and an existential (or 'e') reading. There are two different kinds of this u/e-ambiguity, a complex and a simple one.

Let us first have a look at the complex u/e-ambiguity displayed by the sentence in (1). The u-reading of (1) may be paraphrased in the following way: there is a time that ended in yesterday, and John was in the garden *throughout* that time. In contrast to this, the e-reading of (1) may be paraphrased: there is a time that ended in yesterday, and John was in the garden *at least once* during that time.

(1) John ist bis gestern im Garten gewesen
John is until yesterday in-the garden been
'John was in the garden until yesterday'

For many speakers, the u-reading of (1) is easier to get than the e-reading. But the e-reading is salient with continuations like the ones in (2)-(3). With these continuations, the u-reading is impossible.

(2) und zwar dreimal
and actually three-times
'actually, this was three times'

(3) und zwar um eins
and actually at one
'actually, this was at one'

Now I turn to the simple u/e-ambiguity, which is to be observed in (4). The u-reading may be paraphrased by: the two weeks of John's stay in Boston are *immediately before speech time (or 'S')*. The e-reading means that the two weeks of John's stay in Boston are *somewhere in the past of S*.

(4) John ist zwei Wochen lang in Bostongewesen
John is two weeks for in Bostonbeen
'John has been in Boston for two weeks'

Thus, the difference between the simple and the complex u/e-ambiguity can be stated as follows. In case of the simple ambiguity in (4), the duration of the event is specified by the durational phrase *zwei Wochen lang* 'for two weeks' on both readings; John's stay in Boston is two weeks long on both readings. – But in case of the complex ambiguity in (1), the duration of the event is specified by the durational phrase *bis gestern* 'until yesterday' only in case of the u-reading. John's stay in the garden lasted until yesterday only in case of the u-reading.

2. Questions to be addressed

Two intriguing questions come up with the data from the last section, both of which will be treated here.

First, are we dealing with true semantic ambiguities in (1) and (4)? Second, do the u/e-ambiguities have anything to do with the meaning of the Perfect?

But before I present my answers to these questions, I will have a look at the previous analyses.

3. Previous analyses

3.1. Complex u/e-ambiguity

The only studies treating the complex u/e-ambiguity I know of are Anagnostopoulou et al. (1999) and Fabricius-Hansen (1986). Let us look at Fabricius-Hansen (1986) first.

Fabricius-Hansen (1986) offers a scope solution for the following ambiguous sentence.

(5) Es hat seit gestern geregnet
it has since yesterday rained
'it has rained since yesterday'.

In the case of the e-reading of (5), *seit gestern* 'since yesterday' has wide scope, cf. the LF in (6).

(6) seit gestern (PRES (PERF (es regnen)))
since yesterday (PRES (PERF (it rain)))

But in the case of the u-reading of (5), *seit gestern* 'since yesterday' has narrow scope, cf.:

(7) PRES (PERF (seit gestern (es regnen)))
PRES (PERF (since yesterday (it rain)))

Obviously, there is also a third possibility. *Seit gestern* 'since yesterday' could be inserted between PRES and PERF. In Fabricius-Hansens's system, however, this does not result in a third reading, but in the e-reading again.

To interpret the formulas above, we need Fabricius-Hansen's rules for PRES, PERF and *seit* 'since'. Cf.:

(8) PRES:
(a) *PRES* ϕ is true at (t_0,T_0,T_K)
iff ϕ is true at (t_0,T_{G0},T_K). T_{G0} is a superinterval of t_0.
(b) *PRES* ϕ is true at (t_0,T_j,T_K)
iff (i) or (ii) is true:
(i) t_j is a co-time t_k, which is an event-time of a proposition,
and ϕ is true at (t_k,T_k,T_K)
(ii) t_j is no co-time, and ϕ is true at (t_0,T_j,T_K)

(9) PERF:
(a) *PERF* ϕ is true at (t_j,T_j,T_K), $j\neq0$,
iff ϕ is true at (t_j,T_+,T_K). T_+ stretches backward from t_j
and includes t_j.
(T_+ is called *unechter Vergangenheitsbereich* 'unreal past' of t_j)
(b) *PERF* ϕ is true at (t_i,T_j,T_K)
iff (i) or (ii) is true:
(i) ϕ is true at (t_i,T_+,T_K).
T_+ is that part of *unechter Vergangenheitsbereich* 'unreal past'
of t_i which elements are subintervals of t_j.
(ii) ϕ is true at (t_j,T_+,T_K).
T_+ is that part of *unechter Vergangenheitsbereich* 'unreal past'
of t_i which elements are subintervals of t_{k*}.
T_{k*} is an interval provided by the context.
T_{k*} reaches over the left boundary of t_j.

(10) seit 'since':
(a) '*seit 1972* ϕ' is true at (t_i,T_i,T_K) iff 1972 is before t_i
and ϕ is true at (t_i,T_b,T_K).
T_b is the set of all superintervals of t_i that follow 1972
(b) '*seit 1972* ϕ' is true at (t_i,T_j,T_K) iff 1972 is before t_i
and ϕ is true at (t_i,T_b,T_K).

T_b is the set of intervals following 1972
and standing in the very same relationship to t_i as t_j does.

Within this system, propositions are to be evaluated at the triple (t,T_B,T_K). That is to say, there are three indices, we are dealing with a complex intension. The first index t is the reference time. At the beginning of recursion, t is identical with speech time t_0. But in the course of evaluation, t may denote other times (e.g. it may denote a contextually given time of another event or it may denote the time of a sentence-internal temporal adverb).

T_B is the set of times to be considered (or, in Fabricius-Hansen's terms, Betrachtzeitmenge). Often, T_B is the temporal adverb of the proposition. But in other cases, T_B is an event time or a time delivered by the evaluation process. In rule (a) for PRES, T_{G0} is a time delivered by the evaluation process. The time T_0 in the triple (t_0,T_0,T_K) of rule (a) for the Present is (just as t_0 for the first index t) the default. At the beginning of recursion, T_B gets the value T_0 (but only if the sentence contains no temporal adverb and there is no context).

T_K is a store for times which have already (i.e. up to the time of evaluation) occurred in discourse. Times of temporal adverbs and times of events are stored, but times delivered by the evaluation process are stored as well.

The interpretation of (6), i.e. the e-reading, goes as follows. *Seit gestern* 'since yesterday' is the set of intervals starting in yesterday and overlapping S at the same time. PRES is redundant here. PERF establishes a set of intervals that are in the *Extended Now* (defined as in McCoard 1978) and that are part of a *since-yesterday*-interval. One of these is a raining-interval.

The calculation of the u-reading in (7) goes as follows. PRES establishes an interval including S. PERF establishes a set of intervals that are in the *Extended Now* and that are part of a PRES-interval. *Seit gestern* 'since yesterday' selects intervals starting in yesterday and continuing up to S. One of these is a raining-interval.

My objection against Fabricius-Hansen (1986) is that she makes use of too many semantic distinctions. There are three different rules for PERF in Fabricius-Hansen (1986), cf. (9). Three distinct rules for PRES are used, cf. (8). Even *seit gestern* 'since yesterday' is ambiguous in meaning, cf. (10).

Anagnostopoulou et al. (1999) offer a treatment of the complex u/e-ambiguity which is totally different from Fabricius-Hansen (1986). In their analysis, the ambiguity of *Since 1990 I have been sick* is due to a lexical ambiguity of *since*. Durational *since* yields the u-, and inclusive *since* yields the e-reading. This is illustrated by the following LFs:

(11) u-reading: $\exists i\,[\text{begin}(i)=1990 \,\&\, \text{end}(i)=\text{Now} \,\&\, \forall t \in i\,(\text{VP}(t))]$
(12) e-reading: $\exists i\,[\text{begin}(i)=1990 \,\&\, \text{end}(i)=\text{Now} \,\&\, \exists t \in i\,(\text{VP}(t))]$

My objection against Anagnostopoulou et al. (1999) is the following. In German, all so-called *Grenzadverbien* 'border-adverbs' display the complex ambiguity: *bis* 'until', *seit* 'since', *von...bis* 'from...until', *von...an* 'from...on', and *ab* 'as from'. It is not desirable to make a whole class of adverbs lexically ambiguous.

3.2. Simple u/e-ambiguity

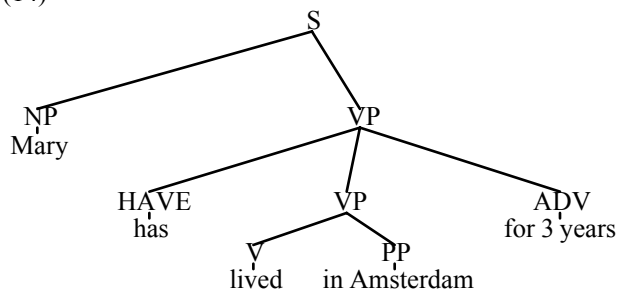
Unlike the complex ambiguity, the simple u/e-ambiguity has received a lot of explanations within different theoretical frameworks, e.g. Abusch & Rooth (1990), Heny (1982), Richards (1982), Mittwoch (1988), Dowty (1979), Kamp & Reyle (1993) and Hitzeman (1997 a,b). For reasons of brevity, I will only present the two latest studies, i.e. Kamp & Reyle (1993) and Hitzeman (1997 a,b). The other studies are discussed in detail in Rathert (1999).

Kamp & Reyle (1993) offer a structural ambiguity for sentences like (13).

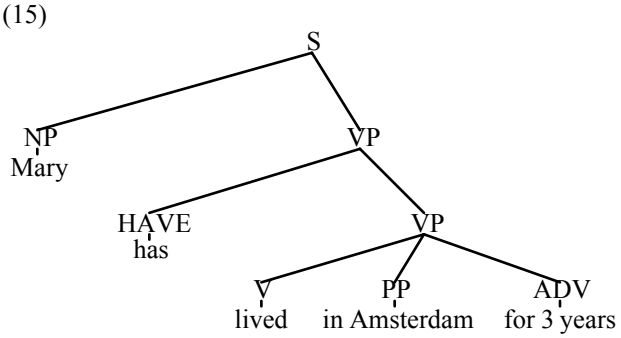
(13) Mary has lived in Amsterdam for three years

The u-reading is represented by the tree in (14), the e-reading by the tree in (15).

(14)



(15)

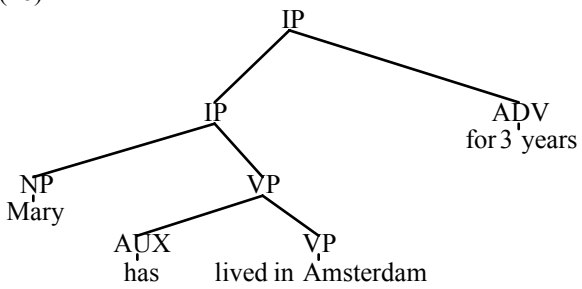


My objections against Kamp & Reyle (1993) are the following. First, the Perfect gets no uniform meaning, there are two DRS-construction rules for HAVE - one for each reading in fact (for the e-reading, the CR.HAVE on page 589 is used; but for the u-reading, we need CR.HAVE.Adv on page 590). The *for*-adverb gets no uniform meaning either, it is analyzed syncategorematically. Again, there are two construction rules, one for each reading (for the e-reading: CR.VP.PP on page 591; for the u-reading: CR.HAVE.Adv on page 590). Abo-

Above all, there is no independent syntactic motivation for the bracketings in (14) and (15).

Like Kamp & Reyle (1993), Hitzeman (1997a,b) uses the framework of DRT. Hitzeman argues that the *for*-phrase in sentences like (13) can modify either the IP or the VP. If the IP is modified, we get the u-reading and the following tree:

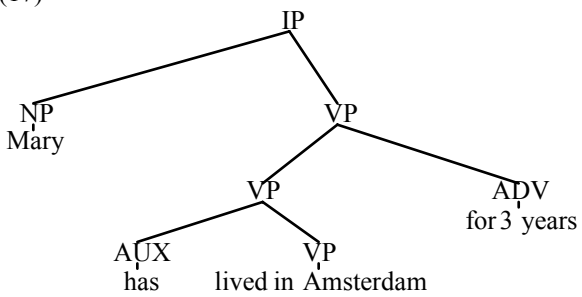
(16)



A DRS-construction rule states that the *for*-phrase is marked [+high] in this configuration. Another construction rule says that the *for*-interval is located immediately before S.

The e-reading results if the adverbial phrase modifies the VP:

(17)



In this configuration, the *for*-phrase is not marked [+high]. A construction rule states that the *for*-interval is located somewhere in the past of S.

My objections against Hitzeman (1997 a,b) mainly concern semantic compositionality. What should be derived, namely the localization of the *for*-interval, is simply written into a construction rule. Insofar, the analysis is uncompositional. Moreover, the Perfect gets no interpretation at all. There is no construction rule for *has* or AUX, we end up with a reducible DRS-condition on both readings. Finally, there is the following empirical problem. With topicalized adverbs, only IP-modification should be possible. Thus, sentences with topicalized adverbs should only have the u-reading. But (18) has both readings:

(18) For two hours someday, Mary has been there

4. My proposal

One of the questions about the u/e-ambiguities is whether they have anything to do with the meaning of the Perfect. In order to answer this question, of course, the meaning of the Perfect has to be clarified.

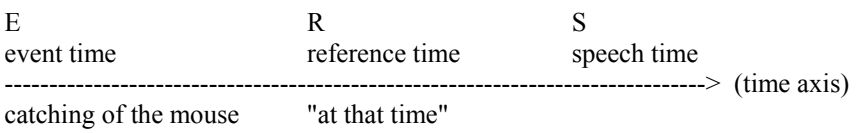
Therefore, the following section 4.1. is about the Perfect. Section 4.2. and 4.3. treat the complex and the simple u/e-ambiguity.

4.1. The Perfect

Reichenbach (1947) introduces three parameters for the analysis of tense: event time (E), reference time (R) and speech time (S). Let me illustrate these with the help of the following example:

(19) Zu dieser Zeit hatte die Katze die Maus schon gefangen
at that time had the cat the mouse already caught
'At that time, the cat had already caught the mouse'

A Reichenbachian analysis of (19) goes as follows. On a time axis, the event time E is located somewhere before the speech time S. In addition, E is also located before a time which is referred to by *zu dieser Zeit* 'at that time'. This time is the reference time R. The diagram below shows the scenario for (19):



Thus, the reference time is a kind of perspective point. The event time in (19) is 'seen from' the reference time as being already completed.

I have argued in Rathert (1999) that adverbs like *schon oft* and *schon immer* are the only adverbs which prove that the traditional Reichenbach-semantics for the Perfect, namely that in (20), is wrong.

(20) E<R & S,R

The comma may stand for *simultaneous to* or *superinterval of* or *subinterval of* or *overlaps with.*

Crucial data for the argumentation in Rathert (1999) are (21)-(24).

(21) Nina bekommt einen Pelzmantel geschenkt. Sie sagt:
Nina gets a fur-coat as-a-present. She says:
'Nina is given a fur coat as a present. She says:'

So einen Pelzmantel habe ich mir
Such a fur-coat have I me

schon *jahrelang* gewünscht!
already for-years wished!
'I've wanted a fur coat like this for years!' (Schipporeit 1971)

(22) Frau Greff lag zu diesem Zeitpunkt *schon* *jahrelang* zu Bett,
Mrs Greff lay at this time already for-yeras in bed,
'At this time, Mrs Lina Greff had already been lying in bed for years,'

und nahm alles Mögliche in die Hand, nur kein Buch
and took everything possible in the hand only no book
'and picked up everything, but never a book' (Schipporeit 1971)

(23) Ich habe mir*schon* *immer* ein Fahrrad gewünscht
I have me already alwaysa bike wished
'I've always wanted a bike'

(24) * Ich wünschte mir*schon* *immer* ein Fahrrad
I wished me already alwaysa bike
'I've always wanted a bike'

The traditional Reichenbach-semantics for the Preterite is *E,R & E<S*. An explanation for the data in (21)-(22) could now be that adverbs like *schon jahrelang* cause E to reach up to R. In (21), the wanting-of-the-coat would reach up to R, and R overlaps with S. In (22), the lying continues up to an R in the past of S.

(23) could be explained in analogy to (21), E reaches up to R. But how, then, can (24) be ungrammatical? Why can the wanting not continue up to an R in the past of S?

My suggestion is that the explanation just given for (23)-(24) is wrong. Obviously, there are adverbs like *schon immer* the denoted intervals of which abut S. This abutting is possible with the Perfect, but impossible with the Preterite. The semantics of these tenses should reflect this.

Within the Reichenbach-frameworks, it is impossible to formulate adverb-rules which together with the assumed semantics of the Perfect and the Preterite explain the differences in grammaticality of (21)-(24).

Because of this weakness of the Reichenbach-frameworks, I assume a different semantics of the Perfect. In my system, the Perfect establishes an *Extended Now*, i.e. a left-infinite interval $(-\infty,m)=\{n \mid n \leq m\}$, for points of time m,n. This indefinite meaning of tense is also assumed by other authors, e.g. Abusch (1996).

Now, the facts in (21)-(24) follow: adverbs like *schon immer* identify with the *Extended Now*, which is the reason why they cannot occur with the Preterite. Adverbs like *schon jahrelang* do not identify with the *Extended Now*, thus they may occur with the Perfect as well as with the Preterite.

Fabricius-Hansen (1986) and Stechow (1999) argue for the *Extended-Now*-Theory of the Perfect, too. They assume that S is part of the *Extended Now*. But cf.:

(25) nun bekennen wir öffentlich,
now admit we in-public
'now, we admit in public'

was wir *schon oft* im Stillen ausgesprochen
what we already often in silence spoke
'what we often admitted only to ourselves'
(Goethe, Schriften zur Literatur)

(26) was wir *schon immer* geahnt haben, jetzt ist es Gewißheit
what we already always suspected have now is it certainty
'what we always suspected is a certainty now'
(Mannheimer Morgen, 28.6.1989)

(25)-(26) show that the quantified state of affairs does not hold at S. For instance, we do not suspect anything at S, we know it, cf. (26). Therefore, S has to be excluded from the *Extended Now*. The meaning of the Perfect is in (27):

(27) Perf:=$\lambda P \lambda t \exists u[u \supset\subset t \ \& \ P(u)=1]$

Perf has the semantic type <<i,t>,<i,t>>. The notation 'u $\supset\subset$ t' means 'the interval u abuts the interval t'.

But intuitively, the exclusion of S from the *Extended Now* is problematic. Somehow, S seems to be involved in the case of adverbs like *schon oft* and *schon immer*. As for the question why this is so, I agree with Behaghel (1924:293):

'Das Perfekt bezeichnet eine Handlung, die aus der Vergangenheit sich bis in die Gegenwart fortsetzt: [...]

ich hab schon lang auf den Ruf des Herrn gewartet [...]

Damit ist nahe verwandt die Feststellung, daß etwas in der Vergangenheit öfters geschehen ist: [...]

mich hat der ber [...] erschrecket dicker denne der man [...]

Die Erfahrung über Wiederholungen desselben Vorgangs gestattet aber auch einen Schluß auf die Gegenwart, das Perfektum gewinnt gnomischen Charakter: [...]

wer Gott [...] traut, der hat auf keinen Sand gebaut [...]'

(‘The Perfect is used for events stretching from the past up to the Present:

ich hab schon lang auf den Ruf des Herrn gewartet [...]
I have already long for the call of-the Lord waited
‘‘for a long time now, I have been waiting for the call of the Lord’’

This is close to the conclusion that something happened often in the past:

mich hat der ber [...] erschrecket dicker denne der man [...]
me has the bear shocked more-often than the man
‘‘the bear and the deer shocked me more often than the man’’

The experience of repetitions of one and the same event allows an inference about the Present, the Perfect gets a gnomish character:

wer Gott[...] traut, der hat auf keinen Sand gebaut [...]
who God trusts he has on no sand built
‘‘who trusts [...] God did not build on sand’’’)

Instead of positing a *gnomish character* of the Perfect one would say today: there is a strong conversational implicature. But let me add the following caveat. I only take over Behaghel's commentary on the gnomish character of the Perfect. I do not think that his example about trusting God is convincing because it is a proverb with timeless validity.

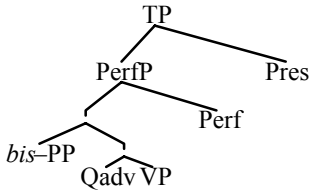
4.2. Complex u/e-ambiguity

To account for the complex u/e-ambiguity, I make the following assumption. Every sentence has exactly one adverb of quantification (Qadv), the default being $\exists_{\subseteq}$ (*einmal* ‘once’) [Bäuerle 1979, Stechow 1991]

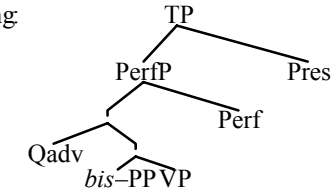
It is my thesis that adverbs like *bis* have scope with respect to Qadv. The u/e-ambiguity thus receives a scope solution:

(28)

e–reading:



u–reading:



To tackle the complex ambiguity of (1), we need the rules in (29) [Pres is for reasons of simplicity taken to denote S]:

(29) $||\exists_{\subseteq}||(p)(t)=1$ iff $\exists t'[t'\subseteq t \;\&\; p(t')=1]$
$||bis||(z)(p)(t)=1$ iff $\exists t'[end(t')\subseteq z \;\&\; z\subseteq t \;\&\; p(t')=1]$

(30) e-reading of (1): *Pres(Perf(bis gestern($\exists_{\subseteq}$(VP))))* =
$\exists u[u \succ\prec S \;\&$
$\exists t[end(t) \subseteq$ yesterday & yesterday $\subseteq u \;\&\; \exists t'[t'\subseteq t \;\&\; VP(t')=1]]]$

(31) u-reading of (1): *Pres(Perf($\exists_{\subseteq}$(bis gestern(VP)))) =*
$\exists u[u \supset\subset S$ &
$\exists t[t \subseteq u$ &$\exists t'[end(t') \subseteq$ yesterday & yesterday $\subseteq t$ & VP(t')=1]]]

Arnim von Stechow suggested that the Qadv $\exists_{\subseteq}$ may be omitted in the case of the u-reading (cf. also Paslawska & Stechow 1999). He argued that we get a true u-reading also without $\exists_{\subseteq}$. Furthermore, he argued that using $\exists_{\subseteq}$ only for the e-reading correctly models our intuition that the e-reading is hard to get. It is hard to get because we need something complicated, something which we do not need elsewhere, namely $\exists_{\subseteq}$. I do not agree that $\exists_{\subseteq}$ may be omitted in case of the u-reading, because you can say something like (32).

(32) Charly ist dreimal bis drei gerannt
Charly is three-times until three run
'Charly ran three times until three'

$\exists_{\subseteq}$ means 'once', but its place in the tree is the general slot for quantificational adverbs. (32) means that there are three different times 'three' up to each of which Charly runs. That is to say: you can count u-readings. It is obvious that the place of $\exists_{\subseteq}$ in the tree is the general slot for quantificational adverbs also in case of e-readings, as you can say something like

(33) Charly ist bis drei dreimal gerannt
Charly is until three three-times run
'Charly ran three times until three'

Thus, overt quantificational adverbs provide additional support for my analysis.

Back to the trees in (28). Qadv and *bis*-PP interact, but there is no scope interaction with Perf. The complex u/e-ambiguity thus has nothing to do with the meaning of the Perfect. This is contrary to what is said in the literature on the topic. But if this is true, the complex ambiguity should also be found with other tenses. This is indeed the case (to my knowledge, this has not been noticed before):

(34) Future: Charly wird bis morgen rennen
Charly will until tomorrow run
'Charly will run until tomorrow'
(35) Present: Charly rennt bis morgen
Charly runs until tomorrow
'Charly runs until tomorrow'

The trees for (34) would look exactly like the trees in (28), the only difference being that there is no Perf and no PerfP for (34) but a Fut and a FutP instead. This in turn would mean that the Perfect and the Future are analyzed on a par, which is in accordance with Stechow (1999). We need a Pres above Perf

and above Fut for the embedded cases. In the embedded cases, Perf and Fut are deleted and Pres remains.

The only tense with which the complex u/e-ambiguity does not occur is the Preterite. Something like

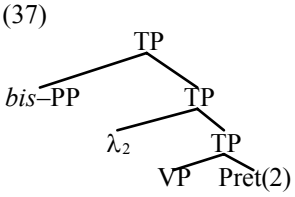
(36) Charly rannte bis drei
Charly ran until three
'Charly ran until three'

never has an e-reading. (36) always means that there is a time that ended at three, and Charly ran *throughout* that time. That is to say, you only get the u-reading. I suggest the following analysis.

First, quantifying adverbs are incompatible with the Preterite. This has been shown by Latzel (1977) and Schipporeit (1971). Thus I suppose that $\exists_{\subseteq}$ is not present in Preterite sentences either.

Second, the Preterite is an anaphorical tense, i.e., it either demands a sentence-internal adverb or a context that makes the time of the event clear. In (36), there is a sentence-internal adverb, the LF could therefore be like (37), with the adverb being lambdad-in as an argument of the Preterite:

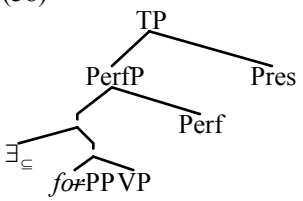
(37)



4.3. Simple u/e-ambiguity

I think the search for a scope solution for the simple ambiguity is a red herring. For the example in (4), the following delivers the desired result:

(38)



The semantics of *for* may be that of Dowty's (1979):

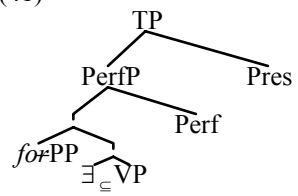
(39) ||for||(z)(p)(t)=1 iff dur(t)=z & ∀t'[t'⊆t → p(t')=1]

Thus, the interpretation of (38) is (40):

(40) *Pres(Perf($\exists_{\subseteq}$(for two weeks(VP))))* =
$\exists u[u \supset\subset S \;\&\; \exists t[t \subseteq u \;\&\; dur(t)=2weeks \;\&\; \forall t'\,[t' \subseteq t \rightarrow VP(t')=1]]]$

The two weeks of John's stay in Boston may be anywhere in the *Extended Now*, bordering on S or being far away in the past of S. This is an analysis in terms of underspecification. - Notice that the opposite scope of Qadv and durational phrase, namely the tree in (41) with the interpretation in (42), leads to nonsense:

(41)



(42) *Pres(Perf(for two weeks($\exists_{\subseteq}$(VP))))* =
$\exists u[u \supset\subset S \;\&\; dur(u)=2weeks \;\&\; \forall t\,[t \subseteq u \rightarrow \exists t'[t' \subseteq t \;\&\; VP(t')=1]]]$

This scoping would mean that the *Extended Now* has a final length (of 2 weeks). But the *Extended Now* is assumed to be left-infinite.

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