for-adverbials quantify over subintervals, not subevents

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for-adverbials: a classic diagnostic of telicity

Temporal for-adverbials are incompatible with telic predicates:

- John ran towards the store for five minutes  
  *John ran (all the way) to the store for five minutes

  (e.g. Vendler, 1957; Verkuyl, 1972; Zwarts, 2005)

Spatial for-adverbials exhibit a similar behavior:

- John ran towards the store for five miles
- *John ran (all the way) to the store for five miles

  (Moltmann, 1991; Gawron, 2005)
This talk is about the following question:

Which aspectual property must predicates have in order to combine with *for*-adverbials?

The traditional answer is: they must be atelic. But as we will see, this notion is imprecise. We will improve on it, without rejecting it. (Basically we’ll end up with temporally vs. spatially telic.)

This talk does **not** address the problem of aspectual composition (e.g. why is *run towards the store* atelic and *run all the way to the store* telic)

But this talk is compatible with mereological theories of aspectual composition like Krifka (1998); Zwarts (2005)
What are subevents and subintervals?

- Both theories presuppose a mereological theory of events as in Krifka (1998).
  - Actually, Dowty (1979) doesn’t, but Moltmann (1991) reformulates him into such a theory.

- An **interval** is just a stretch of time, or a path through space.
  - An interval is always one-dimensional.
  - Its shorter parts are called **subintervals**.
  - e.g. “an hour”, “two days”, “five meters”

- An **event** is an entity that can be described as a state, activity, accomplishment or achievement.
  - An event typically has an extent in space and/or a duration in time. So it can be four-dimensional.
  - Its parts are called **subevents**. They typically have smaller extent and/or shorter duration.
  - e.g. “build a house”, “run”, “know the answer”
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What constraint do *for*-adverbials impose on their predicate?

\[ [S \text{ for INTERVAL}] \text{ requires } [S] \text{ to hold . . .} \]

**Dowty (1979); Moltmann (1991)**

. . . at each subinterval of INTERVAL:

\[
\lambdabar P \lambdabar e. \exists t \ [\text{runtime}(e) = t \land \text{duration-in-minutes}(t) = 5 \\
\land \forall t' \ [t' < t \land \text{moderate-size}(t) \\
\land \exists e' \ [e' < e \land P(e') \land \text{runtime}(e') = t']]\]

**Krifka (1998); Kratzer (2007)**

. . . of each (shorter) subevent of the event in question:

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\land [\forall e' \ [e' < e \land \text{runtime}(e') < \text{runtime}(e) \\
\land \text{moderate-size}(\text{runtime}(e'))] \rightarrow P(e')]\]
Previous answers
What constraint do *for*-adverbials impose on their predicate?

\[ [S \text{ for INTERVAL}] \text{ requires } [S] \text{ to hold} \ldots \]

**Dowty (1979); Moltmann (1991)**

\[ \ldots \text{at each subinterval of INTERVAL:} \]
\[ [\text{for five minutes}] = \lambda P \lambda e. \exists t \ [\text{runtime}(e) = t \land \text{duration-in-minutes}(t) = 5 \]
\[ \land \forall t' \ [t' < t \land \text{moderate-size}(t) \]
\[ \rightarrow \exists e' \ [e' < e \land P(e') \land \text{runtime}(e') = t']] \]

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\[ \land \text{moderate-size(runtime}(e')) \rightarrow P(e')] \]
Contribution of this talk

\[ S \text{ for INTERVAL} \] requires \[ S \] to hold . . .

Dowty (1979); Moltmann (1991)

at each subinterval of INTERVAL

\checkmark

Krifka (1998); Kratzer (2007)
of each (shorter) subevent of the event in question

- As long as only one dimension is considered, the two options are hard to tell apart.
- Unlike previous work, this talk considers several dimensions at once: time, space
- Quantification over subintervals checks for atelicity along only one dimension – exactly what is needed
- Quantification over subevents (shorter or not) checks for atelicity along all dimensions – too strict!
Outline of the talk

- Give two qualifications that both theories need in order to get off the ground
- See how the theories work by looking at cases where both work well
- Look at cases where the subevent theory fails
- Refute arguments that led Krifka (1998) to adopt it
Qualification I: The minimal-parts problem (Dowty, 1979)

Example

The couple waltzed for an hour.

1 2 3 1 2 3

Waltzing involves sequences of three steps
Unclear whether \( x \text{ waltzes} \) is true at intervals < 3 steps
Also unclear whether events of performing those steps count as subevents of a waltzing event
So, can’t use the problem to decide between both accounts
Qualification II: Not literally universal quantification

Example

- Last week, Tai always ate Chinese food with CHOPSTICKS.
- Last week, Tai always ate CHINESE FOOD with chopsticks.
- For a week, Tai ate Chinese food with CHOPSTICKS.
- For a week, Tai ate CHINESE FOOD with chopsticks.

- Does not entail that Tai did nothing but eating throughout a week (Rooth, 1992; von Fintel, 1994, MacDonald and Ürögdí today)
- As with other quantifiers, unfocused material gets copied into the restrictor of the universal quantifier of for an hour
- Won’t use this to decide between theories
The subinterval theory (Dowty, 1979; Moltmann, 1991)

*run towards the store for five minutes – OK*

How the subinterval theory explains this judgment

1. Take an event that qualifies as “run towards the store”

= an event of running towards the store
The subinterval theory (Dowty, 1979; Moltmann, 1991)

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How the subinterval theory explains this judgment

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2. Measure it along the dimension “time”

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1. Take an event that qualifies as “run towards the store”
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   - Krifka takes only those whose duration is less than 5 min.

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= an event of running all the way to the store
The crucial difference

Subinterval theory

Subdivide the event so that for each moderately sized part of the arrow there is a part of the event
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**Subinterval theory**

Subdivide the event so that for each moderately sized part of the arrow there is a part of the event

**Subevent theory**

Subdivide the event into moderately sized parts, ignoring the arrow
The crucial difference

**Subinterval theory**

Subdivide the event so that for each moderately sized part of the arrow there is a part of the event.

**Subevent theory**

Subdivide the event into moderately sized parts, ignoring the arrow.
Both theories can be extended to the spatial case

*run all the way to the store for five miles – bad

- The subinterval theory divides the event into subevents along a spatial instead of a temporal dimension
- The subevent theory still performs a check on all moderately sized subevents (as before)
- So far, the results seem to be the same in all cases.

**extent along path = 5 miles**

run all the way to the store run all the way to the store run all the way to the store run all the way to the store run all the way to the store

= an event of running all the way to the store
Beyond previous analyses
Putting space and time together

- Moltmann (1991) adopts the subinterval theory. She notes that it predicts that spatial *for*-adverbials don’t require events to be homogeneous with respect to the relation ’is a temporal part of’, and vice versa.
- We will use this observation to distinguish between subinterval and subevent theories.
Beyond previous analyses
Putting space and time together

John pushed carts all the way to the store.

True in these two scenarios (among others):

**All-at-once scenario**
- Just one trip to the store
- All carts in question at once
- Takes 5 minutes in total

**Little-by-little scenario**
- Several trips back and forth
- A few carts at a time
- Takes 5 minutes in total
Where spatial and temporal *for*-adverbials differ

- *John pushed carts all the way to the store for fifty meters.*
  - All-at-once: ✢
  - Little-by-little: ✢
Where spatial and temporal *for*-adverbials differ

- John pushed carts all the way to the store for fifty meters.
  - All-at-once: ⚡️  Little-by-little: ⚡️
- John pushed carts all the way to the store for five minutes.
  - All-at-once: ⚡️  Little-by-little: ✓
Where spatial and temporal *for*-adverbials differ

- John pushed carts all the way to the store for fifty meters.
  - All-at-once: ⚡
  - Little-by-little: ⚡

- John pushed carts all the way to the store for five minutes.
  - All-at-once: ⚡
  - Little-by-little: ✓

We will focus on the contrast in the little-by-little scenario.
The subinterval theory predicts the contrast

Judgment to be predicted

John pushed carts all the way to the store for five minutes. – OK

Subinterval theory

Assume that events are closed under sum (standard assumption, e.g. Bach, 1986; Krifka, 1998).
The subinterval theory predicts the contrast

Judgment to be predicted

John pushed carts all the way to the store for five minutes. – OK

Subinterval theory

Step 1: Take a sum event that qualifies as “push carts all the way to the store”

- We choose the sum event that represents the little-by-little scenario
The subinterval theory predicts the contrast

Judgment to be predicted
John pushed carts all the way to the store for five minutes. – OK

Subinterval theory
Step 2: Measure it along the dimension “time”
The subinterval theory predicts the contrast

**Judgment to be predicted**

John pushed carts all the way to the store for five minutes. – OK

**Subinterval theory**

**Step 3:** Check that its duration is a five-minute interval
The subinterval theory predicts the contrast

Judgment to be predicted
John pushed carts all the way to the store for five minutes. – OK

Subinterval theory

Step 4: Take all the moderately sized subintervals of that interval
The subinterval theory predicts the contrast

Judgment to be predicted
John pushed carts all the way to the store for five minutes. – OK

Subinterval theory

Step 5: For each subinterval, consider the corresponding subevent

extent along path

1 min 1 min 1 min 1 min

1 min 1 min 1 min 1 min

STORE

STORE

STORE

STORE

STORE
The subinterval theory predicts the contrast

Judgment to be predicted
John pushed carts all the way to the store for five minutes. – OK

Subinterval theory

Step 6: Check if each of them qualifies as “push carts all the way to the store”

...correctly predicts the sentence is OK
The subinterval theory predicts the contrast

**Judgment to be predicted**

*John pushed carts all the way to the store for 50 meters. – Bad*

**Subinterval theory**

Assume that events are closed under sum (standard assumption, e.g. Bach, 1986; Krifka, 1998).
The subinterval theory predicts the contrast

Judgment to be predicted
*John pushed carts all the way to the store for 50 meters. – Bad

Subinterval theory

Step 1: Take a sum event that qualifies as "push carts all the way to the store"

- We choose the sum event that represents the little-by-little scenario
The subinterval theory predicts the contrast

Judgment to be predicted

*John pushed carts all the way to the store for 50 meters. – Bad

Subinterval theory

Step 2: Measure it along the dimension “space”

extent along path

time = 5 minutes
The subinterval theory predicts the contrast

**Judgment to be predicted**
*John pushed carts all the way to the store for 50 meters. – Bad*

**Subinterval theory**
**Step 3:** Check that its spatial extent is a fifty-meter interval

- **time = 5 minutes**
- **extent along path = 50m**
The subinterval theory predicts the contrast

Judgment to be predicted

*John pushed carts all the way to the store for 50 meters. – Bad

Subinterval theory

Step 4: Take all the moderately sized subintervals of that interval

time = 5 minutes

extent along path = 50m
The subinterval theory predicts the contrast

**Judgment to be predicted**

*John pushed carts all the way to the store for 50 meters. – Bad*

**Subinterval theory**

**Step 5:** For each subinterval, consider the corresponding subevent

```
STORE
STORE
STORE
STORE
STORE

extent along path = 50m
```

```
10m 10m 10m 10m 10m
```

```
time = 5 minutes
```
The subinterval theory predicts the contrast

Judgment to be predicted
*John pushed carts all the way to the store for 50 meters. – Bad

Subinterval theory
Step 6: Check if each of them qualifies as “push carts all the way to the store”

...correctly predicts the sentence is unacceptable
The subevent theory fails

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John pushed carts all the way to the store for five minutes. – OK

**Subevent theory**

Assume that events are closed under sum (standard assumption, e.g. Bach, 1986; Krifka, 1998).
The subevent theory fails

Judgment to be predicted
John pushed carts all the way to the store for five minutes. – OK

Subevent theory

Step 1: Take a sum event that qualifies as “push carts all the way to the store”
- We choose the sum event that represents the little-by-little scenario

extent along path = 50m
time = 5 minutes
The subevent theory fails

Judgment to be predicted
John pushed carts all the way to the store for five minutes. – OK

Subevent theory
Step 2: Measure it along the dimension “time”
The subevent theory fails

Judgment to be predicted

John pushed carts all the way to the store for five minutes. – OK

Subevent theory

Step 3: Check that its duration is a five-minute interval

time = 5 minutes
The subevent theory fails

Judgment to be predicted
John pushed carts all the way to the store for five minutes. – OK

Subevent theory

Step 4: Take all the moderately sized subevents of the event

Krifka takes only those whose duration is less than 5 min.
The subevent theory fails

Judgment to be predicted
John pushed carts all the way to the store for five minutes. – OK

Subevent theory
Step 5: Check if each subevent qualifies as “push carts all the way to the store”
The subevent theory fails

Judgment to be predicted
John pushed carts all the way to the store for five minutes. – OK

Subevent theory

Step 5: Check if each subevent qualifies as “push carts all the way to the store”

... wrongly predicts the sentence is unacceptable
Other cases in which the subevent theory fails

Example
Snow fell throughout the area for two straight days. – OK (attested example, via Web search)

Subinterval theory says: OK
because at each time there is a subevent of which P holds

Subevent theory says: bad
because P fails to hold of any subevent that doesn’t extend throughout the whole area
Other cases in which the subevent theory fails

Example

Snow fell throughout the area for two straight days. – OK

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Subinterval theory says: OK
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Other cases in which the subevent theory fails

Example
Wine flowed from the jar to the floor for five minutes. – OK (Beavers, 2008)

Subinterval theory says: OK
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because P fails to hold of any subevent that doesn’t extend along the whole path
Other cases in which the subevent theory fails

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Wine flowed from the jar to the floor for five minutes. – OK

(Subavers, 2008)

Subinterval theory says: OK
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because P fails to hold of any subevent that doesn’t extend along the whole path
Why Krifka prefers the subevent theory

- There is some leeway in how for-adverbials can be understood.
- *John and Mary sang for four hours* is true in these two scenarios:

**Occupy-the-room scenario**

<table>
<thead>
<tr>
<th>Hour 1</th>
<th>Hour 2</th>
<th>Hour 3</th>
<th>Hour 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>John’s singing</td>
<td></td>
<td>Mary’s singing</td>
<td></td>
</tr>
</tbody>
</table>

**Paid-by-the-hour scenario**

<table>
<thead>
<tr>
<th>Hour 1</th>
<th>Hour 2</th>
<th>Hour 3</th>
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<td></td>
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</tr>
</tbody>
</table>

- Krifka accounts for this by deliberately leaving open how the function that maps events to their duration in hours is defined in detail when it comes to sums of events.
As Krifka himself observes in a separate context (Krifka, 1992), measure expressions in nominal constituents can delimit either the noun phrase denotation or the sum event.

**Example**

Last year, 4000 ships passed through the lock.

- **Object-related reading**: If some ship took part in two subevents (i.e. it passed the lock twice), it is counted only once.

- **Event-related reading**: If some ship took part in two subevents (i.e. it passed the lock twice), it is counted twice.
John and Mary sang for 4 hours follows the same pattern

There is no need to resort to a special mechanism to explain the leeway, contra Krifka. So it is not an argument for the subevent theory.

Example

John and Mary sang for four hours.

- **Occupy-the-room reading**: If some stretch of time was the duration of two subevents (e.g. by John and by Mary), it is counted only once.

- **Paid-by-the-hour reading**: If some stretch of time was the duration of two subevents (e.g. by John and by Mary), it is counted twice.
This talk has shown that *for a minute/mile* means roughly *at all subintervals* or *at each subinterval of a minute/mile*.

“For” individuates subevents along the named dimension. The subevent theory doesn’t get this.

*all* and *each* are distributive quantifiers. This suggests applying methods from the study of distributivity to *for*.

Telicity is usually thought of as a property of predicates (or events). Better to think of temporal telicity and spatial telicity etc. (in support of Gawron (2005))

- push carts all the way to the store for 5 min. / *for 50 meters
Thank you!

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