Measuring times*

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1 Times, events and states

• Account for time adverb modification of negated event predicates
• Negated event predicates are not stative
• In support of the non-stativity account
  – Arguments against stativity (differences between stative and negated event predicates)
  – New data which do not involve negation but have the same effect on adverbial modification and interpretation
• Time adverbs can measure the length of distinct time intervals, assuming that certain conditions are met

2 The problem

(1) a. Fred crossed the street
    b. # Fred crossed the street for ten minutes
    c. For ten minutes, Fred didn’t cross the street
    d. For a week, Fred was sick

• An affirmative event description (as in (1b) cannot be modified by a for-adverb
• The negated counterpart of the event description permits for-adverb modification

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2.1 Stativity hypothesis

- Negated event predicates are states
- Negation is an aspectual operator which converts all event descriptions into states

2.2 Measuring hypothesis

- Negated event predicates are not stative; the properties of the event predicates are not affected by negation
- *For*-adverbs can be licensed by negation because negation yields a homogeneous predicate that meets the condition of *for*-adverb modification

3 Times

- Reichenbachian time structure

3.1 Types of times

- Event time
  - The duration of the event
- Topic time
  - Topic time (reference time)
  - The time interval under discussion
  - The relation of the topic time and event time determines viewpoint aspect (perfective / imperfective)
      * In a perfective event description, the event time is part of the topic time
      * In an imperfective event description, the topic time is a part of the event time

(2) a. \[ [[\text{perfective}]] = \lambda P . \lambda t . \exists t' . [t' \subset t \& P(t')] \]
  b. \[ [[\text{imperfective}]] = \lambda P . \lambda t . \exists t' . [t \subset t' \& P(t')] \]
  (based on Iatridou et al. 2001, von Fintel and Iatridou 2002)

- Speech time
  - Tense orders the topic time and the speech time
3.2 Structure and times

- The event time is associated with vP
- The topic time is associated with AspP
- The speech time is associated with TP

[other times (e.g. perfect time) are also possible, but not necessarily present in the structure]

3.3 Modifying times

- Either the event time or the topic time may be modified by a for-adverb (given certain conditions)
- Modification of the speech time is excluded
  - Speech time is instantaneous and for-adverbs require a time interval with non-atomic duration (Bennett and Partee 1972)
  - Speech time is deictic; deictic elements cannot be modified (Hornstein 1990)

4 Event time or topic time?

- A for-adverb may measure the event time and/or the topic time

4.1 Time adverbs

- For-adverbs measure the length a time interval t
- With for-adverb modification, the predicate of times P which applies to t must be divisible
(3) Divisibility

a. A predicate $P$ is divisible iff whenever $P(x)$ for an argument $x$, then for all $y \subseteq x$, $\exists z \in x \& P(z)$
   (von Fintel 1997, based on Hinrichs 1985)

b. A predicate $P$ is divisible iff whenever $P(x)$ for an argument $x$, then $x = \oplus_{NT} \{ y : P(y) \}$
   (x is the non-trivial sum of a set of $P$-arguments)
   (von Fintel 1997)

(4) *For*-adverbs (to be revised)

a. Fred slept for two hours
b. *for* (two hours) (Fred sleep) (t)
c. $[[for]] = \lambda T . \lambda P . \lambda t . [\forall t' \subseteq t [\exists t'' [t' \subseteq t'' \subseteq t \& P(t'')]] \& |t'| = T ]$
   (von Fintel 1997, based on Hinrichs 1985)
d. $[[for]] = \lambda T . \lambda P . \lambda t . [t = \oplus_{NT} t' : P(t') \& |t'| = T ]$
   (von Fintel 1997)

- A time interval $t$ can be measured by a *for*-adverb if
  - The modification of $t$ is not independently excluded and
  - The predicate of times $P$ which applies to $t$ is divisible

5 Negated event predicates are not stative

- Negation is not a stativizer
- Negated event predicates behave unlike stative predicates

5.1 Arguments for non-stativity

5.1.1 Present tense interpretation

- Present-tense stative predicates (including derived states such as progressives) have an ongoing interpretation
- Present-tense event predicates lack an ongoing interpretation; a habitual or future interpretation is possible
(5) Stative predicates
   a. Fred is sick
      (ongoing interpretation)
   b. Fred is reading a book
      (ongoing interpretation)

(6) Affirmative event predicates
   a. Fred reads a book
      (no ongoing interpretation)
   b. Fred runs along the tracks
      (no ongoing interpretation)

- Present-tense negated event predicates do not allow an ongoing interpretation
- Negated event predicates pattern with their affirmative counterparts rather than states

(7) Negated event predicates
   a. Fred doesn’t read a book
      (no ongoing interpretation)
   b. Fred doesn’t run along the tracks
      (no ongoing interpretation)

5.1.2 Discourse structure
- Stative predicates (including derived states) do not advance narration but provide ‘background information’
- Event predicates (whether affirmative or negated) advance narration
- Dowty 1986, Kamp and Reyle 1993, a.o.

(8) Affirmative predicates
   a. Melissa looked at Fred. He smiled
      (event predicate; consecutive)
   b. Melissa looked at Fred. He was smiling
      (stative; non-consecutive)
   c. Melissa looked at Fred. He was asleep
      (stative; non-consecutive)

(9) Negated event predicates
   a. Melissa looked at Fred. He didn’t smile
      (consecutive; the expected reaction didn’t happen)
   b. Melissa looked at Fred. He didn’t jump
      (consecutive; the expected reaction didn’t happen)
Negated stative predicates

a. Melissa looked at Fred. He wasn’t smiling
   (non-consecutive)

b. Melissa looked at Fred. He wasn’t asleep
   (non-consecutive)

5.2 Non-arguments for stativity

- Negated event predicates appear to pattern with states rather than affirmative event predicates
- Environments identify agentivity rather than stativity
- The behavior of stative and negated event predicates differs in these environments
  - Negated event predicates permit an agentive interpretation (coercion)
  - Only some, but not all states allow a similar coercion

5.2.1 Imperatives

- Imperatives are possible with predicates with an agentive argument
- If a predicate lacks an agentive argument, it may be coerced (and have a marked agentive – and imperative – interpretation)

(11) Affirmative agentive predicates
    Eat chocolate!

(12) Affirmative non-agentive predicates
    a. Be quiet!
    b. Arrive on time!
    c. # Sleep!
    d. # Slip on the ice!

(13) Negated agentive predicates
    a. Don’t shout!
    b. Don’t eat broccoli!

- Some stative – and therefore non-agentive – predicates (but not all) can be coerced and appear as imperatives
- Negated event predicates can appear as imperatives
5.2.2 Agentive adverbs

- Agentive adverb modification requires the presence of an agent argument
- If a predicate lacks an agentive argument, it may be coerced and have a marked agentive interpretation

(14) Affirmative agentive predicates
a. Fred hit the car intentionally
b. Fred pushed the glass off the table deliberately

(15) Affirmative non-agentive predicates
a. # Fred fell on purpose
b. # Fred deliberately recognized his creditor

(16) Negated agentive predicates
a. Fred didn’t read the notice deliberately
   (he just saw it from the corner of his eye)
b. Fred didn’t push the glass of deliberately
   (it was an accident)

- An agentive adverb can take scope below or above negation
- A negated event predicate can be modified by an agentive adverb and is therefore is not necessarily stative

(17) Neg > deliberately
a. Fred didn’t read the notice deliberately
b. # Fred deliberately didn’t read the notice
c. (he just saw it from the corner of his eye)

(18) deliberately > Neg
a. # Fred didn’t read the notice deliberately
b. Fred deliberately didn’t read the notice
c. (he made sure that he didn’t)

- For-modification is possible even if the negated event predicate is modified by an agentive adverb

(19) a. For a few minutes, Fred deliberately didn’t recognize his creditor
b. For a few minutes, Fred deliberately didn’t notice the obvious mistake

- A negated event predicate can be modified by a for-adverb and an agentive adverb as well
- A negated event predicate can be modified by a for-adverb even if an agentive adverb takes scope over negation
- Stativity of a negated event predicate is not a precondition for for-adverb modification
5.2.3 Other agentive environments

- Predicates such as *must* (with a deontic interpretation), *force* and *persuade* require their complements to have an agentive argument

(20) Fred forced Peter to leave
(21) # Fred forced Peter to like chocolate

- Some, but not all non-agentive affirmative predicates can be coerced to appear as complements
- The negated counterpart of an agentive event predicate can appear as a complement of these predicates

(22) Fred forced Peter not to eat chocolate
(23) Fred persuaded Peter not to diet

5.3 Stativity of negated event predicates

- Negated event predicates do not pattern with stative predicates
- Negated event predicates are not stative

6 Measuring topic time elsewhere

- *For*-adverb modification of event predicates in general is also possible in absence of negation
- If the predicate of times applying to the topic time is divisible, then *for*-adverb modification is licensed

6.1 Downward entailing quantifiers

- Downward entailing quantifiers can create a divisible predicate applying to the topic time
- Downward entailing quantifiers can license *for*-adverb modification of all event predicates
- The *for*-adverb measures the topic time, not the event time

(24) Event predicates with downward entailing quantifiers
(The predicate applying to the event time is non-divisible)

a. For two years, fewer than ten people received a degree in virology
   (the overall number of degree recipients was less than ten)

b. For two hours, Fred found fewer than ten shells on the beach
   (the total sum of shells found was less than ten)

c. For two weeks, Fred told the news to fewer than five people
   (Fred told the news to fewer than five different people)
(25) Event predicates without downward entailing quantifiers (or negation)
(The predicate applying to the event time is non-divisible)
   a. # For two years, (exactly) ten people received a degree in virology
   b. # For two hours, Fred found (more than) ten shells on the beach
   c. # For two weeks, Fred told the news to (more than) five people

6.2 Modification by only
   • Only licenses for-adverb modification of all event predicates
   • The for-adverb measures the topic time

(26) Event predicates with only
(The predicate applying to the event time is non-divisible)
   a. For two years, only five people climbed Mt Everest
   b. For two years, only Fred received a degree in virology

(27) Event predicates without only
(The predicate applying to the event time is non-divisible)
   a. # For two years, (exactly) five people climbed Mt Everest
   b. # For two years, Fred received a degree in virology

   • Only does not yield a divisible predicate of times

(28) For two years, only Fred received a degree in virology
(29) John received a degree in virology on August 30, 2001
    Fred received a degree in virology on August 30, 2001
    Peter received a degree in virology on August 31, 2003
(30) For two years (between August 31, 2001 and August 30, 2003)
    only Fred received a degree in virology
    (t is the time interval between August 30, 2001 and August 30, 2003)

(31) For some subintervals t’ ⊂ t, such as the time span between March 30, 2003 and August 30, 2003, there is no t” ⊂ t such that [t’ ⊆ t” and t” ⊂ t and only Fred received a degree in virology is true at t”]

   • Solution: Strawson divisibility
   • Strawson divisibility is defined based on Strawson entailment (von Fintel 1999)

(32) Strawson divisibility
A predicate P of times is Strawson divisible iff whenever P(t) for an interval t,
then for all t’ ⊆ t, such that P is defined at t’, ∃t” [t’ ⊆ t” ⊂ t & P(t’)]

   • Only licenses Strawson divisibility
   • For-adverb modification by only is predicted if for-adverbs require Strawson divisibility

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6.3 *For*-adverb licensing by downward entailing quantifiers and *only*

- Downward entailing quantifiers and *only*, like negation, yield a divisible predicate of times. Given the ‘measuring hypothesis’, it is predicted that these constituents can license *for*-adverb modification of the predicate of times which applies to the topic time alike.

- The stativity hypothesis does not carry over to instances of *for*-adverb licensing by downward entailing quantifiers and *only*.

7 An exception to the ambiguity of *for*-adverb modification

- Structurally case marked equivalents of *for*-adverbs can measure only the event time, but not the topic time.

7.1 Hungarian

- The PP and structurally case marked equivalents of *for*-adverbs pattern identically with respect to event time modification, but differ with respect to the modification of the topic time.

(33) *For*-adverbs (revised)

(34) *for* (two hours) (Fred sleep) (t)

(35) \[ [[for]] = \lambda T . \lambda P . \lambda t . [\forall t' \subset t \text{ such that } P \text{ is defined at } t' \exists t'' | t' \subset t'' \subset t \& P(t'')] \]

& |t| = T ]

(based on von Fintel 1997, adapting Hinrichs 1985)

(36) *For*-adverbs

a. két órát
   two hour-acc
   ‘for two hours’ (structurally case marked adverb)

b. két óráig
   two hour-until
   ‘for two hours’ (PP adverb)

(37) Affirmative event predicates

a. Feri két órát / két óráig futott
   F-nom two hour-acc / two hour-until ran
   ‘Feri ran for two hours’

b. # Feri két órát / két óráig meg érkezett
   F-nom two hour-acc / two hour-until perf arrived
   ‘Feri arrived for two hours’
Negated event predicates
(The predicate applying to the event time is non-divisible)

a. # Feri két óráig nem érkezett meg
   F-nom two hour-until not arrived perf
   ‘Feri didn’t arrive for two hours’

b. Feri két óráig nem érkezett meg
   F-nom two hour-until not arrived perf
   ‘Feri didn’t arrive for two hours’

7.2 The source of the restriction
• Locality restrictions
  – Structural case licensing is local
    Accusative case must be licensed in a position local to the case licensor v
  – Adverbial modification is local
    Adverbs can only measure a time interval that is local to the position where the adverb
    is merged

• An accusative adverb can only measure the event time, the time interval associated with v

• The restriction of accusative adverbs to event time modification is independent of the deno-
  tation of the adverb

• It is possible to maintain a universal definition of for-adverbs, independently of their structural
  / morphological properties

7.3 Structurally case marked adverbs elsewhere

7.3.1 Finnish

(38) Negated event predicates
(39) # Kymmenen minuuttia hän ei tunnistanut presidenttiä
    ten-part minute-part he-nom not recognized president-part
    ‘For ten minutes, he didn’t recognize the president’
    (Negated event predicate modified by a structurally case marked adverb)

(40) Kymmeneen minuuttiin hän ei tunnistanut presidenttiä
    ten-ill minute-ill he not recognized president-part
    ‘For ten minutes, he didn’t recognize the president’
    (Negated event predicate modified by a PP adverb)
7.3.2 Korean

(41) # Sip-pwun-ul, ku-nun taythonglyeng-ul alapo-ci-mos-hay-ss-ta
ten-minute-acc he-top president-acc recognize-cl-not-do-past-dec
‘For ten minutes, he didn’t recognize the president’
(Negated event predicate modified by structurally case marked adverb)

(42) Sip-pwun tongan, ku-nun taythonglyeng-ul alapo-ci-mos-hay-ss-ta
ten-minute for he-top president-acc recognize-cl-not-do-past-dec
‘For ten minutes, he didn’t recognize the president’
(Negated event predicate modified by PP adverb)

- A puzzle

(43) ? 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’
(Negated event predicate modified by an accusative PP adverb)

8 A prediction

- Ambiguity in *in*-adverbs
  (*In*-adverbs measure a time interval t, where the predicate P applying to t is non-divisible)

- Hungarian *alatt* (‘under’) and *belül* (‘within’) adverbs measure a time interval t such that
  the predicate P applying to t is non-divisible
  - *alatt* adverbs measure the event time
  - *belül* adverbs measure the topic time

- When modifying an instantaneous event predicate (with an atomic event time),
  - *alatt* adverbs, which measure the event time, enforce a preparatory stage interpretation
    (resulting in a non-atomic event time)
  - *belül* adverbs, which measure the topic time, do not
    (the adverb does not interfere with the event time)

(44) # Feri tiz perc alatt megbotlott
F-nom ten minute under slipped
‘Feri slipped in ten minutes’
(preparatory stage enforced)

(45) Feri tiz percen belul megbotlott
F-nom ten minute-in within slipped
‘Feri slipped (with)in ten minutes’
• The event time is a proper part of the topic time

(46) Let us assume an event time which lasts exactly an hour
[e.g. Feri started writing a letter at 4:00 and finished at exactly 5:00]

(47) Feri egy óra alatt írt egy levelet
F-nom one hour under wrote a letter-acc
‘Feri wrote a letter in an hour’
(Adverb measures the event time)

(48) # Feri egy órán belül írt egy levelet
F-nom one hour-on within wrote a letter-acc
‘Feri wrote a letter (with) in an hour’
(Adverb measures the topic time, which properly contains the event time)

9 Measuring time intervals

• For-adverbs can measure a time interval if
  – The predicate applying to the time interval is divisible and
  – The modification of the time interval is not independently excluded (e.g. speech time)

• An adverb can be restricted to modifying the event time due to the interaction of locality
  restrictions on case licensing and adverbial modification

• For-adverb modification of negated event predicates – as well as that of event predicates with
  downward entailing quantifiers or only – can be licensed because the predicate applying to
  the topic time can be divisible

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