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.
$\exists e[\mathsf{attack}(e, b, c) \wedge \tau(e) \subseteq t_{\text{PAST}}]$
(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. $[\![\mathsf{attack}]\!] = \lambda y \lambda x \lambda e.\mathsf{attack}(x, y, e)$
  b. $[\![\mathsf{attack}]\!] = \lambda y \lambda x \lambda e[\mathsf{attack}(e) \wedge \text{THEME}(e) = y \wedge \text{AGENT}(e) = x]$

- 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. $[\![\text{in his back}]\!] = \lambda e.\text{LOC}(e, \textsf{his-back})$

b. $[\![\text{with the knife}]\!] = \lambda e.\text{INST}(e, \textsf{the-knife})$

(7) a. Brutus attacked Caesar in his back.
$\exists e[\textsf{attack}(e, b, c) \wedge \text{LOC}(e, \textsf{C'-back}) \wedge \tau(e) \subseteq t_{\text{PAST}}]$

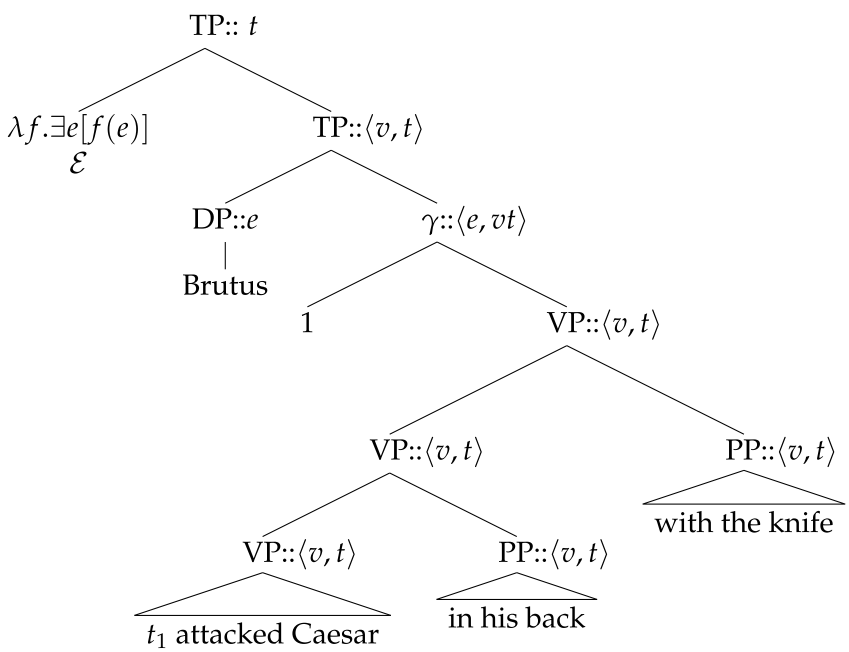
b. Brutus attacked Caesar with the knife.
$\exists e[\textsf{attack}(e, b, c) \wedge \text{INST}(e, \textsf{the-knife}) \wedge \tau(e) \subseteq t_{\text{PAST}}]$

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

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. $[\![\text{quickly}]\!] = \lambda e_v.\textsf{quick}(e)$

ii. $\exists e[\textsf{left}(e, j) \wedge \textsf{quick}(e) \wedge \tau(e) \subseteq t_{\text{PAST}}]$

b. Brutus attacked Caesar violently. $\Rightarrow$ There was something violent.

i. $[\![\text{violently}]\!] = \lambda e_v.\textsf{violent}(e)$

ii. $\exists e[\textsf{attack}(e, b, c) \wedge \textsf{violent}(e) \wedge \tau(e) \subseteq t_{\text{PAST}}]$

c. Fred announced the news happily. $\Rightarrow$ Someone was happy.

i. $[\![\text{happily}]\!] = \lambda e_v.\textsf{happy}(\textsc{Agent}(e))$

ii. $\exists e[\textsf{announce}(e, f, \textsf{the-news}) \wedge \textsf{happy}(\textsc{Agent}(e)) \wedge \tau(e) \subseteq t_{\text{PAST}}]$

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

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

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

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) $[\![\text{attack}]\!] = \lambda e_v.\textsf{attack}(e)$

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:
DP $\rightarrow \theta$ DP

b. Lexicon:
$\theta \rightarrow$ [AGENT], [THEME], [EXPERIENCER], ...

c. Interpretations:

i. $[\![[\textsc{Agent}]]\!] = \lambda x_e \lambda e_v.\textsc{Agent}(e) = x$

ii. $[\![[\textsc{Theme}]]\!] = \lambda x_e \lambda e_v.\textsc{Theme}(e) = x$

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 $\textsc{Agent}(e)$ 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.
$\exists e[\textsf{fall}(e) \wedge \textsc{Agent}(e, m) \wedge \textsc{Theme}(e, \textsf{the-tree})] \Rightarrow \exists e[\textsf{fall}(e) \wedge \textsc{Theme}(e, \textsf{the-tree})]$

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

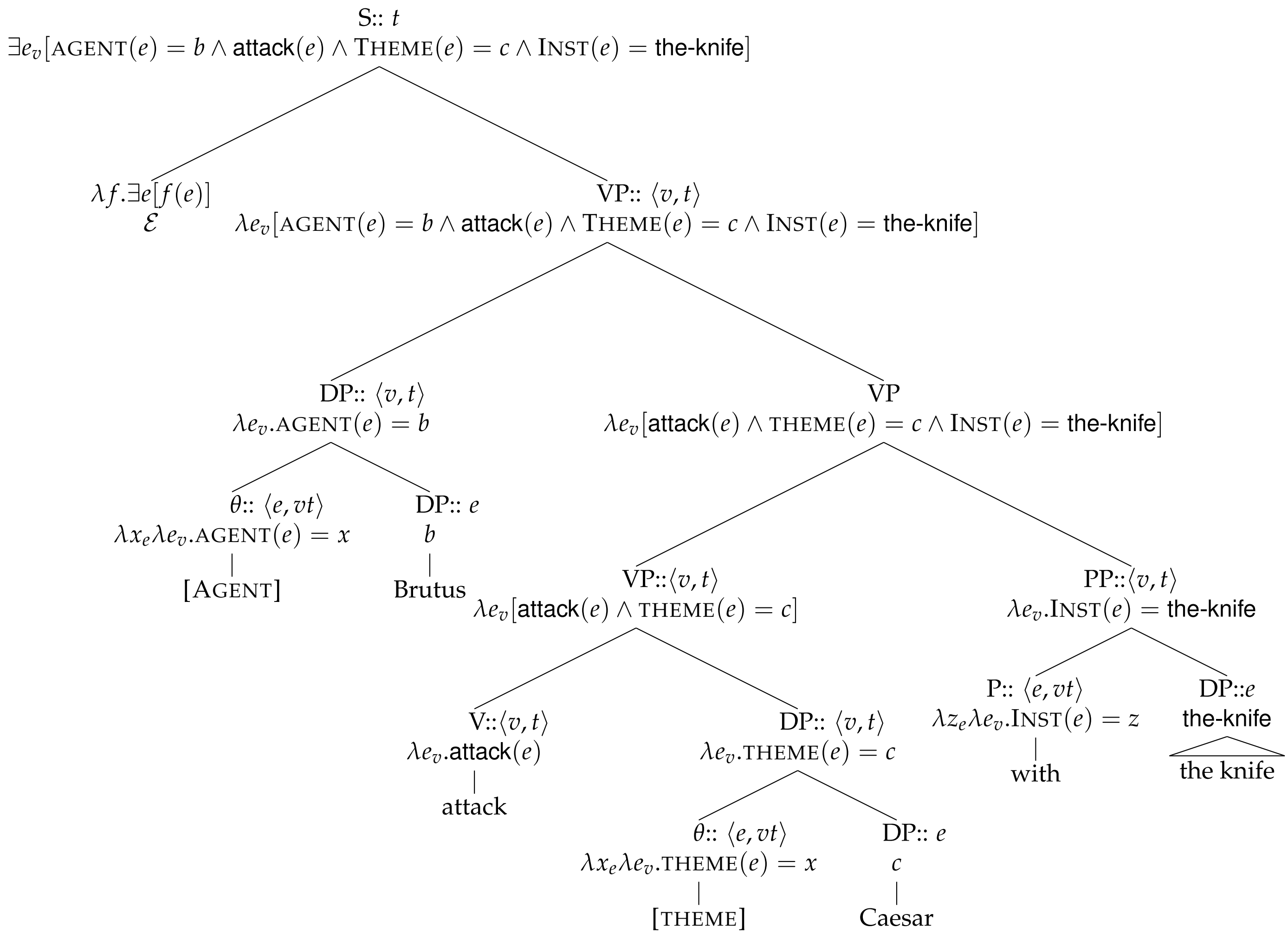
- We can also treat prepositions as theta role heads.

(15) Brutus attacked Caesar **with** the knife.
$[\![\text{with}]\!] = \lambda x_e \lambda e_v.\textsc{Inst}(e) = x$

(16) Jane gave the ball **to** Mary.
$[\![\text{to}]\!] = \lambda x_e \lambda e_v.\textsc{Recipient}(e) = x$

- 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).

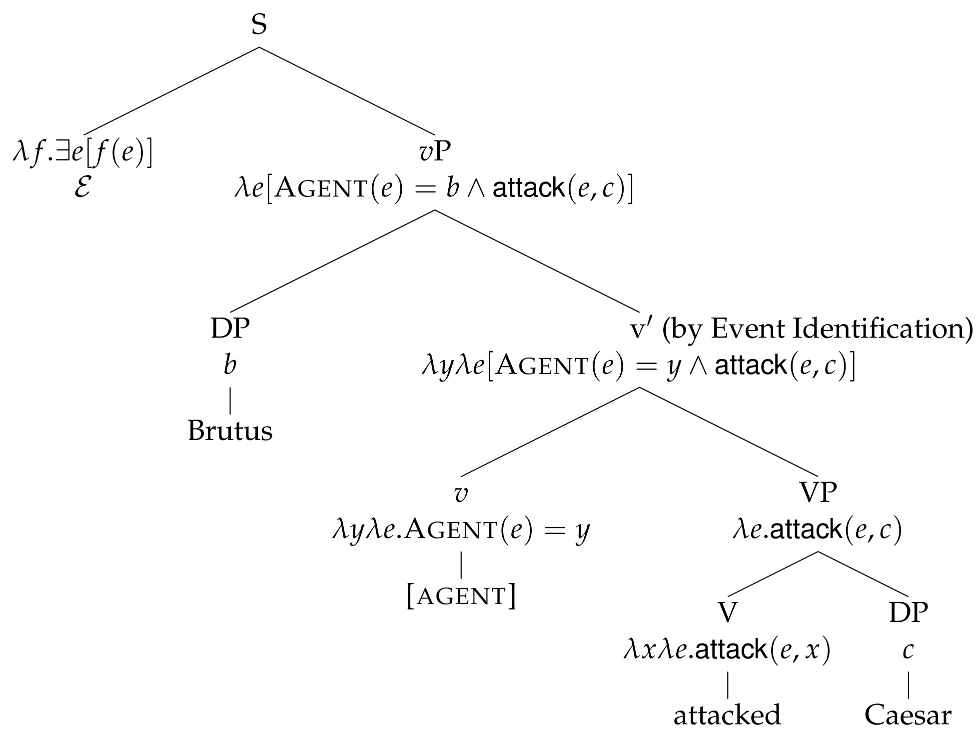
(19)
  a. throw support behind a candidate
  b. throw a party
  c. throw a fit
  d. throw a baseball

(20)
  a. kill a cockroach
  b. kill a conversation
  c. kill an evening watching TV
  d. kill a bottle (i.e., empty it)

- 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**
$[\![\text{X Y}]\!] = \lambda y \lambda e[[\![\text{X}]\!](e, y) \wedge [\![\text{Y}]\!](e)]$, 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.
   a. $[\![\text{run}]\!] = \lambda e_v.\mathsf{run}(e)$
   b. $[\![\text{not run}]\!] = \lambda e_v.\neg\mathsf{run}(e)$??
   c. $[\![$[[AGENT] [John]] not run$]\!] = \lambda e_v[\textsc{agent}(e) = j \wedge \neg\mathsf{run}(e)]$??

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

(24) Exactly one dog barked.
   a. $\exists! x[\mathsf{dog}(x) \wedge \exists e[\text{AGENT}(e) = x \wedge \mathsf{bark}(e)]]$
   b. # $\exists e \exists! x[\mathsf{dog}(x) \wedge \text{AGENT}(e) = x \wedge \mathsf{bark}(e)]$

(25) Every dog barked.
   a. $\forall x[\mathsf{dog}(x) \rightarrow \exists e[\text{AGENT}(e) = x \wedge \mathsf{bark}(e)]]$
   b. # $\exists e \forall x[\mathsf{dog}(x) \rightarrow [\text{AGENT}(e) = x \wedge \mathsf{bark}(e)]]$

- 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) $[\![\text{run}]\!] = \lambda f_{\langle v,t\rangle}.\exists e[f(e) \wedge \mathsf{run}(e)]$

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

  – The events are closed off by a STOP-closure

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

  – 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.