33

Durative Adverbials for Result States

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1 Introduction

This paper is devoted to the analysis of sentences such as those in (1), where the intended interpretation of (1a) and (1b) is that Manuela was in the water for twenty minutes after having jumped and that the window was open for five minutes after having been opened, respectively[1].

(1) a. Manuela jumped into the water for twenty minutes.
b. Rebecca opened the window for five minutes.

Both Manuela's being in the water and the window's being open are known as result states of the events in question. Accordingly, I will call the use of for-adverbials for asserting a duration of the result state of an event their result state-related (RS-related) interpretation.

It is not too difficult to understand the sentences in (1) as expressing something else, namely, that Manuela jumped into the water repeatedly for twenty minutes and that Rebecca opened the window repeatedly for five minutes, respectively. In such examples, the for-adverbials are used to assert a duration of an iteration of events. I will call this use their eventuality-related (E-related) interpretation. The iterativity shows up most saliently with accomplishments (as in 1) and achievements; however, the E-related

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interpretation is also at work in the following examples of an activity and a state, where such iterativity is absent:[2]

(2) a. Rebecca swam for twenty minutes.
b. Thomas loved Manuela for five years.

The point here is that accomplishments and achievements are incompatible with the E-related reading of *for*-adverbials unless an iterative interpretation is forced, whereas activities and states accommodate the E-related reading of *for*-adverbials without necessitating an iterative interpretation.[3]

Distinguishing the RS-related from the E-related interpretation is sometimes tricky. In other languages these two interpretations are often lexicalized differently. In German the preposition *für* 'for' is used with durative adverbials to express the RS-related interpretation and the adverb *lang* 'long' is used to express the E-related interpretation:

(3) a. Manuela ist für zwanzig Minuten in das Wasser gesprungen.
Manuela is for twenty minutes into the water jumped
'Manuela jumped into the water for twenty minutes.'
b. Manuela ist zwanzig Minuten lang in das Wasser gesprungen.
Manuela is twenty minutes long into the water jumped
'Manuela jumped into the water (repeatedly) for twenty minutes.'
(4) a. Rebecca hat das Fenster für fünf Minuten geöffnet.
Rebecca has the window for five minutes opened
'Rebecca opened the window for five minutes.'
b. Rebecca hat das Fenster fünf Minuten lang geöffnet.
Rebecca has the window five minutes long opened
'Rebecca opened the window (repeatedly) for five minutes.'

Thus, the sentences in (1) may be rendered unambiguously into German as the one of the variants in (3) or (4)

In fact, German allows 'bare durative adverbials' as well, namely, durative adverbials with neither *lang* nor *für*, as in (5). Bare durative adverbials in German are strictly ambiguous between an RS-related and an E-related interpretation, just like English for-adverbials, though the RS-related reading is strongly preferred here (see Footnote 3).

[2] I assume acquaintance with Vendler's (1967) four aspectual classes of states, activities, accomplishments, and achievements.

[3] Where both readings are available, as in (1), the RS-related reading is preferred when no special assumptions about the context are made. Presumably, this is because the E-related reading requires the additional semantic component of iterativity, whereas the RS-related one does not.

(5) a. Manuela ist zwanzig Minuten in das Wasser gesprungen.
Manuela is twenty minutes into the water jumped
'Manuela jumped into the water for twenty minutes.'
b. Rebecca hat das Fenster fünf Minuten geöffnet.
Rebecca has the window five minutes opened
'Rebecca opened the window for five minutes.'

In Hungarian the RS-related and E-related uses of durative adverbials are also lexically distinguished. In particular, the sublative case marker *-rV* 'onto' is used with durative adverbials to express the RS-related interpretation and the postposition *át* 'through' (which governs the superessive case -Vn 'on') is used to express the E-related interpretation, as in (6). Since accomplishment verbs in Hungarian do not always admit of an iterative interpretation, a verb slightly different from the one in (6a) is required in (6b) for the E-related reading.

(6) a. Manuela húsz percre beugrott a vízbe.
Manuela twenty minute.onto into-jumped the water.into
'Manuela jumped into the water for twenty minutes.'
b. Manuela húsz percen át ki-be ugrált a vízből.
Manuela twenty minute.on through out-into jumped the water.out-of
'Manuela jumped into the water (repeatedly) for twenty minutes.'

The remainder of this paper focuses on the analysis of the RS-related interpretation of durative adverbials. In Section 2 I discuss three issues that the RS-related reading raises, and in Section 3 I present an analysis of this reading in an event semantics.

2 Three issues

2.1 A result state is required

No surprise: the foremost semantic requirement of RS-related durative adverbials is that the meaning of the constituent that they combine with entail a result state. Since activities and states do not imply a result state, they are not compatible with RS-related durative adverbials, as in (7)(borrowed from (2))

(7) a. #Rebecca swam for twenty minutes. RS-related
b. #Thomas loved Manuela for five years. RS-related

This is confirmed by the unacceptability of the corresponding sentences in German with a *für*-adverbial:

(8) a. #Rebecca ist für zwanzig Minuten geschwommen.
Rebecca is for twenty minutes swum
b. #Thomas hat Manuela für fünf Jahre geliebt.
Thomas has Manuela for five years loved

It is often claimed that accomplishments as a rule imply a result state (Dowty 1979, Rappaport Hovav and Levin 1998), but this is not true. Among the accomplishments that do entail a result state are jump into the water, open the window, and paint the wall red, but among those that do not are sing the song and drive ninety kilometers:

(9) a. #Manuela sang the song for five minutes.
b. #Rebecca drove ninety kilometers for an hour.

Since compatibility with temporal in-adverbials is a good test for accomplishments, we can verify that sing the song and drive ninety kilometers are indeed interpretable as accomplishments:[4]

(10) a. Manuela sang the song in five minutes.
b. Rebecca drove ninety kilometers in an hour.

The unacceptability of a RS-related reading in (9) is again confirmed by the corresponding sentences in German:

(11) a. #Manuela hat das Lied für fünf Minuten gesungen.
Manuela has the song for five minutes sung
b.#Rebecca ist neunzig Kilometer für eine Stunde gefahren.
Rebecca is ninety kilometers for an hour driven

Achievements are also not uniform in their interaction with RS-related durative adverbials. Many achievements are compatible with such adverbials, but others are not, as seen in (12) and (13), respectively.

(12) a. Rebecca left for three hours.
b. The patient recognized his daughter for a few minutes.
(13) a. ?Rebecca arrived for three hours.
b. #Manuela reached the summit for five hours.

The pattern in German is no different:

[4] A difference between sing the song and drive ninety kilometers is that former is also interpretable as an activity, whereas the latter is not, thus (9b) could only have an iterative interpretation that is in this case pragmatically implausible.

(14) a. Rebecca ist für drei Stunden gegangen.
Rebecca is for three hours gone
'Rebecca left for three hours.'
b. Der Patient hat seine Tochter für ein paar Minuten erkannt.
the patient has his daughter for a couple minutes recognized
'The patient recognized his daughter for a few minutes.'
(15) a. ?Rebecca ist für drei Stunden angekommen.
Rebecca is for three hours arrived
b. #Manuela hat den Gipfel für fünf Stunden erreicht.
Manuela has the summit for five hours reached

The unacceptability of the sentences in (13) and (15) is puzzling, especially because the verbs *arrive (ankommen)* and *reach (erreichen)* seem to imply result states, namely, the theme's being at a particular location.

Hungarian has two verbs corresponding to arrive, the bare form *érkezik* and the form *megérkezik* with the preverb *meg* (traditionally, a kind of perfective marker). Whereas the first is compatible with RS-related durative adverbials, the second (like *arrive* and *ankommen*) is not:[5]

(16) a. Rebecca három órára érkezett.
Rebecca three hour.onto arrived
Lit. 'Rebecca arrived for three hours.'
b. #Rebecca három órára megérkezett.
Rebecca three hour.onto PREV-arrived

Hungarian has only one verb corresponding *to reach*, the prefixed form *elér*, and it is incompatible with RS-related durative adverbials:

(17) #Manuela öt órára elérte a csúcsot.
Manuela five hour.onto PREV-reached the summit. ACC

2.2 Should the result state be 'reversible'?

It is sometimes said that RS-related durative adverbials require the result state to be 'reversible'. Consider this remark by Dowty (1979: 255) from a brief discussion of RS-related adverbials:

> Actually, not quite all accomplishments can felicitously take an internal adverb [here: a RS-related durative adverbial] but only those in which the result state is a reversible one; we find it very hard to interpret *?John killed Bill for three weeks* with an internal [i.e. RS-related] reading because we ordinarily assume death to be an irreversible state.

[5] The adverbial három órára in (16) is ambiguous and should be understood as *három óra hosszára* (three hour length. POSS.onto; lit. 'for a length of three hours'). Its other, irrelevant sense is 'by three o'clock'. The same applies to *öt órára* in (17).

Indeed, there are many examples like *kill* which both imply a result state and sound odd with a RS-related durative adverbial:

(18) a. #Rebecca broke the window for two hours. RS-related
b. #Manuela ate the apple for five minutes. RS-related
c. #Thomas wrote his dissertation for five years. RS-related

It is not really clear what status Dowty attributes to the 'reversibility' condition, because he does not offer an analysis of RS-related durative adverbials. In Section 3.6 I will argue that 'reversibility' is simply an effect of a pragmatic implicature of most RS-related durative adverbials and therefore need not be built into a semantic analysis.

2.3 Actualist vs. modal interpretation

A subtle fact about RS-related durative adverbials is that they exhibit a meaning difference even within the confines of the RS-related interpretation. At first glance, the sentences in (1) imply that Manuela was in the water for twenty minutes and that the window was open for five minutes, respectively. Indeed, this is how I characterized the RS-related interpretation in the first place.

But is this the only way to understand the RS-related reading? Consider the examples in (19), which do not necessarily express contradictions.

(19) a. Thomas put the bread in the oven for thirty minutes but someone took it out after ten minutes.
b. Rebecca went out into the garden for an hour but she came back in after forty minutes when it began to rain.

In (19), we cannot insist that the bread was in the oven for thirty minutes or that Rebecca was in the garden for an hour, and yet the use of RS-related adverbials that appear to make these claims are acceptable. The sentences in (1) are no different in principle: given no information to the contrary, we tend to assume that Manuela was in the water for twenty minutes and that the window was open for five minutes, but this is not a necessary conclusion.

Let us say that a RS-related durative adverbial has an actualist interpretation just in case the described duration actually holds of the result state and that it has a modal interpretation when it is possible that the described duration does not actually hold of the result state.

Are RS-related durative adverbials then ambiguous between an actualist and a modal interpretation? In English it is hard to tell. Evidence that there is an ambiguity comes from German and Hungarian, where there are sentences corresponding to those in that are contradictory. Recall from Section 1 that German may express the RS-related reading with *für*-adverbials or bare durative adverbials. Rendering (19a) into German, we find that use of a

für-adverbial yields a consistent assertion, whereas use of a bare adverbial results in a contradiction:

(20) a. Thomas hat das Brot für dreißig Minuten in den Ofen getan,
Thomas has the bread for thirty minutes into the oven done,
aber jemand hat es nach zehn Minuten herausgenommen.
but someone has it after ten minutes out.taken
'Thomas put the bread in the oven for thirty minutes but someone took it out after ten minutes.'
b. #Thomas hat das Brot dreißig Minuten in den Ofen getan,
Thomas has the bread thirty minutes into the oven done
aber jemand hat es nach zehn Minuten herausgenommen.
but someone has it after ten minutes out.taken

The contrast between (20a) and (20b) indicates that für-adverbials admit of a modal interpretation but that the RS-related reading of bare durative adverbials is actualist.

Further evidence that there is such an ambiguity comes from Hungarian, where the placement of a RS-related durative adverbial in a topic position yields the actualist interpretation and its placement in the focus position results in the modal interpretation:[6]

(21) a. Thomas harminc percre betette a kenyeret a sütőbe. ***actualist***
Thomas thirty minute.onto into-put the bread. ACC the oven.into
'Thomas put the bread in the oven for thirty minutes.'
b. Thomas harminc percre tette be a kenyeret a sütőbe. ***modal***
Thomas thirty minute.onto put into the bread. ACC the oven.into
'Thomas put the bread in the oven for thirty minutes.'

Rendering (19a) into Hungarian, we find that (22a) expresses a contradiction, whereas (22b) does not.

(22) a. #Thomas harminc percre betette a kenyeret a sütőbe,
Thomas thirty minute.onto into-put the bread. ACC the oven.into
de valaki tíz perc után kivette.
but someone ten minute after out-took.it
'Thomas put the bread in the oven for thirty minutes but someone took it out after ten minutes.'

[6] In Hungarian the focus position is immediately preverbal and the (multiple) topic positions precede the focus position. In (21a) the preverb be occupies the focus position.

b. Thomas harminc percre tette be a kenyeret a sütőbe,
Thomas thirty minute.onto put into the bread. ACC the oven.into
de valaki tíz perc után kivette.
but someone ten minute after out-took.it
'Thomas put the bread in the oven for thirty minutes but someone took it out after ten minutes.'

However adverbial placement in Hungarian is to be analyzed, it is clear that a distinction is drawn between the actualist and modal interpretation of RS-related durative adverbials.

Strictly speaking, these facts from German and Hungarian are consistent with the possibility that RS-related durative adverbials in English have only a modal interpretation. However, in Section 3.4 I will argue that a closer examination of the modal interpretation makes this possibility less likely and the ambiguity hypothesis more probable.

3 Analysis

3.1 Technical preliminaries

The analysis that I will present presupposes the following four pairwise disjoint domains of objects and their associated sorted variables: (i) *ordinary objects* (x , y , z , ...); (ii) *events* (e , e' , e" , ...); (iii) *states* (s , s' , s" , ...); and (iv) *times* (t , t' , t" , ...). It is also useful to employ the unsorted variables v , v' , v" for events, states, or times, because these are all temporal objects.

In addition, I assume the following three basic relations: (i) *a proper part relation* ($\sqsubset$) on all four domains; (ii) *a temporal precedence relation* ($\prec$) on the domain of temporal objects; and (iii) *a temporal trace function* (τ) from events or states to times. These relations are also used in Krifka 1989.

The notions of *immediate precedence* and *initial proper* part apply to temporal objects and are defined as in (23)

(23) a. $\checkmark v' \ll v := v' \prec v \wedge \neg \exists v''[\, v' \prec v'' \wedge v'' \prec v\,]$
(v' immediately precedes v)
b. $\checkmark\ v' \sqsubset_{\prec} v := v' \sqsubset v \wedge \exists v''[\, v'' \sqsubset v \wedge v'' \prec v']$
(v' is a initial proper part of v)

I analyze verbs as denoting relations on the aforementioned domains and treat thematic relations as relations between events or states and ordinary objects. I make use of relations such as Agent and Theme without much ado, with the condition that while only events may have agent participants, both events and states may have theme participants.

Finally, since modality will play a role, I adopt the standard view that there is a domain of *possible worlds* (of which the actual world is an element) and that propositions denote subsets of this domain.

3.2 Result states

Since result states figure prominently in the analysis of RS-related durative adverbials, we need a way of representing them. The following ingredients appear to be part and parcel of the notion of result state that we are after: A result state is of a particular type (e.g. of type Be-open), it has a theme participant (i.e. the object in that state), it immediately follows the event that brings it about, and its theme participant is identical to the theme participant of the event that brings it about. All of this is encapsulated in the four-place relation Result:

(24) Result(e, x, s, P) : = Theme(e, x) ∧ e << s ∧ P(s) ∧ Theme(s, x)
(event *e* with theme *x* has result state *s* of type *P* with theme *x*)

A reasonable axiom for Result is that if an event e with a theme participant x has a result state s of type P with theme participant x, then no initial proper part e' of e has a result state s' of type P with theme participant x, as in . Intuitively, this axiom declares that if an object is in a result state of a given type at the end of an event, then it is not in a result state of that type before the event ends.

(25) Result(e, x, s, P) →∀e'[e'⊏ e→ ¬ ∃s'[Result(e', s', x, P)]]
('result states do not begin earlier than they do')

Some events have result states; others do not. This is a basic observation from Section 2.1 that we have to contend with. Verbs or verbal complexes that denote events with result states are represented with the help of Result . For example, transitive open denotes events with an agent participant, a theme participant, and a result state whose theme participant (identical to the event's theme) is open, as in (26).[7]

(26) open (trans.) ⇒ λsλyλxλe [Agent(e, x)∧Result(e, y, s, Be-open)]

Observe that transitive verbs which denote events having result states are analyzed as four-place relations between events, ordinary objects, and result states. By convention, a result state argument will be represented as the lowest argument of a verb or verbal complex.

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[7] No causal relation is included in the analysis of open, contrary to received wisdom (e.g. Parsons 1990) about such matters. The postulation of a relation CAUSE between events has its problems, and given that it is not crucial for present purposes, I have dispensed with it.

The intransitive version of open is succinctly analyzed as transitive open without the agent relation:

(27) open (intrans.) ⇒ λsλxλe [Result(e, x, s, Be-open)]

Parallel to transitive verbs, intransitive verbs that denote events having result states are analyzed as *three-place* relations between events, ordinary objects, and result states.

In other cases, the verb itself may not exclusively denote events that have result states, but the addition of a resultative predicate serves to restrict the denotation of the verb to those events that do. Consider, for example, the derivation of *paint red* from *paint* and (resultative) *red*:

(28)a. paint ⇒ λyλxλe [Paint(e)∧Agent(e, x)∧Theme(e, y)]
b. red (result.) ⇒ λRλsλyλxλe [R(e,x,y)∧Result(e,y,s,Be-red)]
c. paint red ⇒ λsλyλxλe [Paint(e)∧Agent(e,x)∧Result(e,y,s,Be-red)]

Notice how the meaning of *red* as represented in (28b) enhances the meaning of *paint* with a result state argument.

The case of *jump* vs. *jump into the water* indicates how an unergative verb can become an unaccusative verb phrase:

(29)a. jump⇒ λxλe[Jump(e)∧ Agent(e,x)]
b. into the water ⇒λRλsλxλe[R(e,x)∧Result(e,x,s,In-the-water)]
c. jump into the water⇒λsλxλe[Jump(e)∧Agent(e,x)∧Result(e,x,s,In-the-water)]

The addition of *into the water* to *jump* serves not only to introduce a result state argument, but also to assert that the agent of the event is now a theme as well. This is not a violation of thematic uniqueness, because it is not claimed that the event of jumping into the water has two agents or two themes, but only that its agent participant is also a theme.

Verbs such as *sing* (not to mention verb phrases such as *drive ninety kilometers*) denote events that lack a result state:

(30) sing⇒λyλxλe[Sing(e)∧Agent(e,x)∧Theme(e,y)]

Finally, I assume that there is a default mechanism for existentially binding the result state argument of a verb or verbal complex if nothing else does:

(31) λRλȳλxλe[∃s [R(e, x, ȳ, s)]]

To my knowledge, the combination of the notion of a result state as a four-place relation and the treatment of verbs and verbal complexes that

denote events with a result state as having an additional result state argument has not been advocated elsewhere. Parsons (1990: 119-120) hesitantly represents result states with an undefined relation BECOME between events and states. And while it is possible to understand him as implicitly proposing that verbs denoting events with a result state should be analyzed as having a result state argument, nowhere does he actually say this. Not unlike Parsons, Dölling (1998: 199) makes use of an undefined relation RESULT between events and states. But Dölling explicitly rejects (p. 185) as unintuitive the idea that verbs denoting events with a result state might be analyzed as having a result state argument, preferring an analysis in terms of abduction, but at the price of forcing all events to have a result state (p. 203). My reaction must be brief: Other things being equal, a defined notion of a result state is to be favored over an undefined one, and the idea of introducing result state arguments allows us to straightforwardly distinguish verbs and verbal complexes that denote events with a result state from those that do not.

3.3 The actualist interpretation

My analysis of the actualist interpretation of RS-related *for* is as in (32), where '$\bar{y}$' stands for a sequence of zero or more ordinary object arguments.

(32) for (act. RS) $\Rightarrow\lambda P\lambda R\lambda y\lambda x\lambda e[\exists s[R(e, x, \bar{y}, s) \wedge P(s)\ ]\ ]$

Note that *for* first applies to a predicate of states (specifically, a temporal measure expression) and then to a relation between events, ordinary objects, and result states, existentially binding the state argument. Crucially, the semantics of *for* does not introduce a result state argument; rather, it requires that the relation which it applies to already have one.[8]

For example, the meaning of *twenty minutes* is represented in (33a), where Minute denotes a function that measures the duration of temporal objects in terms of minutes. The result of combining *twenty minutes* with actualist *for* is shown in (33b).

(33)a. twenty minutes$\Rightarrow\lambda v$[MINUTE(v)$\geq$20]
b.for.twenty.minutes(act.RS)$\Rightarrow\lambda R\lambda\bar{y}\lambda x\lambda e[\exists s[R(e,x,\bar{y},s)\wedge$Minute(s)$\geq$20]]

Applying the formula in (33b) to the relation in (29c) and then to Manela , we derive the following (untensed) event predicate for (1a):

[8] I assume a principle asserting that the relation R does indeed entail a result state, perhaps as a presupposition. If ForAct abbreviates the relation in (32), then the principle is as follows:
$For_{Act}(e, \bar{x}, y, R, P)\rightarrow\forall s\ [\ R(e, \bar{x}, y, s) \rightarrow\exists Q\ [\ Result(e, y, s, Q)\ ]\ ]$

(34) Manuela jumped into the water for twenty minutes (act. RS) ⇒
λe[λs[Jump(e)∧Agent(e, Manuela) ∧
Result(e, Manuela, s, In-the-water) ∧Minute(s)≥20]]

If Manuela did not stay in the water for at least twenty minutes, then it is evident that (1a) is false on the actualist interpretation of the for-adverbial.

If bare durative adverbials in German are analyzed as headed by a phonologically empty preposition, then the analysis in (32) would characterize the sole meaning of the RS-related reading of this preposition.

3.4 The modal interpretation

My analysis of the modal interpretation of RS-related for (and German *für* and Hungarian *-rV*) is as follows:

(35) for (mod. RS)
⇒λPλRλȳλxλe[∃s[R(e,x,ȳ,s)∧Intend(τ(e),x,^P(s))]]

The difference between actualist *for* and modal *for* is that the second but not the first introduces the three-place relation Intend between times, ordinary objects ('intenders'), and propositions. In particular, the meaning of modal *for* asserts that the object denoted by the highest ordinary object argument of the verb intends during the time of the event for the result state to be of type *P*. Since Intend -as a modal operator-introduces opacity, it does not follow that the result state is of type P in the actual world, but only that it is of type *P* in the worlds compatible with *x*'s intentions during the time of the event that brings it about.[9]

Applying modal *for* to *twenty minutes* as analyzed in (33a), we derive the following representation of the meaning of *for twenty minutes*:

(36) for twenty minutes (mod. RS) ⇒
λRλxλe[∃s[R(e,x,s)∧Intend(τ(e),x,^Minute(s)≥20)]]

And, parallel to (34), by applying this formula to the one in (29c) and then to Manuela, we get the following event predicate for (1a):

(37) Manuela jumped into the water for twenty minutes (mod. RS) ⇒
λe[∃s[Jump(e)∧ Agent(e, Manuela) ∧
Result(e, Manuela, s, In-the-water) ∧
Intend(τ(e), Manuela, ^Minute(s) ≥20)]]

In contrast to the semantics in (34), this interpretation requires Manuela to have jumped into the water but allows her to have stayed in the water for

[9] The raised '^' in (35) is interpreted as a functor over possible worlds.

less than twenty minutes as long as she originally intended to stay in the water for at least twenty minutes.

Further evidence bearing on the question of whether RS-related for is ambiguous (see Section 2.3) are sentences such as the following:

(38)a. ?The window opened for five minutes.
b. ?My towel fell into the water for ten minutes.

If RS-related *for* is ambiguous in the way that I claim, then these sentences have both an acceptable and an unacceptable interpretation, which seems correct. They are unacceptable on the modal interpretation because neither windows nor towels can intend anything. However, they are acceptable on the actualist interpretation, because windows can open for five minutes before closing and towels may fall into the water for ten minutes before being taken out by someone. Thus, in (38a), although the window could not have opened with the intention of staying open for at least five minutes, the wind could have pulled it open for five minutes before pushing it closed, and (38a) could be used as a partial report of such an event.

If RS-related *for* were unambiguous and had only the modal interpretation, then the status of the sentences in should be unambivalently unacceptable, which seems too strong. Insofar as such sentences have an acceptable reading, the hypothesis that RS-related *for* is ambiguous is more telling than the insistence that it is not.

3.5 Recalcitrant achievements

As we saw in Section 2.1, achievements do not pattern uniformly with respect to RS-related durative adverbials. However, just as not all accomplishments imply a result state, there is little reason to think that all achievements do either. Consider, for example, *reach*: although we have the clear intuition that if you reach a place, then you are there, this does not necessarily mean that reach has a result state argument. And yet if *reach* lacks a result state argument, then there is no possibility of modification by a RS-related adverbial.

The case of Hungarian *érkezik* and *megérkezik* (both 'arrive') is trickier, because recall from (16) that they diverge in behavior. One possibility is that *érkezik* has a result state argument, whereas the addition of the preverb *meg* has the effect of existentially binding this argument, with the consequence that it is no longer available for modification. For concreteness, these two verbs could be provisionally analyzed as in (39), where the formula in (39b) would represent the meaning of *arrive* and German *ankommen* as well.[10]

[10] The argument y in (39) denotes a location (e.g. arrive in Tucson) and Loc designates a function from eventualities to their spatial locations.

(39) a. érkezik ⇒λsλyλxλe[Arrive(e) ∧ Result(e,x,s,λs'[Loc(s')=y])]
b. megérkezik ⇒λyλxλe[∃s[Arrive(e)∧Result(e,x,s,λs'[Loc(s') = y])]]

3.6 'Reversibility' as an implicature

Recall the 'reversibility' condition from Section 2.2 and its uncertain status. I contend that RS-related adverbials impose no *semantic* requirement that the result state be 'reversible'. Rather, the 'reversibility' effect is due to an implicature of the use of numeral expressions. In general, an expression of the form *n units* asserts 'at least *n units*' and its use implicates 'no more than *n units*'. To take Dowty's example, *?John killed Bill for three weeks* is strange because the use of *for three weeks* implicates 'for no more than three weeks', and yet if Bill was dead for no more than three weeks, then he must have been alive again after three weeks, which contradicts our usual assumptions about death. The examples in (18) can also be treated in this way.

A nice consequence of the view that the 'reversibility' condition is due to an implicature is that-depending on the particular choice of durative adverbial-it may not always arise. In this connection, consider that the sentence in (40a), although somewhat redundant, is nonetheless acceptable, and the same is true of its German counterpart in (40b). This is because the use of RS-related *forever* (or *für immer*) does not implicate an interval shorter than all of future time, which is more than time enough for Bill to be dead.

(40) a. John killed Bill forever.
b. John hat Bill für immer getötet.
John has Bill for always killed

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