3.9 Events and Temporal Reference

So far we haven't talked about temporal phenomena at all. But DRT has proved to be an excellent framework to discuss intricate temporal relationships, e.g. in narrative texts. Important contributions are: Partee (1984), 'Nominal and temporal anaphora', *Linguistics and Philosophy*, elaborating on a 1981 thesis by Erhard Hinrichs, and Kamp & Reyle (1993), chapter 5.

3.9.1 Events and Reference Times

Some basic principles of the treatment of temporal reference can be illustrated with the following example:

(89)   Last Friday, Pedro bought a donkey.

- Past tense: The reported event is before the time of speech.

- Temporal adverbial: The event is located within a given time. Incidentally, this time is specified with reference to the speech time as well.

Let us assume that our model contains times and time intervals, that it provides us with a speech time, and that it also contains events that are located in time. The DRT language is extended accordingly. In particular, we have:

- a discourse referent n for the time of speech (n, for "now")

- we can refer to times, using discourse referents t, t etc.,

- we can refer to events, using discourse referents e, e etc.

- a condition like $e \subseteq t$ should express that event e occurs within time t,

- a condition like $d < d$ expresses that the time or event d is anchored to occurs after the time or event d is anchored to.

- a condition like e:[u bought v] expresses that e is an event of u buying v.

We then get the following DRS for our example:

(90)

n t e u v	
e ⊆ t	n: time of utterance,
last Friday(n, t)	t: the Friday preceding n
t < n	past tense
u = Pedro	
donkey(v)	
e: [u buys v]	

We know that even if we don't have a time adverbial we should assume that sentences are interpreted with respect to a reference time. This reference time can be implicitly given. One example that shows that is due to Barbara Partee:

(91)   I didn't turn off the stove.

Assume that (91) is uttered by a speaker who just has left his house. It certainly doesn't mean that the speaker never before turned off the stove. Rather, it means that he didn't turn off the stove in the presently salient reference time. Hence we should analyze this example as follows:

(92)
```
n  t  u
u = the stove
t < n                                    Note: tense is not in the scope of negation
¬ ┌─────────────────┐
  │ e               │
  │ e    t          │
  │ e: [I turn off u] │
  └─────────────────┘
```

3.9.2 Sequence of Events

One area that has been treated in DRT is the sequencing of events in narrative discourses:

(93)   a.   John opened the door.
        b.   He entered the room.
        c.   He walked to the window and opened it.

A text like (93) reports a series of subsequent events. The events seem to be related to each other in a quasi-anaphoric way: Sure, the event described in the second sentence is not identical to the one in the first sentence, but it is temporally related to the one in the first sentence. This is similar to the case of partitive pronouns like *one*: They pick up a discourse referent d introduced before and introduce a new DR d that is related to d. In the case of *one*-anaphora, d is anchored to a part of d. In the case of narrative sequences, d should be anchored to an event or a time following the event or time of d.

One way to express this is by introducing reference points. A condition like Rpt: = e expresses that e, or the time of e, is the current reference point. In particular, a sentence S_i introduces a reference point Rpt for the following sentence S_{i+1}; the second sentence deletes the information of the old reference point and introduces a new one. The following shows how (93.a,b)are analyzed:

(94)
```
┌──────────────┐   ┌──────────────────┐   ┌──────────────────┐
│ n  t  e  u  v │   │ n  t  e  u  v t e  w │   │ n  t  e  u  v t e  w │
│ t < n        │   │ t < n            │   │ t < n            │
│ e    t       │   │ e    t           │   │ e    t           │
│ u = John     │   │ u = John         │   │ u = John         │
│ v = the door │   │ v = the door     │   │ v = the door     │
│ e: [u opens v] │  │ e: [u opens v]   │   │ e: [u opens v]   │
│ Rpt := e     │   │ Rpt := e         │   │                  │
│              │   │ t  < n           │   │ t  < n           │
│              │   │ e    t           │   │ e    t           │
│              │   │ e < t            │   │ e < t            │
│              │   │ w = the room     │   │ w = the room     │
│              │   │ e : [u entered w] │  │ e : [u entered w] │
│              │   │                  │   │ Rpt := e         │
└──────────────┘   └──────────────────┘   └──────────────────┘
```

After processing (a)   Processing (b)   Deleting of old Rpt := e
                                                    introducing new Rpt := e

Note: A sentence like *He enteredthe room* introduces a new event discourse referent (here, e). We look for a condition Rpt: = d and introduce a new condition, d < e . This being done, the condition Rpt: = d is deleted, and a new condition Rpt: = e is introduced.

3.9.3 States and Events

So far we considered sentences that express events. Stative sentences can be expressed in a parallel fashion when we assume states as objects in our model and DRs that are anchored to states. Example:

(95)   In 1986, John was married to Sue.

```
n  t  s  u  v
t < n
t    1986
s o t
u = John
v = Sue
s: [u be married to v]
```
s and t overlap temporally,
that is, t [t   t   s]

There is a slight difference to sentences expressing events: The state expressed by a stative sentence need not be embedded in the reference time, but should just overlap it (here expressed by "o"). For example, (95) is true even if John was married to Sue from 1985 to 1987, or from fall 1986 to 1988, or any time within 1986.

Stative sentences and eventive sentences also differ in narrative texts. In particular, stative sentences should include the time of the reference point, and they do not advance the reference point:

(96)   a. John opened the door.
        b. It was pitch dark.
        c. He entered the room.

```
n  t  e  u  v
t < n
e    t
u = John
v = the door
e: [u opens v]
Rpt := e
```

```
n  t  e  u  v  t  s
t < n
e    t
u = John
v = the door
e: [u opens v]
Rpt := e
t  < n
s o t
e    s
s: [pitch dark]
```
(states include events)

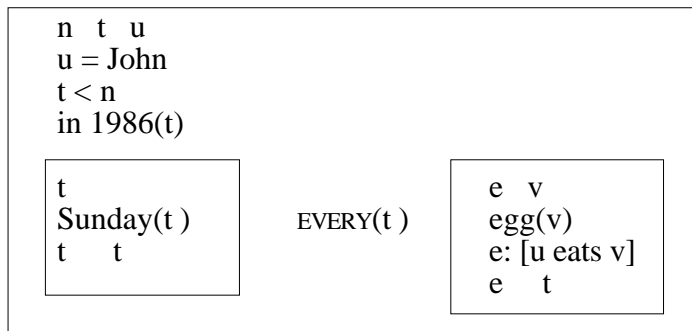   After processing (a)   Processing (b); old Rpt not deleted.

However, we have seen in our discussion of tense that the temporal relations between eventive sentences and stative sentences, and also between eventive sentences, are not always so clear-cut:

(97)   a. John switched off the light. It was pitch dark.

        b. 1986 was a busy year for Mary. She visited Kenya, she finished her Ph.D., she got her first job, and she married John.
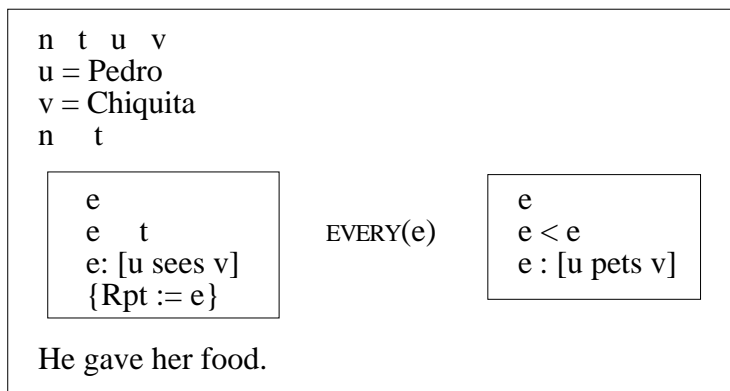
3.9.4 Event Quantification

We have assumed that times and events are represented by discourse referents. Hence we should expect that these DRs can be quantified over, and that we find similar accessibility restrictions as with nominal pronouns and their antecedents. This is indeed the case. First, a case with an explicit quantification over times:

(98)   In 1986 John ate an egg$_i$ every Sunday. *It$_i$ is boiled.

```
┌─────────────────────────────────────────────────────┐
│ n t u                                                 │
│ u = John                                              │
│ t < n                                                 │
│ in 1986(t)                                            │
│                                                       │
│  ┌─────────────────┐           ┌───────────────────┐ │
│  │ t               │           │ e  v              │ │
│  │ Sunday(t )      │ EVERY(t ) │ egg(v)            │ │
│  │ t    t          │           │ e: [u eats v]     │ │
│  │                 │           │ e    t            │ │
│  └─────────────────┘           └───────────────────┘ │
└─────────────────────────────────────────────────────┘
```

But we also have true cases of event quantification. The restrictor of event quantifiers is usually specified by a *when*-clauses. Notice that in the following text, the second sentence is bad, as its event cannot be anaphorically related to the preceding sentence.

(99)   When Pedro sees Chiquita, he pets her. *He gave her food.

```
┌─────────────────────────────────────────────────────┐
│ n t u v                                               │
│ u = Pedro                                             │
│ v = Chiquita                                          │
│ n    t                                                │
│                                                       │
│  ┌─────────────────┐           ┌───────────────────┐ │
│  │ e               │           │ e                 │ │
│  │ e    t          │ EVERY(e)  │ e < e             │ │
│  │ e: [u sees v]   │           │ e : [u pets v]    │ │
│  │ {Rpt := e}      │           │                   │ │
│  └─────────────────┘           └───────────────────┘ │
│                                                       │
│  He gave her food.                                    │
└─────────────────────────────────────────────────────┘
```

Cf. Kamp & Reyle (1993) for further discussion of event quantification in DRT.

Exercises:

3. a) Construct a DRS for the following text; you will have to assume events.
        You don't have to follow particular DRS construction rules.
        Pedro beat a donkey. It kicked back. When someone kicks a donkey, it usually kicks back.

    b) Interpret this DRS with respect to the model M = ⟨U, F⟩,
        with U = {p, j, s, d1, d2, d3, d1, e1, e2, e3, e4, e5, e6, e7},
        F($<$) = {⟨e1, e2⟩, ⟨e3, e4⟩, ⟨e5, e6⟩, (...)}
        F(*Pedro*)=p,
        F(*someone*)={p, j, s},
        F(*kick*) = {⟨e1, p, d1⟩, ⟨e3, s, d1⟩, ⟨e5, j, d1⟩, ⟨e7, p, d3⟩}
        F(*kick back*) = {⟨e2, d1, p⟩, ⟨e4, d1, p⟩, ⟨e6, d1, j⟩}

4. In contrast to example (99), the following example is fine:
    When Pedro sees Chiquita, he pets her. He usually gives her a carrot
    a) Explain why this is a good text.
    b) Give a DRS of this text.

5. Discuss how the following text should be treated in DRT (it is a so-called "generic passage", in Carlson & Spejewski's article in *Natural Language Semantics* 1997.)

a) *My grandmother used to bake the most wonderful pies.*
b) *She would go to the orchard on Shady Lane early in the morning.*
c) *She used to pick a basket of apples there.*
d) *Sometimes she would also pick a basket of peaches*
e) *Then she would go into the kitchen and shoo everyone else away.*
f) *In the late afternoon an irresistible aroma wafted through the entire house*