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1 Introduction

This paper investigates some aspects of durative *in-* and *for*-adverb modification. It is argued that these adverbs are not restricted to modifying the event time, but can measure the topic time as well. This approach yields a specific account of *for*-adverb modification licensed by negation. Negation makes it possible for the adverb to measure the topic time by yielding an appropriate topic time predicate. I also argue for a general view of durative adverbs, and attribute some distribution restrictions to external factors.

2 Durative Adverbs and Times

This section lays the groundwork by enumerating the tools and notions necessary for the discussion.

2.1 Times

Following Reichenbach (1947), I assume that all finite eventuality descriptions contain at least three distinct time intervals. The *event time* measures the duration of the event. The *topic time* identifies the time interval under discussion. Based on Klein (1994) and Iatridou et al. (2001), I assume that the ordering between the topic time and the event time determines the aspectual specification of the event description; distinct orderings yield a perfective or an imperfective event. If the event description is perfective, then the event time is a proper part of the topic time (1a). If the event description is imperfective, then the topic time is a proper part of the event time (1b). Finally, the third time interval is the *speech time*. Following standard descriptions, I assume that tense orders the topic time and the speech time.[1]
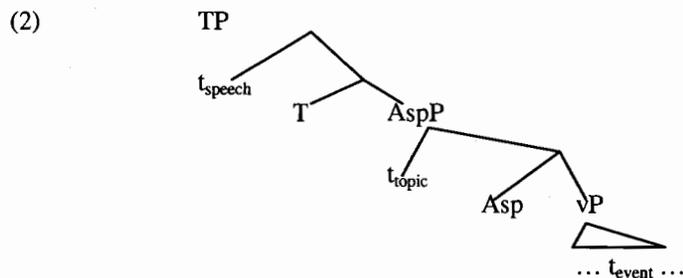
[1]A finite eventuality description may also contain other time intervals, including

(1)   a. Fred ate the beans.   (perfective)
       b. Fred was eating the beans.   (imperfective)

Concerning the position of these time intervals, I assume that the event time is associated with vP, topic time with the functional projection AspP and the speech time with TP. These positions build on Klein (1994), Thompson (1996), Kratzer (1998), Iatridou et al. (2001) and von Fintel and Iatridou (2002).

(2)

```
            TP
           /\
          /  \
   t_speech   \
         /\
        T  AspP
          /\
         /  \
    t_topic  \
        Asp   vP
             /\
            /__\
         ... t_event ...
```

I argue below that durative adverbs can measure the duration of either the event time or the topic time. A priori, it may be expected that durative adverbs can also measure speech time. The modification of the speech time is, however, independently excluded. Speech time is deictic, and deictic elements all resist modification (Hornstein 1990), as shown for the deictic speech time in (3a) and for *here* in (3b).

(3)   a. #In ten minutes, Fred arrived at the restaurant.
          (speech time modification; the speech time lasts ten minutes)
       b. #Here, where Fred lives, the sun never sets before midnight.

Durative *in* and *for*-adverbs can thus modify either the event time or the topic time (modulo the divisibility condition discussed in the next section), but not the speech time.

2.2 Measuring Time Intervals

The ambiguity of *for*-adverbs is illustrated below.

(4)   a. For a week, Fred was sick.   (event time)
       b. For ten minutes, Fred was writing the paper. (topic time)

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a perfect or a result time. These times, however, will be ignored in this paper.

In-adverb modification is similarly ambiguous; they can also modify either the event time or the topic time. While the English *in*-adverb is ambiguous in this respect, the Hungarian equivalents are not. As argued in detail in section 3.1, the *alatt* equivalent of the *in*-adverb can modify only the event time, and the *belül* adverb only the topic time.

(5) Feri *tíz perc alatt* / *tíz percen belül*
     F-nom ten minute under$_{event}$ / ten minute within$_{topic}$
     megírta a levelet
     wrote the letter-acc
     'Feri wrote the letter in ten minutes.' (the writing lasted ten minutes
     (event time) / the letter was written within a ten-minute interval
     (topic time))

Concerning the structure of durative adverbs, I assume that adverbs have three arguments: a measure phrase, a predicate of times[2] and a time interval argument. The predicate of times holds for the time interval argument, and the time has the length specified by the measure phrase.

Durative *in-* and *for*-adverbs are in complementary distribution. The relevant condition determining the distribution of these adverbs is divisibility, defined below.

(6) Divisibility
     A predicate P is divisible iff whenever P(x) for an argument x, then
     for all $y \subseteq x$, P(y).
     (Bennett and Partee 1972, Dowty 1979, a.o.)[3]

The predicate of times may or may not be divisible with respect to the time argument that it applies to. The predicate of times that applies to the event time is divisible in (7a), since if *Fred ran* holds for an interval *t*, then it also holds for all parts of that interval. In (7b), in contrast, the predicate is non-

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[2]In this paper I assume a crucial distinction between *predicates of times* and *event descriptions*. *Predicates of times* are predicates that take a time interval argument; an *event time predicate* applies to the event time. *Event descriptions*, in contrast, refer to the complete description of the event, such as *Fred has been reading the paper for two days* (which contains several predicates of times).

[3]The definition falls short in two respects. First, the predicate of times fails to accommodate atomicity: it does not encode the fact that a predicate may be divisible even if it does not hold for all parts of the time argument (see section 4.1). Second, time intervals can contain gaps, for which the predicate does not hold – and yet the predicate is divisible with respect to the time interval, as is the case with iterative and habitual events. I ignore these issues here.

divisible. If *Fred ran to the store* is true for a time interval t, it does not follow that it is also true for all parts of t. In fact, for any part of t that does not include the endpoint of t, the predicate fails to hold.

(7)   a.   Fred ran *for two hours*.
      b.   Fred ran to the store *in half an hour*.

The distribution of *in* and *for*-adverbs can thus be captured as given below (based on Bennett and Partee 1972, Dowty 1979 and others).

(8)   a.   *For*-adverbs require a divisible predicate of times argument.
      b.   *In*-adverbs require a non-divisible predicate of times argument.

3 Durative Adverb Ambiguity

Given the previous assumptions, it is possible to nail down the ambiguity of durative adverb modification. Both *in* and *for*-adverbs can measure either the event time or the topic time, yielding differences in interpretation.

3.1 Ambiguity of *In*-adverbs

The ambiguity of *in*-adverbs is clearly illustrated by their Hungarian equivalents. Hungarian *alatt* and *belül* adverbs differ in the time interval they modify: *alatt* adverbs measure the event time and *belül* adverbs, the topic time.

The distinction becomes apparent with instantaneous event descriptions, such as *Fred slipped*. An *alatt* adverb, which measures the event time, enforces a marked, durative interpretation of the event time – for instance, the resulting interpretation is that Fred tried to slip for ten minutes (9a). A *belül* adverb (9b) measures the topic time and does not enforce such a reading. (9b) merely asserts that at some point within the ten-minute interval, Fred slipped.

(9)   a.   #   Feri   *tíz*   *perc*   *alatt*   megbotlott
             F-nom   ten   minute   under   slipped
             'Feri slipped in ten minutes.' (event time)
      b.   Feri   *tíz*   *percen*   *belül*   megbotlott
             F-nom   ten   minute-on   within   slipped
             'Feri slipped in ten minutes.' (topic time)

The difference between the adverbs can also be shown elsewhere. Let us assume an event of Fred writing a letter, which lasts exactly sixty minutes from start to finish. In this case the event time, which is an hour long, can be measured as in (10a). The topic time, however, cannot measure exactly an

hour (10b). This is expected if the topic time must properly contain the event time, and so must last longer than an hour.

(10) a. Feri   *pontosan egy   óra   alatt*   írt   egy   levelet
          F-nom   exactly   one   hour   under   wrote a   letter-acc
          'Feri wrote a letter in an hour.' (event time)
      b. #Feri   *pontosan egy órán   belül* írt   egy   levelet
          F-nom   exactly   one hour-on within wrote a   letter-acc
          'Feri wrote a letter exactly (with)in an hour.'

Generalizing the previous observations, other durative adverbs, including English *in*-adverbs, may also measure either the event time or the topic time.[4] *Within*-adverbs, in contrast, seem to measure the topic time only.

3.2 Ambiguity of *For*-adverbs

As noted above, *for*-adverbs can also measure either the event time or the topic time.

(11) a. Fred was sick *for a week*.   (event time)
      b. Fred was crossing the street *for ten minutes*. (topic time)

For-adverbs are licensed in both examples because there is a divisible predicate of times applying to the time interval measured. The event time predicate is divisible in (11a), and in (11b) it is the topic time predicate that is divisible[5]. In the following section I argue that other environments also license a divisible topic time predicate and *for*-adverbial modification as well.

4 Negation and *For*-adverbs

Negation licenses *for*-adverb modification of any eventuality description, even if the adverb is marked in absence of negation:

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[4]Both *(with)in*-durative adverbs and the Hungarian equivalents impose restrictions on the predicate of times. *(With)in*-adverbs require the predicate applying to the event time to be non-divisible (i.e., telic). In Hungarian, both *alatt* and *belül*-adverbs require the event predicate that they modify to be both telic and perfective.

[5]As assumed in section 2.1, the imperfective aspect enforces the topic time to be a proper part of the event time. Given this interpretation, all subintervals of the topic time will also be contained within the event time, satisfying divisibility.

(12) a. #For ten minutes, Fred crossed the street.
      b. For ten minutes, Fred didn't cross the street.

Two competing accounts have been proposed for the unexpected effect of negation on durative adverb modification. I dub these the *stativity hypothesis* and the *measuring hypothesis*, discussed below in more detail.

4.1 Stativity Hypothesis

The stativity hypothesis assumes that negation is an aspectual operator, converting all eventuality descriptions into states, which are illustrated below.

(13) a. Fred was sick (for two weeks).
      b. Fred was crossing the street (for ten minutes).

In this approach, negated eventuality descriptions can be modified by a *for*-adverb because they are states. The event time predicate of states is divisible (for instance, if *Fred was sick* holds for a time interval *t*, then it is also true for all subintervals of *t*), and so the event time can be measured by a *for*-adverb. The stativity hypothesis has been argued for, among others, by Bennett and Partee (1972), Dowty (1979) and more recently by Verkuyl (1993).

Let us consider what it would mean, under the stativity hypothesis, for negated eventuality descriptions to be states. There are two properties that have been proposed as distinguishing states and non-states: homogeneity and dynamicity. Homogeneity is the distinguishing property according to Vendler (1967), Comrie (1976), Dowty (1979), and Smith (1991). Divisible event predicates, in contrast with states, are not homogeneous. The event time of a divisible event time predicate contains atomic time intervals, where the predicate does not apply to proper subintervals of the atomic time. For instance, the predicate *Fred ran* does not hold for all subintervals of the event time. It does not hold, among others, for the time when he raises his toes from the ground. Thus, states are homogeneous, but event predicates are not.

Another distinguishing property, assumed by Comrie (1976) and Smith (1991), is dynamicity. Only states lack dynamicity, where dynamic eventualities cannot continue unless they receive outside energy. I propose that lack of dynamicity is better described as *inertia*, the property of continuing unless interrupted. Inertia characterizes stative predicates including imperfectives:

(14) a. Fred was sick.   (state)
      b. Fred was crossing the street.   (state (imperfective))

The eventuality descriptions in (14) have inertia; the eventuality of Fred being sick and of Fred crossing the street progresses until interrupted by some other event—for instance, by taking some medication or by a truck crossing his path. Event descriptions, in contrast, do not continue by themselves, as noted by Comrie (1976). At this point, either characterization of states may be appropriate. In section 5 I argue that states should be characterized by inertia, but not by homogeneity.

4.2 Measuring Hypothesis

The alternative account to the stativity hypothesis does not assume that negation is a stativizer. Rather, it appeals to the intuition that negation creates a divisible predicate that meets the condition of *for*-adverb modification. In (15), for instance, the predicate *Fred didn't cross the street* is divisible. If it holds for a certain time interval, then it also holds for all subintervals of that interval, since no subinterval can contain an event of Fred crossing the street.

(15) Fred didn't cross the street.

The measuring hypothesis makes no claim concerning the stativity of the eventuality description. It merely asserts that the necessary property of divisibility holds. Some version of this account is advocated by Zucchi (1991), Moltmann (1991) and Kamp and Reyle (1993), among others.

I adopt this hypothesis to account for *for*-adverb licensing by negation. I also propose a specific implementation of the hypothesis and suggest that negation yields a divisible topic time predicate. That is, the *for*-adverb measures the topic time in (16).

(16) Fred didn't cross the street for ten minutes.

The interpretation of (16) supports this account: (16) states that there was a ten-minute interval (the topic time), during which there was no event of Fred crossing the street. The interpretation shows two crucial ingredients: (a) the time interval measured is the topic time, the time under discussion, and that (b) negation takes scope within the topic time predicate and yields a divisible topic time predicate.

The present account does not require negation to be a stativizer. Furthermore, section 5 offers explicit arguments against stativization.

5 Against the Stativity Hypothesis

The measuring hypothesis does not require negation to be a stativizer. A number of arguments, which show the divergent nature of states and negated event predicates, yield the stronger conclusion that it cannot be a stativizer.

5.1 States and Negated Event Descriptions

States and negated event descriptions pattern differently in a number of environments. First, they play a different role in the discourse structure, as noted by Dowty (1986) and Kamp and Reyle (1993). When following a clause, states do not advance the time of the narration; the state is interpreted as having begun prior to the event described in the first sentence. In (17), Fred started sleeping or smiling before Melissa looked at him.

(17) a. Melissa looked at Fred. He was asleep.
      b. Melissa looked at Fred. He was smiling.

Affirmative event descriptions are unlike states. The ordering is consecutive; the event described in the second clause follows the one described in the first sentence.

(18) Melissa looked at Fred. He smiled.

Negated event descriptions pattern with their affirmative counterparts rather than with states. The preferred ordering is consecutive; the expected reaction of Fred smiling didn't happen after Melissa looked at him. This ordering contrasts with negated imperfectives, which have an overlapping interpretation—again, on a par with the affirmative counterpart.

(19) a. Melissa looked at Fred. He didn't smile.
      b. Melissa looked at Fred. He wasn't smiling.

Negation thus does not play a role in determining discourse role. Rather, the relevant factors are the stative / eventive distinction, with imperfectives behaving like states.
    The interpretation of morphologically present forms also provides an environment where negated event descriptions and states diverge. States have an ongoing interpretation, and the state holds at the time of speech:

(20) a. Fred is sick.
      b. Fred is reading a book.

No such interpretation is possible for present tense event descriptions, where a habitual reading is enforced:

(21) Fred runs along the railroad tracks.

Once again, negated event descriptions pattern with their affirmative counterparts rather than with states. A negated event description must be interpreted as a habitual event (22a). The ongoing interpretation is only possible for negated event descriptions if they appear as imperfectives (22b).

(22) a. Fred doesn't run along the railroad tracks.
      b. Fred isn't running along the railroad tracks.

Present tense and discourse structure interpretations of event descriptions are sensitive to (im)perfective specification rather than to the presence or absence of negation. Negation by itself fails to induce state-like behavior, a fact that is easily explained if negation is not a stativizer.

As noted above, homogeneity and inertia have both been evoked as the properties identifying states. Negated event descriptions distinguish between the two characterizations. Homogeneity also holds for these negated event descriptions, since the predicate holds for all subintervals of the topic time, without exception (so no atomicity effect arises). Yet negated event descriptions do not pattern with states, which is unexpected if all non-atomic divisible predicates of times are states. Inertia, in contrast with homogeneity, yields an appropriate division of eventuality descriptions. While inertia holds for both lexical states and imperfectives, it is not true for negated event descriptions. The description *Fred didn't fall off the rope high above the street*, for instance, shows that negated event descriptions can lack inertia – not falling down does require some energy input. Thus, if states are defined in terms of inertia, then negated event predicates do not qualify as states. It is expected then that they pattern unlike states, as shown above.

5.2 *For*-adverbs Elsewhere

A further argument against the stativity hypothesis comes from affirmative environments, which lack the purported stativizer yet license *for*-adverb modification.

5.2.1 Downward Entailing Quantifiers

If *for*-adverb modification requires divisibility of the predicate of times, then it is predicted that other structures also permit *for*-adverbs. This prediction is

borne out: downward entailing quantifiers allow a *for*-adverb to modify any eventuality description.

(23) a.#For two years, five people received a degree in virology.
     b. For two years, fewer than five people received a degree in virology.
(24) a.# For two hours, Fred found more than ten shells on the beach.
     b. For two hours, Fred found fewer than ten shells on the beach.

The *for*-adverb in (23b), (24b) measures the topic time, with a divisible predicate applying to the topic time. The topic time predicate in (23b) states that fewer than five people received a degree in virology in t—a predicate that holds for all subintervals of the topic time, since the number of people who received a degree is always smaller than five. In (24b), the topic time predicate, *Fred found fewer than ten shells on the beach*, also holds of the topic time as well as of all its subintervals. The time predicates in (23a), (24a) are not divisible, so no *for*-adverb modification is possible.

    In addition to being divisible, the predicate fails to show an atomicity effect—yet, like negated event descriptions, is not stative, showing again that *for*-adverb modification is independent of stativity. Not only does negation fail to yield properties identical to states for negated event descriptions, but *for*-adverb modification can be licensed by downward entailing quantifiers in addition to negation. While these facts follow naturally from a measuring account, they are unexpected under the stativity hypothesis.

5.2.2 *Only* and Strawson Divisibility

Only also permits *for*-adverbial modification of the topic time:

(25) a.# For five years, Fred climbed Mount Everest.
     b. For five years, only Fred climbed Mount Everest.

While (25a) may have, at best, a marked iterative interpretation, (25b) only requires that Fred climbed the mountain once. In (25b), the five-year long topic time only contains a single event (but possibly multiple events) of climbing Mount Everest, where the agent of the event is Fred. The topic time predicate is expected to be divisible since it permits *for*-adverbial modification. This expectation is not borne out. If Fred climbed the mountain only once in the course of the five years, then the predicate *only Fred climbed Mount Everest* fails to hold for all the subintervals that do not contain the event time. The topic time predicate is not divisible, since it fails to hold for

they can measure either the event time or the topic time, as long as the predicate applying to the time interval is Strawson divisible.

6.1 The Exception

The ambiguity does not extend to all forms of *for*-adverbs. Accusative and bare durative adverbs systematically differ from *for*-adverbs, as noted by Csirmaz (2005, in press) and independently in Morzycki (2004). These adverbs can measure the event time but not the topic time, as shown by accusative adverbs in Hungarian and bare adverbs in the English translation.

(27) a. Feri   *két órát*   aludt   (event time)
         F-nom   two hour-acc slept
         'Feri slept (for) two hours.'
     b.#Feri   *két órát*   nem érkezett meg   (topic time)
         F-nom   two hour-acc not arrived   perf
         'Feri didn't arrive #(for) two hours.'

This distribution of accusative-marked and bare adverbs extends to a number of other languages, including Spanish, Finnish, Korean and Polish.

6.2 The Source of the Restriction

To account for the restriction to event times, I propose an account that capitalizes on the presence of overt case marking on some durative adverbs. Several typologically diverse languages have overtly accusative adverbs, including Hungarian, Polish, Korean and Finnish. Case marking is structural in Korean, since the accusative marked adverbs show the same variation as accusative thematic objects in the active–passive alternation (Maling 1989). Similarly, Finnish accusative adverbs and objects share case alternation patterns between genitive, nominative and partitive case (Csirmaz 2005 and reference therein), supporting a structural case marking analysis.

   The restriction on accusative adverbs can be tied to structural case by appealing to accusative case checking (as proposed independently in Morzycki 2004). On the one hand, accusative case licensing is local; the adverb must be local to the case licenser *v* head. On the other, adverbial modification is also local: adverbs can only measure a time interval that is local to the adverb (Thompson 1996). Thus, an accusative adverb can only measure a time interval local to *v* (event time), but not the one local to Asp (topic time). If bare adverbs are also structurally case marked, their restriction is derived in the same way. The obligatory event time modification of accusative adverbs is thus a direct consequence of their structural case marking. It is pos-

sible to maintain a uniform definition of the equivalents of *for*-adverbs, independently of their variable morphological properties.[8]

7 Summary

I have argued that durative *in*- and *for*-adverbs, as well as their equivalents, are ambiguous in measuring either the event time or the topic time. The adverbs are sensitive to divisibility: *in*-adverbs can only measure time intervals if the predicate of the interval is non-divisible, while *for*-adverbs appear only with divisible predicates. This view of adverbial modification reveals the nature of 'exceptional' *for*-adverb modification of negated eventuality descriptions. Negation yields a divisible predicate of times that applies to the topic time and thus permits *for*-adverbs to measure that time. Downward entailing quantifiers and *only* also license a (Strawson) divisible topic time predicate and consequently, *for*-adverb modification.

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[8]As noted by an anonymous reviewer, some Korean adverbs behave exceptionally. While PP adverbs with *tongan* 'for' can measure the topic time and accusative adverbs cannot, an adverb with both PP and accusative marking is acceptable:

(i) ? Sip-pwun-tongan-ul, ku-nun taythonglyeng-ul alapo-ci-mos-hay-ss-ta
        ten-minute-*for*-acc   he-top president-acc   recognize-cl-not-do-past-dec
        'For ten minutes, he didn't recognize the president'

At this point I can offer no account of these facts, but note that the adverb in (i) is not fully grammatical and is more marked than a 'bare' PP adverb without case marking.

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