

VP modification and Event Semantics

1. Why Event Semantics?

1.1. Compare VP modification with from NP modification

- Unlike predicative NP modifiers, VP modifiers cannot be defined as predicates.
 - (1) a. Kitty is a gray cat. \Rightarrow Kitty is gray.
b. John ran fast. $\not\Rightarrow$??John was fast.
c. John punched strongly. $\not\Rightarrow$ John was strong.
d. John is calling from China. $\not\Rightarrow$ John is from China.
- Recall: we define modified NP as the intersection/generalized conjunction of the modifiers and the modified NP. This treatment captures the following equivalence:
 - (2) Kitty is a happy gray cat. \Leftrightarrow Kitty is a cat &
Kitty is gray &
Kitty is happy.

However, such an equivalence is observed with VP modification. Compare:

- (3) a. Brutus attacked Caesar in the back with the knife.
b. Brutus attacked Caesar in the back & Brutus attacked Caesar with the knife.

While (3a) entails (3b), (3b) doesn't entail (3a). For example, only (3b) is true if Brutus attacked Caesar twice — B punched C in the front and stabbed C in C's back with the knife.

1.2. Adding event variables

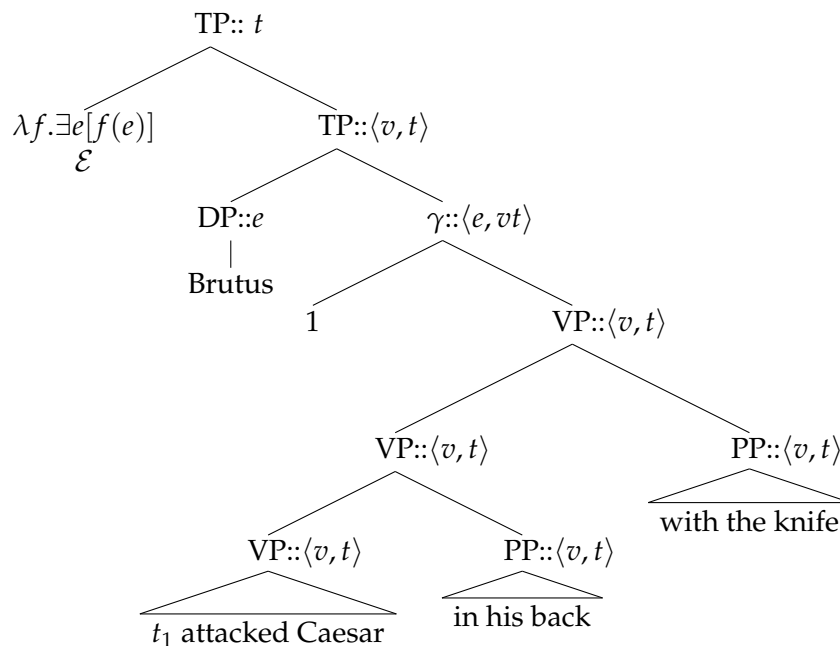
- Davidson (1967): We introduce an event argument e (of type v) which undergoes \exists -closure as part of the semantic composition.
 - (4) Brutus attacked Caesar.
 $\exists e[\text{attack}(e, b, c) \wedge \tau(e) \subseteq t_{\text{PAST}}]$
(There is an event e such that e is an attacking of Caesar by Brutus, and that the temporal trace of e is included in t_{PAST} .) [The function τ maps an event d into the temporal trace of e , i.e. the time interval throughout which e lasts. t_{PAST} is a contextually determined past interval of type i .]
- Two ways to define a verb in Davidson's Event Semantics:
 - (5) a. $\llbracket \text{attack} \rrbracket = \lambda y \lambda x \lambda e. \text{attack}(x, y, e)$
b. $\llbracket \text{attack} \rrbracket = \lambda y \lambda x \lambda e [\text{attack}(e) \wedge \text{THEME}(e) = y \wedge \text{AGENT}(e) = x]$
- VP-modifiers are treated as predicates of events (of type $\langle v, t \rangle$) (cf. VP-modifiers are treated as predicates of entities). VP-modification is modeled as intersections/conjunctions.

- (6) a. $\llbracket \text{in his back} \rrbracket = \lambda e. \text{LOC}(e, \text{his-back})$
 b. $\llbracket \text{with the knife} \rrbracket = \lambda e. \text{INST}(e, \text{the-knife})$
- (7) a. Brutus attacked Caesar in his back.
 $\exists e[\text{attack}(e, b, c) \wedge \text{LOC}(e, \text{C'-back}) \wedge \tau(e) \subseteq t_{\text{PAST}}]$
 b. Brutus attacked Caesar with the knife.
 $\exists e[\text{attack}(e, b, c) \wedge \text{INST}(e, \text{the-knife}) \wedge \tau(e) \subseteq t_{\text{PAST}}]$
 c. Brutus attacked Caesar in his back with the knife.
 $\exists e[\text{attack}(e, b, c) \wedge \text{LOC}(e, \text{C'-back}) \wedge \text{INST}(e, \text{the-knife}) \wedge \tau(e) \subseteq t_{\text{PAST}}]$

Discussion: Do you see how the interpretations in (6) captures the asymmetry between (3a-b)?

- In the composition, VP-adjuncts combine with the modified VP via **Predicate Modification**. The meaning of a sentence is thus a set of events. To close off the event, we finally introduce an \mathcal{E} -closure operator (or alternatively, use a type-shifting rule that introduces a existential-closure). [Details of tense are ignored.]

- (8) Brutus attacked Caesar in his back with the knife.



Discussion: In the above composition, it is crucial to assume the VP-internal subject hypothesis. Do you see why?

1.3. Other consequences

- Adverbs can be analyzed as predicates of events; they ascribe properties to events.

- (9) a. John left quickly. \Rightarrow There was something quick.
 i. $\llbracket \text{quickly} \rrbracket = \lambda e_v. \text{quick}(e)$
 ii. $\exists e[\text{left}(e, j) \wedge \text{quick}(e) \wedge \tau(e) \subseteq t_{\text{PAST}}]$

- b. Brutus attacked Caesar violently. \Rightarrow There was something violent.
 - i. $\llbracket \text{violently} \rrbracket = \lambda e_v. \text{violent}(e)$
 - ii. $\exists e[\text{attack}(e, b, c) \wedge \text{violent}(e) \wedge \tau(e) \subseteq t_{\text{PAST}}]$
- c. Fred announced the news happily. \Rightarrow Someone was happy.
 - i. $\llbracket \text{happily} \rrbracket = \lambda e_v. \text{happy}(\text{AGENT}(e))$
 - ii. $\exists e[\text{announce}(e, f, \text{the-news}) \wedge \text{happy}(\text{AGENT}(e)) \wedge \tau(e) \subseteq t_{\text{PAST}}]$

- A perceptual predicate takes an event variable as its argument. (Higginbotham 1983)

(10) John saw Mary leave.
 \Rightarrow Mary left.

(11) $\exists e \exists e'[\text{saw}(e, j, e') \wedge \text{leave}(e', m) \wedge \tau(e') \subseteq \tau(e) \subseteq t_{\text{PAST}}]$
 $\Rightarrow \exists e'[\text{saw}(e, j, e') \wedge \text{leave}(e', m) \wedge \tau(e') \subseteq t_{\text{PAST}}]$

2. The Neo-Davidsonian turn

- In **Neo-Davidsonian Event Semantics** (Castañeda 1967; Parsons 1990; a.o.), the event variable is the only argument of the verb.

(12) $\llbracket \text{attack} \rrbracket = \lambda e_v. \text{attack}(e)$

The relationship between this event and syntactic arguments of the verb is expressed by a small number of semantic relations called **thematic roles** (e.g., *agent, theme, experiencer, instrument, beneficiary, ...*).¹ These thematic roles are the semantic correspondents of **theta roles**.

- (13) a. Syntax:
 $\text{DP} \rightarrow \theta \text{ DP}$
- b. Lexicon:
 $\theta \rightarrow [\text{AGENT}], [\text{THEME}], [\text{EXPERIENCER}], \dots$
- c. Interpretations:
- i. $\llbracket [\text{AGENT}] \rrbracket = \lambda x_e \lambda e_v. \text{AGENT}(e) = x$
 - ii. $\llbracket [\text{THEME}] \rrbracket = \lambda x_e \lambda e_v. \text{THEME}(e) = x$
 - iii. ...

NB: It is also commonly assumed that each event has at most one agent, at most one theme, and so on — **The unique role requirement** (Carlson 1984; Parsons 1990; Landman 2000; compare Krifka 1992). As such, thematic roles are represented as partial functions. (E.g. (13c-i) is defined only if $\text{AGENT}(e)$ is unique.)

- As such, in Neo-Davidsonian event semantics, there is no fundamental semantic distinction between syntactic arguments (i.e., the subject/object of a verb) and syntactic adjuncts. As such, we can capture semantic entailment relations between different syntactic subcategorization frames of the same verb, such as *causatives* and the corresponding *intransitives*. (Parsons 1990)

(14) Mary felled the tree. \Rightarrow The tree fell.
 $\exists e[\text{fall}(e) \wedge \text{AGENT}(e, m) \wedge \text{THEME}(e, \text{the-tree})] \Rightarrow \exists e[\text{fall}(e) \wedge \text{THEME}(e, \text{the-tree})]$

¹Currently, there is no consensus on the inventory of thematic roles.

- We can also treat prepositions as theta role heads.

(15) Brutus attacked Caesar **with** the knife.

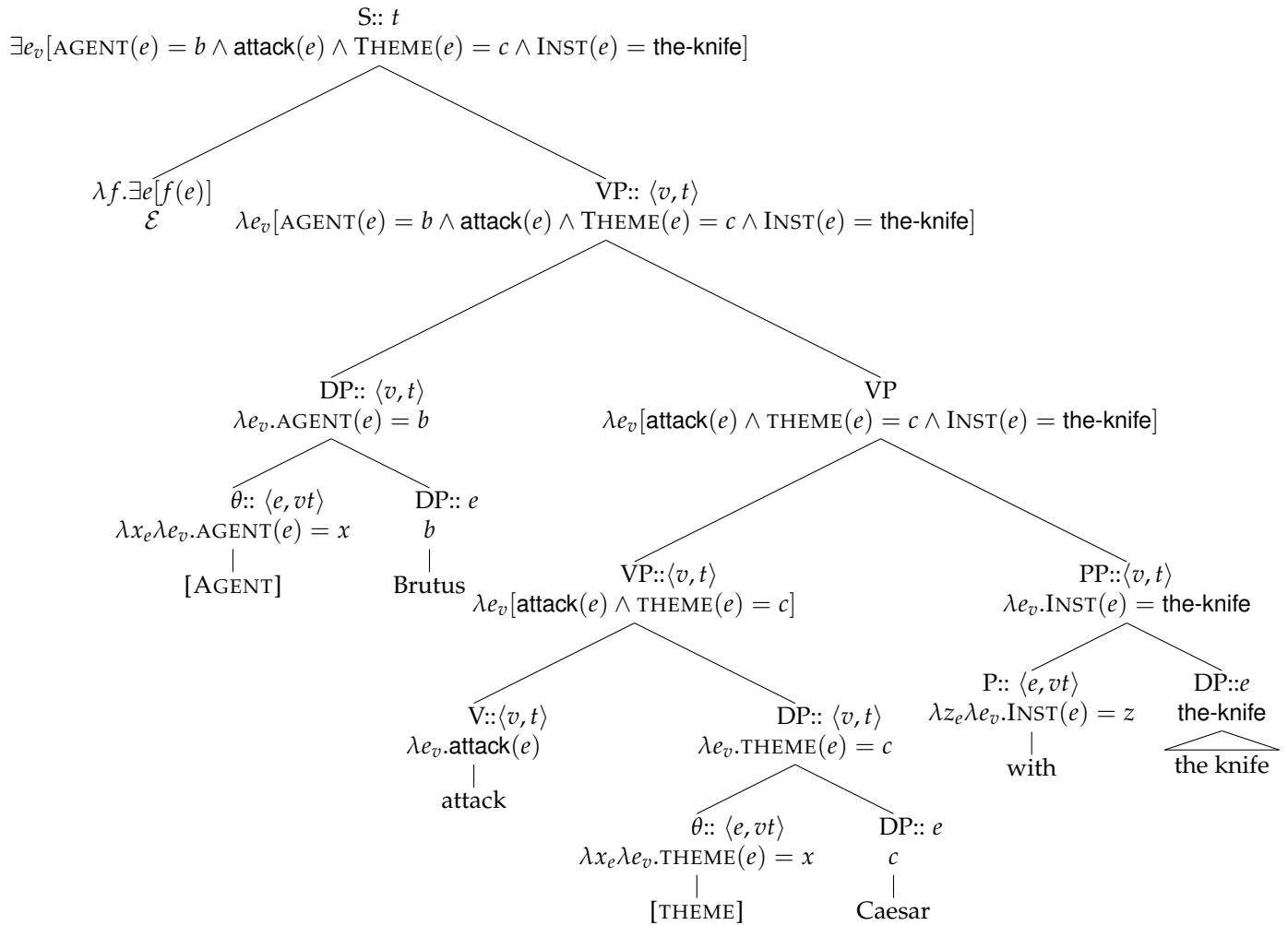
$$\llbracket \text{with} \rrbracket = \lambda x_e \lambda e_v. \text{INST}(e) = x$$

(16) Jane gave the ball **to** Mary.

$$\llbracket \text{to} \rrbracket = \lambda x_e \lambda e_v. \text{RECIPIENT}(e) = x$$

- Composition:

(17) Brutus attacked Caesar with the knife.



Exercise: Compose the following sentences following Neo-Davidsonian Event Semantics.

- (18) a. Jane gave the ball to Mary.
 b. Jane gave Mary the ball.

3. The asymmetric view

- Internal arguments (themes) closely linked to verbs; they can trigger a non-idiomatic interpretation of a verb, while very few or no instances of external arguments can do so (Marantz 1984).

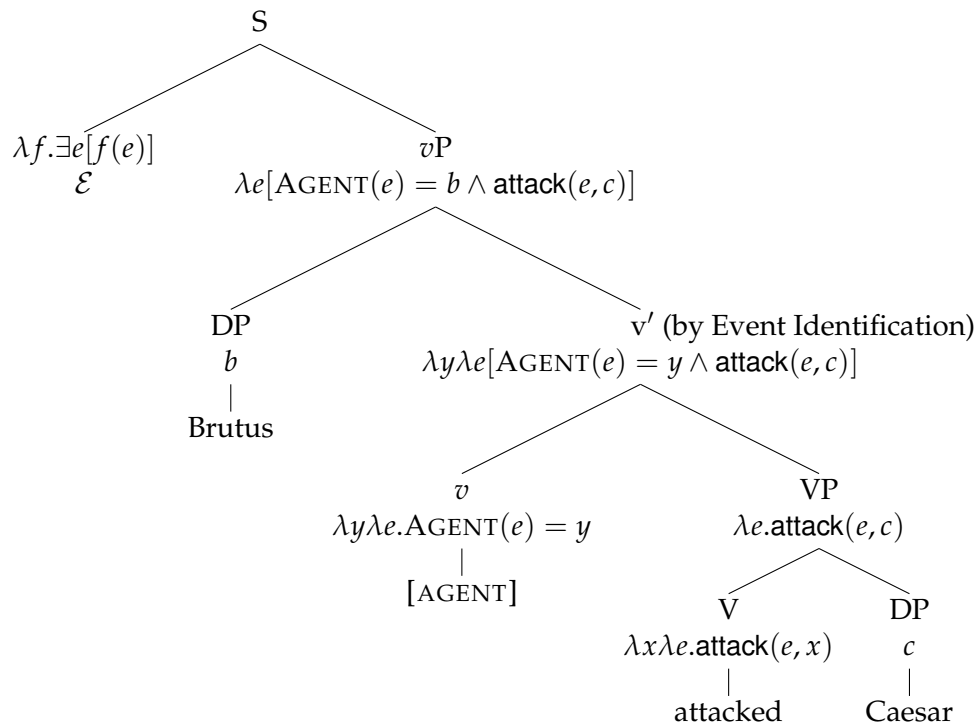
- | | |
|--|--|
| <p>(19) a. throw support behind a candidate
 b. throw a party
 c. throw a fit
 d. throw a baseball</p> | <p>(20) a. kill a cockroach
 b. kill a conversation
 c. kill an evening watching TV
 d. kill a bottle (i.e., empty it)</p> |
|--|--|

- As such, Kratzer (1995, 2000) makes the following assumptions:
 - internal arguments (viz., themes) are true arguments of the verb;
 - external arguments (viz., agents) are introduced by little-v;
 - little-v combines with VP via a new composition rule — *Event Identification*.

(21) **Event Identification**

$[[X Y]] = \lambda y \lambda e [[X](e, y) \wedge [Y](e)]$, when defined

(22) Brutus attacked Caesar.



4. Quantification and negation in Event Semantics

- Some observations:

– Negation takes scope over the existential event closure. (Krifka 1989)

(23) John didn't run.

- $\llbracket \text{run} \rrbracket = \lambda e_v. \text{run}(e)$
- $\llbracket \text{not run} \rrbracket = \lambda e_v. \neg \text{run}(e) ??$
- $\llbracket \llbracket \text{AGENT} \rrbracket \llbracket \text{John} \rrbracket \text{not run} \rrbracket = \lambda e_v [\text{AGENT}(e) = j \wedge \neg \text{run}(e)] ??$

– Quantifiers also always take scope over the existential event closure. (Landman 2000)

(24) Exactly one dog barked.

- $\exists! x [\text{dog}(x) \wedge \exists e [\text{AGENT}(e) = x \wedge \text{bark}(e)]]$
- $\# \exists e \exists! x [\text{dog}(x) \wedge \text{AGENT}(e) = x \wedge \text{bark}(e)]$

(25) Every dog barked.

- $\forall x [\text{dog}(x) \rightarrow \exists e [\text{AGENT}(e) = x \wedge \text{bark}(e)]]$
- $\# \exists e \forall x [\text{dog}(x) \rightarrow [\text{AGENT}(e) = x \wedge \text{bark}(e)]]$

- Champollion's (2015) solution for (23):

– the \mathcal{E} -closure of events is encoded within the lexicon of a verb; in other words, verbs are existential generalized quantifiers over events.

(26) $\llbracket \text{run} \rrbracket = \lambda f_{\langle v,t \rangle}. \exists e [f(e) \wedge \text{run}(e)]$

– θ -heads and VP-adjuncts are higher-typed modifiers; they combine with a syntactic argument (of type e) and then a verb (of type $\langle vt, t \rangle$).

(27) a. $\llbracket \llbracket \text{AGENT} \rrbracket \rrbracket = \lambda x_e \lambda V_{\langle vt,t \rangle} \lambda f_{\langle v,t \rangle}. V(\lambda e_v [\text{AGENT}(e) = x \wedge f(e)])$
 b. $\llbracket \llbracket \text{AGENT} \rrbracket \rrbracket (\llbracket \text{John} \rrbracket) = \lambda V_{\langle vt,t \rangle} \lambda f_{\langle v,t \rangle}. V(\lambda e_v [\text{AGENT}(e) = j \wedge f(e)])$
 c. $(\llbracket \llbracket \text{AGENT} \rrbracket \rrbracket) (\llbracket \text{John} \rrbracket) (\llbracket \text{run} \rrbracket) = \lambda f_{\langle v,t \rangle}. \exists e_v [\text{AGENT}(e) = j \wedge \text{run}(e) \wedge f(e)]$

– The events are closed off by a STOP-closure

(28) a. $\llbracket \text{STOP} \rrbracket = \lambda e_v. \text{TRUE}$
 b. $\exists e_v [\text{AGENT}(e) = j \wedge \text{run}(e) \wedge \text{TRUE}]$
 $= \exists e_v [\text{AGENT}(e) = j \wedge \text{run}(e)]$

– Negation has to adjoin to sentential nodes (of type t) (i.e., after applying the STOP-closure)

Exercise [read Coppock & Champollion chapter 12]: Compose the following sentence following standard Neo-Davidsonian approach and following Champollion's approach. Consider, what reading(s) can be generated if we assume QR with *no dog*? what reading(s) can be generated if we assume object raising with [AGENT]?

(29) No dog barked.