

LING 364: Introduction to Formal Semantics

Lecture 26

April 20th

Administrivia

- Homework 5
 - mostly graded and returned
 - *a few remaining yet to do*

Administrivia

Next Tuesday: in place of class go to...

- **Place: Student Union Kiva, Time: 2:00pm to 3:00pm**
- **Reception With Refreshments To Follow The Talk**
- Distinguished Speaker Seminar Series. Sponsored by the Department of Electrical and Computer Engineering

Computing with Theories of Language

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Traditionally, there has been a deep divide between engineering solutions and linguistic technology when it comes to the construction of natural language parsing systems. High quality parsing systems are naturally hard to build as they need to reflect the apparent surface complexity that is inherent in natural languages. In this talk, I argue (and exhibit software as evidence) that linguistic theory may have much to offer engineers. In particular, linguists have hypothesized that, instead of a baroque system of seemingly arbitrary rules, there may be a small set of core interacting principles at work, common to all languages. Such a system built around a linguistically sound core can indeed be constructed today, and may result in significant advantages for multilingual parsing systems.

Administrivia

- Short Quiz at the end of today's lecture

Last Time

- Introduced some formal tools for dealing with the semantics of tense
- (Reichenbach):
 - the notion of an **event**
 - **utterance** or **speech time** (S)
 - **event time** (E) and
 - **reference** (R) or **topic time** (T)
 - the notion that E, S and T are time **intervals**
 - relations: precedence ($<$), inclusion (\subseteq)

Last Time

- Past Tense example:

- (16) **Last month**, I **went** for a hike
past tense

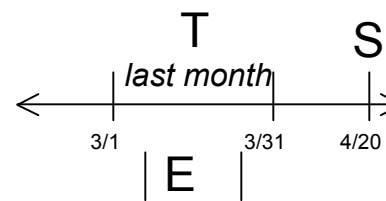
T = reference/topic time

T = last_month(S)

- S = speech or utterance time
- E = time of hiking event

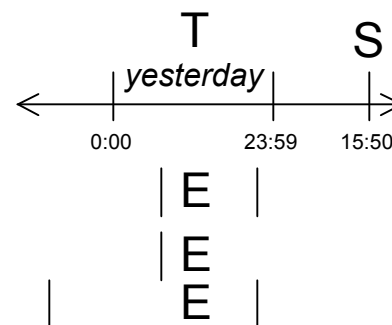
- What can we infer?

- $T < S$
- $E \subseteq T$
- *subset relation: E is a (time) interval, wholly contained within or equal to T*
- $E < S$ (*intuitive notion of past*)



Last Time

- Past Tense **Stative** example:
 - (17) Yesterday, Noah had a rash



- Let
 - $T = \text{yesterday}(S)$
 - $E =$ interval in which Noah is in a state of having a rash
- What does (17) say about E?
 - E may have begun before or extend beyond T, or be wholly contained within T
 - $E \cap T \neq \emptyset$

Last Time

- (English) **Present Tense**
 - present = utterance time
- **Simple Present Tense**
 - T=S, E has a **stative** interpretation (“state”-like)
- Examples
 - (18a) Mary runs (*simple present*)
 - ??? (surprisingly: isn’t the same as...)
 - (18b) Mary is running (*present progressive*)
 - T = S, run(mary) true @ T @ T = “at time T”
 - i.e. *Mary is running right now at utterance time*
 - (18c) Noah has a rash (*simple present*)
 - T=S, rash(noah) true @ T
 - i.e. *Noah has the property of having a rash right now*

$$E \cap T \neq \emptyset$$

Aspect

- Aspectual classification of events

- **Achievement**

- property: *instantaneous nature*
- (20a) Shelby awoke

- **Accomplishments**

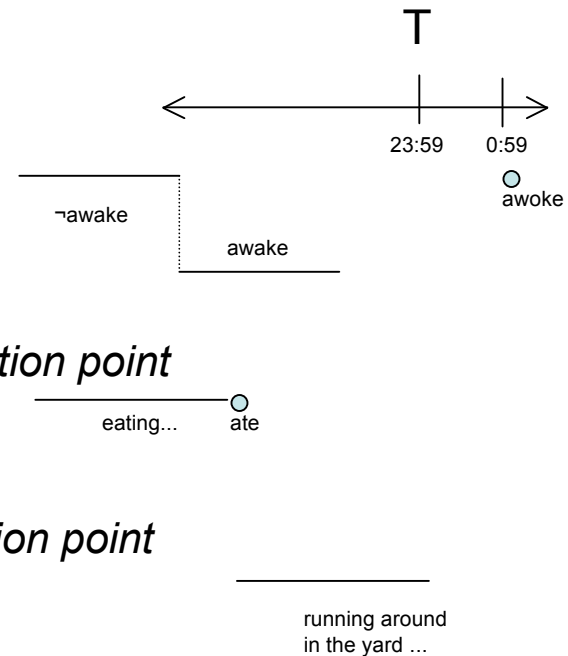
- property: *non-instantaneous with culmination point*
- (20b) Shelby ate the bone

- **Activities**

- property: *non-instantaneous, no culmination point*
- (20c) Shelby ran around in the yard

- **Distinguishing Tests:**

- **for an hour** (activity)
- **in an hour** (accomplishment)
- note: different semantics for achievements



Aspect

- Give semantics for these sentences
- **Achievement**
 - property: *instantaneous nature*
 - Shelby awoke **in an hour**
 - Shelby awoke **for an hour**
- **Accomplishments**
 - property: *non-instantaneous with culmination point*
 - Shelby ate the bone **in an hour**
 - Shelby ate the bone **for an hour**
- **Activities**
 - property: *non-instantaneous, no culmination point*
 - Shelby ran around in the yard **in an hour**
 - Shelby ran around in the yard **for an hour**

Perfect

- **Perfective in English: $E < T$**
 - signaled by auxiliary *have* + past participle form of main verb
 - e.g. *has eaten*
 - e.g. *had arrived*
- **Example**
 - (23') When I got there at 6 o'clock, Mary *had arrived*
 - (23) When I got there at 6 o'clock, Mary *had arrived* an hour before
- What can we infer?

S = utterance time

T = 6 o'clock (past)

T < S

E = Mary's arrival

E < T (**perfective aspect**)

Let *an_hour_before* be a function that maps a time interval onto another one hour earlier

E = *an_hour_before*(T)

E = 5 o'clock

Perfect

- **Problems**
- Example:
 - (26) Mary has been in Belmont for two days
 - E = time interval for Mary being in Belmont

–One Meaning (dis-preferred)

- *there is some period in the past such that Mary was in Belmont for two days*
- *predicted by analysis so far*
- $T=S, E<T$ *has been in Belmont for two days before*

–Another Meaning (preferred)

- *Mary arrived in Belmont two days ago and is still here*
- $T=S$
- but $E \not\prec T$
- **continuative perfect**

Quiz 6

- Explain why the following sentences might be considered as odd or strange
 - *if you don't consider them odd: explain why*
- Be as formal as possible
 - (28) ?Gutenberg has discovered the art of printing
 - (29) ?Einstein has visited Princeton
 - (30) *Mary has walked to the market yesterday