

# EGG intro semantics week 2

## Events as individuals

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## So far

- ▶ The program of natural language metaphysics.
- ▶ Relating data about plurals and mass terms in English to hypotheses about the structure of the domain of individuals.

# This lecture

- ▶ Two related hypotheses from Donald Davidson:
  1. Action sentences describe events.
  2. Events are particulars, in the same sense as individuals.
- ▶ Consequences for adverbial modification.
- ▶ Some similarities between events and individuals.

## Davidson's opening gambit

*Strange goings on! Jones did it slowly, deliberately, in the bathroom, with a knife, at midnight. What he did was butter a piece of toast. We are too familiar with the language of actions to notice at first an anomaly: the 'it' of 'Jones did it slowly, deliberately, ...' seems to refer to some entity, presumably an action, that is then characterized in a number of ways. Asked for the logical form of this sentence, we might volunteer something like, 'There is an action  $x$  such that Jones did  $x$  slowly and Jones did  $x$  deliberately and Jones did  $x$  in the bathroom, ...' and so on. But then we need an appropriate singular term to substitute for ' $x$ '.*

## Two interrelated arguments

1. Whatever it is about individuals that makes them able to act as antecedents for anaphora like *it*, the elements described by action sentences (call them *events*) can do that too.
  - ▶ Comment: Lots of things can antecede *it*: facts, beliefs, measures, . . .
  - ▶ This could either mean that this is only a weak argument for similarity between events and individuals, or that the relevant similarity extends to other domains: certain other semantic objects also have individual-like properties.
2. Those events are implicated in the analysis of modification.
  - ▶ Let's start there.

## Two event-free theories of modification

- ▶ Assume that a verb denotes an  $n$ -place predicate:
  - ▶ **[dance]** =  $\lambda x.\text{dance}(x)$
  - ▶ **[flatter]** =  $\lambda x\lambda y.\text{flatter}(y)(x)$
  - ▶ **[give]** =  $\lambda x\lambda y\lambda z.\text{give}(z)(y)(x)$
- ▶ Then maybe:
  1. *slowly* is an extra argument (verbs really denote  $n + m$ -place predicates).
    - ▶ **[dance]** =  $\lambda m\lambda x.\text{dance}(x)$  in manner  $m$
    - ▶ **[dance slowly]** =  $\lambda x.\text{dance}(x)$  in a slow manner
  - or:
  2. *slowly* denotes an operator taking a predicate (or proposition, perhaps) as argument.
    - ▶ **[slowly]** =  $\lambda P\lambda x.\text{slow}(P)(x)$
    - ▶ **[dance slowly]** =  $\lambda x.\text{slow}(\text{dance})(x)$

# Problems

- ▶ Neither of these is great.
- ▶ No guarantee that  $O(P)$  entails  $P$ , so the fact that *dance slowly* entails *dance* has to be taken out of the compositional semantics.
- ▶ As for modifiers as extra arguments, how many should we allow for?

(1) Amazingly, he only recently voluntarily described what happened convincingly in his own words to the jury as requested by the judge without coercion.

Probably no principled upper bound on the number of modifiers in a sentence.

- ▶ So what arity should our predicates have? And what do we do when a modifier isn't supplied?
- ▶ Also a related problem: there's no compositional guarantee that a 6-place predicate *dance* entails a 3-place predicate *dance*.

## Event variables help

- ▶ Davidson's trick is to give *one* extra argument position, and relate all modifiers to that position.
  - ▶  $[\text{dance}] = \lambda x \lambda e. \text{dance}(x)(e)$
  - ▶  $[\text{slowly}] = \lambda P \lambda e. P(e) \wedge \text{slow}(e)$
  - ▶  $[\text{Mary dance}] = \lambda e. \text{dance}(m)(e)$
  - ▶  $[\text{Mary dance slowly}] = \lambda e. \text{dance}(m)(e) \wedge \text{slow}(e)$
  - ▶  $[\text{Mary dance slowly in the cupboard}] = \lambda e. \text{dance}(m)(e) \wedge \text{slow}(e) \wedge \text{in}(\text{the cupboard})(e)$
- ▶ Assume some functional head (e.g. T) existentially quantifies over  $e$  (more on this later).
  - ▶  $[\text{PAST}] = \lambda P \exists e. P(e) \wedge \tau(e) < \text{now}$   
(Read "... and the time at which  $e$  took place is prior to now":  $\tau$  is Krifka's "temporal trace" function).
  - ▶  $[\text{Mary danced slowly in the cupboard}] = \exists e. \text{dance}(m)(e) \wedge \text{slow}(e) \wedge \text{in}(\text{the cupboard})(e) \wedge \tau(e) < \text{now}$

## Event variables help

- ▶ Now we don't have any problems with arbitrary numbers of arguments.
- ▶ And we get the correct entailment pattern from conjunct elimination.
  - ▶  $\exists x.(P(x) \wedge Q(x)) \rightarrow \exists x.(P(x))$
  - ▶  $\exists e.dance(m)(e) \wedge slow(e) \rightarrow \exists e.dance(m)(e)$
- ▶ These are big points in favour of Davidson's analysis.

# Adnominal modification

- ▶ The compositional treatment above was pioneered by James Higginbotham.
- ▶ He also showed how the same trick could be used for adjectives.
  - ▶  $[\text{car}] = \lambda x.\text{car}(x)$
  - ▶  $[\text{red}] = \lambda P\lambda x.P(x) \wedge \text{red}(x)$
  - ▶  $[\text{red car}] = \lambda x.\text{car}(x) \wedge \text{red}(x)$
  - ▶  $[\text{the}] = \lambda P.\sigma x.P(x)$   
(where  $\sigma x.P(x)$  is the element  $y$  s.t.  $P(y) \wedge \forall z.P(z) \rightarrow z \sqsubseteq y$ .  
If there is no such element, e.g. because there are multiple red cars,  $\sigma x.P(x)$  is undefined — a presupposition failure).  
( $\sigma$  is Link's symbol. Many other authors use  $\iota$  in a broadly similar way).
  - ▶  $[\text{the red car}] = \sigma x.\text{car}(x) \wedge \text{red}(x)$

# Variations on a theme 1: Modal modifiers

- ▶ It is not always the case that a modified noun/verb entails the unmodified variant.
  - ▶ A possible problem isn't necessarily a problem
  - ▶ If John probably ate the hamster, it's possible that John didn't eat the hamster.
- ▶ This can now fall out naturally from the denotations of such modal adjectives and adverbs.
  - ▶ **[possible]** =  $\lambda P \lambda x. \diamond (P)(x)$
  - ▶ **[possibly]** =  $\lambda P \lambda e. \diamond (P)(e)$

## Variations on a theme 2: Subjective modifiers

- ▶ Other *subjective* modifiers have the following entailment pattern:
  - ▶ Big car  $\rightarrow$  car  $\neg \rightarrow$  big (thing)
  - ▶ Dance slowly  $\rightarrow$  dance  $\neg \rightarrow$  perform action slowly
- ▶ (See also Davidson's discussion of a sphere rotating quickly and heating up slowly — just like the Earth!)
- ▶ Higginbotham had a faintly terrifying theory of these, which can be simplified (against his intentions) by suggesting that the sister of *big/slowly* supplies a comparison class  $C$ , and a big car is a big-for-a-car car.
- ▶ However, Hans Kamp and Barbara Partee show that the comparison class is at least partially contextually determined.
  - ▶ My 2-year-old son / the fraternity built a really big snowman yesterday

So we can probably make do compositionally with just intersective and modal modifiers.

## Similarities between $e$ and $x$ : Particulars

- ▶ Higginbotham's compositional implementation of Davidson brings home the similarity between the roles of  $e$  and  $x$  in the formal system.
- ▶ For Davidson, this represented a common status as particulars (concrete entities with a definite spatiotemporal location).
- ▶ For Higginbotham, events, like individuals, can be the object of perception reports.
  - ▶ John saw Obama  $\leftrightarrow$  John saw the president of the US.
  - ▶ John saw Obama cry  $\leftrightarrow$  John saw the president of the US cry.
  - ▶ John saw that Obama cried  $\neg \leftrightarrow$  John saw that the president of the US cried
  - ▶ The dog saw Obama cry / # that Obama cried.

## Similarities between $e$ and $x$ : spatiotemporal overlap

- ▶ Link argued that his ring is a separate individual from the gold composing his ring, because the two have different properties.
- ▶ The same is true of events: as mentioned above, a sphere can rotate quickly and heat up slowly at the same time. The rotation and the heating up have different properties, so by Link's criterion they are different events.
- ▶ (This means that there are more events than common sense would suggest, just as there are more individuals than common sense would suggest. More on this later in the week).

## Similarities between e and x: relationship to kinds

- ▶ Greg Carlson treated the distinction between generic and episodic statements involving bare plurals as related to a distinction between ordinary individuals (or spatiotemporal “stages” thereof) and *kinds*.
  - ▶ Dogs are barking: there are individuals (or stages), now, which are dogs and which are barking.
  - ▶ Dogs bark: generally, individuals realizing the dog-kind have the property of barking on occasion.
- ▶ Berit Gehrke (partly following Marcin Morzycki) has suggested that adjectival passives can describe event kinds.

(2) Die Zeichnung ist von einem kind / #Maria  
the drawing is by a child  
angefertigt  
made  
“The drawing is made by a child/#Maria”

## Which predicates are predicates of events?

- ▶ Davidson restricted his original proposal to action sentences.
- ▶ But given the crucial role of the event variable in compositional analyses of modification, there are strong reasons to extend the use of the event variable to any predicates showing similar patterns of modification.
- ▶ Uncontroversial: dynamic verbs, even if not actions, denote properties of events.
  - ▶ The package arrived without warning in the dead of night.
- ▶ Also pretty uncontroversial: Maienborn's "Davidsonian states" (like *sit*, *stand*, *lie*) denote properties of events.

## Individual-level vs. Stage-level predicates

- (3)
- a. (i) Firemen are available (generic/existential)
  - (ii) Firemen are altruistic (generic only)
  - b. There were firemen available/\*altruistic
  - c. John saw Mary tired/\*intelligent.
  - d. Mary was tired/\*intelligent in the car.

- ▶ Angelika Kratzer: only stage-level predicates have an event argument.
- ▶ So only stage-level predicates can be the object of perception reports, or undergo Davidsonian modification.
- ▶ But the intuitive distinction in permanence doesn't neatly match onto the interpretation of bare plurals.

- (4)
- a. Firemen are hungry/tired (generic only?)
  - b. There were firemen dead

## Davidsonian vs. Kimian states

- ▶ Maienborn distinguishes two types of states in a similar in spirit to ILPs vs. SLPs, but focusing on a well-behaved subset of diagnostics. Davidsonian states have an event variable, Kimian states don't.

- (5)
- a. I saw the child sit/\*be on the bench
  - b. \*He knew the answer over there.

- ▶ Kimian states (like ILPs) are temporally located.

- (6)
- a. The child was on the bench when I saw her.
  - b. He knew the answer last Wednesday.

- ▶ Some researchers (e.g. Gillian Ramchand) think this means that events as particulars must be temporally, but not spatiotemporally, located. Maienborn argues that Kimian states are not events.
- ▶ This may be partly a matter of terminological taste.

# Summary

- ▶ Many verbs (and other categories) can be analysed as denoting predicates of events. On such analyses, we talk as if there are events.
- ▶ Events are (spatio)temporal particulars.
- ▶ This explains their ability to antecede anaphora.
- ▶ More importantly, it allows a good analysis of adverbial modification (and a parallel analysis of adnominal modification).
- ▶ Other verbs may not denote properties of events (ILPs, Kimian states). The exact limit is still under discussion.