

## Introducing Events

### 1 Modifiers and entailments

Davidson (1967): why do sentences like (1a) entail any variant with (at least) one fewer adjunct?

- (1)
  - a. Jones buttered the toast slowly deliberately in the bathroom with a knife at 12am.
  - b. Jones buttered the toast slowly deliberately in the bathroom with a knife.
  - c. Jones buttered the toast slowly deliberately in the bathroom.
  - d. Jones buttered the toast slowly deliberately.
  - e. Jones buttered the toast slowly.
  - f. Jones buttered the toast.

The ‘Semantics 1’ analysis of (1f), which presumes a denotation for  $butter_V$  along the lines of (2a), is clearly a non-starter. But we already know that we need to deal with tense, so maybe assuming (2b) is enough?

- (2)
  - a.  $\llbracket butter_V \rrbracket = \lambda x \lambda y . y$  **buttered**  $x$
  - b.  $\llbracket butter_V \rrbracket = \lambda x \lambda y \lambda t . y$  **butter**  $x$  **at**  $t$

This would let us handle *at 12am*, assuming (3), but that’s it.

- (3)  $\llbracket 12am \rrbracket = \lambda f_{\langle i,t \rangle} \lambda t . f(t) \wedge t = \mathbf{12am}$

What about a world variable? We need something like that anyway to handle embedded clauses, modals, counterfactual conditionals, and so forth:

- (4)
  - a. Kim thinks that Jones buttered the toast.
  - b. Jones might have buttered the toast.
  - c. If Jones had buttered the toast, Smith would have been pleased.
- (5)
  - a.  $\llbracket butter_V \rrbracket = \lambda x \lambda y \lambda t \lambda w . y$  **butter**  $x$  **at**  $t$  **in**  $w$
  - b.  $\llbracket think \rrbracket = \lambda f_{\langle s,t \rangle} \lambda x \lambda t \lambda w . \forall w' \in W$  **think** $_{(x)(t)(w)}$ ,  $f(w') = 1$
  - c.  $\llbracket might_{epist} \rrbracket = \lambda f_{\langle s,t \rangle} . 1$  iff  $\exists w \in W_{EPIS}$  s.t.  $f(w) = 1$

This lets us handle modal adjuncts like *probably*, *likely* or *certainly*, and maybe even adverbs like *clearly*, but not the ones in (1). And unlike the adverbs in (1), modal adverbs don’t always have the same entailment patterns: (6a) doesn’t entail (6b), any more than (4b) does.

- (6)
  - a. Kim probably buttered the toast.
  - b. Kim buttered the toast.

This is expected if the denotation of (epistemic) *probably* is something similar to that of (epistemic) *might* in (5c), possibly with some probabilities thrown in to get the modal domain right.

So how do we capture the entailments in (1)? The first option is to just keep increasing the valence of our verbs and assume massive lexical polysemy, as in (7), and also introduce some meaning postulates which get the right entailments between sentences based on a verb of valence  $n$  and a variant of that verb of valence  $m < n$ . This approach is obviously not particularly explanatory.

- (7) a.  $\llbracket butter_{V-4} \rrbracket = \lambda x \lambda y \lambda t \lambda w . y$  **butter**  $x$  **at time**  $t$  **in world**  $w$   
 b.  $\llbracket butter_{V-5.1} \rrbracket = \lambda x \lambda y \lambda m \lambda t \lambda w . y$  **butter**  $x$  **in manner**  $m$  **at time**  $t$  **in world**  $w$   
 c.  $\llbracket butter_{V-5.2} \rrbracket = \lambda x \lambda y \lambda l \lambda t \lambda w . y$  **butter**  $x$  **in location**  $l$  **at time**  $t$  **in world**  $w$   
 d.  $\llbracket butter_{V-6.1} \rrbracket = \lambda x \lambda y \lambda l \lambda m \lambda t \lambda w . y$  **butter**  $x$  **in manner**  $m$  **in location**  $l$  **at time**  $t$  **in world**  $w$

The second option would be to start from the worst case, and assume a mechanisms for existentially binding unexpressed arguments.

- (8)  $\llbracket butter_V \rrbracket = \lambda x \lambda y \lambda i \lambda l \lambda m \lambda n \lambda t \lambda w . y$  **butter**  $x$  **with instrument**  $i$  **in location**  $l$  **in manner**  $m$  **with intention**  $n$  **at time**  $t$  **in world**  $w$

Davidson argues against this approach by claiming that we can add modifiers indefinitely, and we always get an entailment from  $[V \dots \text{mod}_n]$  to  $[V \dots \text{mod}_{m < n}]$ . This is a strong argument if this is correct, but is it? Not all modifier combinations are OK.

- (9) a. ??Jones buttered the toast slowly carefully in a circular motion happily.  
 b. Jones behaved \*(badly) towards Smith.

It is in fact logically possible that there are a finite number of modifier ‘slots’ associated with each verb (Cinque 1999), and a default strategy for interpreting structures where they go unsaturated. Getting this to work compositionally is non-trivial, but probably not impossible.

If Davidson is correct, however, then this option won’t work either. And even if there is a limit to the number of possible modifiers, it’s possible that the constraint is not semantic, but rather syntactic, so it is still worth considering an analysis that keeps valence under control.

Davidson: the pattern in (1) is the same as the pattern we see in complex descriptions of individuals, i.e., nominal modification: (10a-b) entail variants with fewer modifiers:

- (10) Jones is a doctor...  
 a. ... who I respect who I see frequently who has an office downtown ....  
 b. ... from NU with a small practice in a research group studying MS ....

Our semantics of nominals predicts this, since both nouns and their modifiers denote properties, or *descriptions of individuals*.

- (11) a.  $\lambda z . f(z) \wedge g(z) \wedge h(z)$   
 $\lambda x . f(x) \wedge g(x) \quad h_{\langle e, t \rangle}$   
 $f_{\langle e, t \rangle} \quad g_{\langle e, t \rangle}$   
 b.  $\exists y [f(y) \wedge g(y) \wedge h(y)] \Rightarrow \exists y [f(y) \wedge g(y)] \Rightarrow \exists y [f(y)]$

Davidson’s solution to (1) is to treat verbs and modifiers as *descriptions of events*. This gets us pretty far in dealing with (1).

- (12) a.  $\llbracket butter_V \rrbracket = \lambda x \lambda y \lambda e \lambda w . e$  **is an event of**  $y$  **buttering**  $x$  **in**  $w$   
 b.  $\llbracket at_{temp} \rrbracket = \lambda t \lambda e . e$  **occurs at**  $t$   
 c.  $\llbracket in_{loc} \rrbracket = \lambda l \lambda e . e$  **occurs in**  $l$   
 d.  $\llbracket with_{inst} \rrbracket = \lambda i \lambda e . i$  **is used to bring about**  $e$   
 e.  $\llbracket slowly \rrbracket = \lambda e . \text{speed}(e) \prec$  **the average speed for things like**  $e$   
 f.  $\llbracket deliberately \rrbracket = ???$   
 g.  $\llbracket PAST \rrbracket^{\langle t_u \dots \rangle} = \lambda e . \text{runtime}(e) \prec t_u$

- (13)  $\lambda e \lambda w. e$  is an event of Jones buttering the toast in  $w \wedge \text{speed}(e) < \text{the average speed for things like } e \wedge ??? \wedge e$  occurs in the bathroom  $\wedge$  a knife is used to bring about  $e \wedge e$  occurs at midnight

**NB:** Sentences, in Davidson's view, never denote particular events, but are rather (propositions based on) existential claims about events.

One kind of argument for this approach involves *excuses*, which show that the same event can be presented under distinct descriptions. Another kind of argument comes from nominalizations, which appear to involve reference to events.

## 2 Nominalizations

### 2.1 Vendler's taxonomy

Vendler (1967, ch. 5) makes a distinction between two types of nominalizations: *perfect* and *imperfect*. The initial distinction is a syntactic one, based on the distribution of tense, auxiliaries, negation, adverbs, prenominal adjectives, determiners and *of*-marked objects:

- (14) *'Imperfect' nominals*
- that John sings
  - John's singing the Marseillaise
  - John's not having sung
  - John's being able to sing
  - John's singing well
- (15) *'Perfect' nominals*
- the singing of the Marseillaise
  - the beautiful singing
  - John's singing of the Marseillaise
- (16)
- John's beautiful singing \*(of) the Marseillaise
  - John's being able to sing (\*(of) the Marseillaise
  - John's not having sung \*(of) the Marseillaise
  - \*the having sung
  - singing \*(of) the Marseillaise

Vendler points out that these differences follow if imperfect nominals are syntactically verbs, while perfect nominals are syntactically nouns. What is relevant to us is that the distinction has semantic consequences: perfect nominals denote events, imperfect nominals do not. This is shown by the fact that event modifying adjectives allow only perfect nominals:

- (17)
- John's beautiful singing of the Marseillaise was slow/fast/prolonged.
  - ??John's singing the Marseillaise was slow/fast/prolonged.
  - John's slow/fast/prolonged singing \*(of) the Marseillaise

Temporal prepositions only allow perfect nominals:

- (18)
- Everything was quiet until his singing \*(of) the Marseillaise.
  - The trouble started after his singing \*(of) the Marseillaise.

But note also:

- (19)
- Everything was quiet until he sang the Marseillaise.
  - The trouble started after he sang the Marseillaise.

Perception verbs only allow perfect nominals:

- (20) a. I heard the singing of the Marseillaise.  
b. I felt the trembling of the earth.  
c. I watched the execution of the criminal.
- (21) a. \*I heard John's singing the Marseillaise.  
b. \*I felt the earth's having trembled.  
c. \*I watched the criminal's being executed.

But:

- (22) a. I heard John singing the Marseillaise.  
b. I felt the earth tremble/trembling.  
c. I watched the criminal be executed.

On the other hand, some predicates allow only imperfect nominals, or at least prefer them:

- (23) a. That John has sung the Marseillaise is unlikely.  
b. John's having sung the Marseillaise is unlikely.  
c. John's having sung the Marseillaise beautifully is unlikely.
- (24) a. The singing of the Marseillaise is unlikely.  
b. ??John's singing of the Marseillaise is unlikely.  
c. ??John's beautiful singing of the Marseillaise is unlikely.

(24b-c) can be handled in terms of a conflict between the presuppositions of the nominal and the predicate. (24a) is more of a puzzle; perhaps it involves some sort of coercion?

**The bottom line:** It is unclear how to handle the differences between these nominals in a principled way without introducing events into our ontology.

- Imperfect nominals: type  $\langle s, t \rangle$ ?
- Perfect nominals: type  $\epsilon$

Specifically, we can analyze event nominalizations as structures in which the event argument of the predicate is bound by an  $\iota$ -operator or something along those lines.

## 2.2 Moltmann's objections and some responses

Moltmann (2006) calls the Davidsonian analysis of event nominalizations into question, pointing to the following set of problematic facts. In each case, however, I think there is a reasonable response.

1. Some adverbials do not appear to be predicates of the event introduced by the verb, but rather of a more complex event:

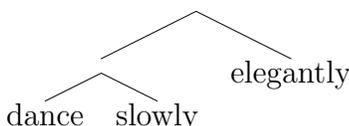
- (25) a. The ball suddenly rolled very quickly.  
b. John spoke very slowly with patience.  
c. Mary danced slowly very elegantly.

What is elegant in (25c) is Mary's dancing slowly, not (just) Mary's dancing. Similarly for the other examples.

Note, however, that we see the same effect in adjectival modifiers:

- (26) a. a tall short boy  
 b. a short tall boy

We do not conclude from this that *tall* and *short* do not denote properties of individuals, but rather that the kinds of properties they denote (they, like the adverbs in (25), are context-dependent) can be affected by the denotations of their complements.

- (27) a. 
- b.  $\lambda e.e$  is a dancing event  $\wedge$   
**speed**( $e$ )  $\prec$  **the average speed of things in**  $\{e' \mid \llbracket \text{dance} \rrbracket(e) = 1\}$   $\wedge$   
**elegance**( $e$ )  $\succ$  **the average elegance of things in**  $\{e'' \mid \llbracket \text{dance slowly} \rrbracket(e'') = 1\}$

2. Some adverbs can modify quantified predicates; compare (28a-b) with (29a-b), which are not (necessarily) equivalent.

- (28) a. John carefully eliminated every mistake.  
 b. John gracefully ate all the doughnuts.
- (29) a. John eliminated every mistake carefully.  
 b. John ate all the doughnuts gracefully.

Moltmann correctly points out that (30) does not adequately capture the truth conditions of (29a).

- (30)  $\exists e[\text{careful}(e) \wedge \forall x[\text{mistake}(x) \rightarrow \text{eliminate}(x)(\text{john})(e)]]$

Because the distributive quantifier triggers a shift in objects, and new objects means new events, there is no event that could possibly satisfy this description.

Moltmann forgets, however, that *every* (cf. *each*) can be interpreted collectively in English, even though it prefers a distributive interpretation:

- (31) a. John eliminated every mistake together/at once.  
 b. John eliminated all the mistakes together/at once.  
 c. ??John eliminated each mistake together/at once.

This indicates that (28a) can have truth conditions along the lines of (32).

- (32)  $\exists e[\text{careful}(e) \wedge \text{eliminate}(\iota x * .\text{mistake}(x*))(\text{john})(e)]$

(33), on the other hand, is correctly predicted to allow only a wide-scope interpretation of the quantifier.

- (33) John carefully eliminated each mistake.

3. Frequency adverbials, most naturally analyzed as quantifiers over events, can occur inside other frequency adverbials.

- (34) a. Last year John worked out only rarely.  
 b. Sometimes John works out only rarely.

Frequency adverbials may very well quantify over times (as well as events?), however.

- (35) a. Last year I was (still) a student.  
b. Sometimes I am a student; sometimes I am a professor.

4. Event nominalizations appear to allow reference to kinds of events; Davidson requires them to be particulars.

- (36) a. Laughter is rare.  
b. John's laughter is not very loud.

Are these really event nominalizations?

- (37) a. Quiet laughter is rare.  
b. ??Quiet laughing is rare.

- (38) a. John's quiet laughter is pleasant.  
b. John's quiet laughter didn't disturb me.

- (39) a. ??John's quiet laughing is pleasant.  
b. John's quiet laughing didn't disturb me.

It's not obvious that they are. This would be an interesting issue to investigate.

### 3 The logical form of action sentences

Perhaps the biggest question that follows from the initial hypothesis that a sentence like (1) conveys a description of an event, and the one that Davidson spends most of his time discussing (though not fully answering), concerns its logical form: what the right characterization of the truth conditions of such a sentence is, and how we get there from the syntactic representation.

- (40) a.  $\exists e[e \text{ is an event of Jones buttering the toast}]$   
b.  $\exists e[e \text{ is an event of buttering the toast and Jones is the agent of } e]$   
c.  $\exists e[e \text{ is an event of buttering and Jones is the agent of } e \text{ and the toast is the patient of } e]$   
d.  $\exists e, e'[e \text{ is an event of Jones doing something and } e' \text{ is an event of the toast becoming covered with butter and } e \text{ causes } e']$

What's at stake is the analysis of:

- the lexical semantics of verbs
- the syntax and compositional semantics of the extended verbal projection (the clause)
- argument alternations
- 'event composition' structures
- the semantics of adverbs
- interactions between verbs/clauses and other operators (quantifiers, modals, etc.)

A further question concerns how the analysis of these issues/phenomena interacts with two related but distinct features of verbal/clausal meaning: the nature of semantic roles and the

way they are related to syntactic positions, and the relation between clausal syntax/semantics and aspectual classification.

These are the issues that we will be addressing over the rest of the quarter. As we will see, questions about argument structure and semantic roles and questions about aspectual classification are interconnected. We will separate them out when we can, but in the end, we will be interested in how these two factors come together in the course of building up the meaning of the verbal projection, starting from the initial Davidsonian hypothesis that this projection is a description of an event.

A rough plan, then, for the next few weeks:

1. Event structure and aspectual classification
2. The neo-Davidsonian analysis of thematic roles
3. An alternative: thematic proto-roles
4. Telicity, incrementality, and argument structure
5. Measure of change
6. Resultatives
7. Quantification, plura(ctiona)lity, and the stage/individual distinction

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