A Little Bit on Adverbs and Events

1.   From Adjectives to Adverbs to Events

We've developed a theory of the semantics of adjectives, under which they denote either functions of type <et> or of type <et,et>.

(1)   **The Lexical Semantics of Intersective and Subsective Adjectives**

      a.   <u>Intersective Adjectives (Type <et>):</u>   [[male]]   =   [λx_e : <u>x is male</u>]

      b.   <u>Subsective Adjectives (Type <et,et>):</u>
              [[young]]   =   [$\lambda f_{<et>}$: [λx_e : <u>f(x) = T and</u>
                                                      <u>x is below the average age for { y : f(y) = T }]</u>

Of course, adjectives aren't the only kind of modifier in natural language…
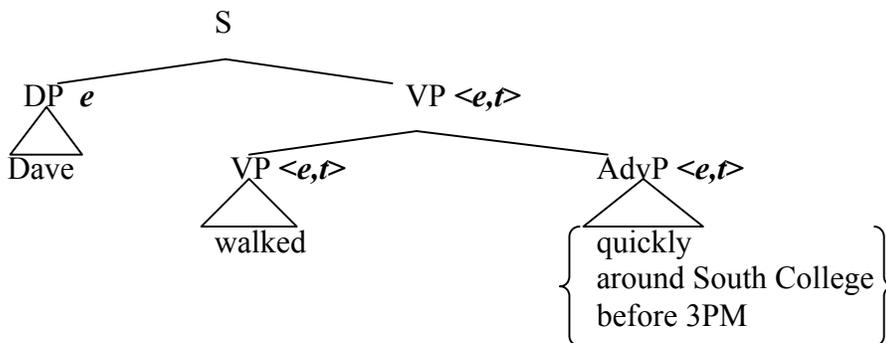   There are also **adverbs**, which modify VPs…

(2)   **Adverbial Modifiers**

      a.   [Dave [walked **quickly**]]
      b.   [Dave [walked **around South College**]]
      c.   [Dave [walked **before 3PM**]]

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(3)   **Initial Observation**
      If we assume adverbs to also be of type <et>, then we could interpret sentences like those in (2) via Predicate Modification.

(4)   **Immediate Question:**   What should be the <e,t> denotation of these adverbs?

      a.   [[quickly]]   =   [λx_e : <u>x is quick</u>]
      b.   [[around South College]]   =   [λx_e : <u>x is around South College</u>]
      c.   [[before 3PM]]   =   [λx_e : <u>x is before 3PM</u>]

(5)   **Immediate Problem:**
        If we assume the lexical entries in (4), then interpreting the structure in (3) via PM will
        yield truth-conditions that *don't sound quite right*.

        a.   [[Dave walked **quickly**]] = T *iff* Dave walked and Dave is quick.   [not bad]

        b.   [[Dave walked **around South College**]] = T *iff*
                        Dave walked and Dave is around South College.   [erm…]

        c.   [[Dave walked **before 3PM**]] = T *iff*
                        Dave walked and Dave is before 3PM.   [this is insane]

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(6)   **What's Going Wrong Here? (Davidson 1967)**

- In sentences like those in (2), it isn't *Dave* that is 'quick', 'around South College' or 'before 3PM'.

- Rather, it's **his walking** that is 'quick', 'around South College', 'before 3PM'.

- Or, to put a slightly different spin on it, it's **the event of Dave walking** that is 'quick', 'around South College', 'before 3PM'.

Ever since the work of Davidson (1967), philosophers and linguists have found the following
core hypotheses to be extremely productive:

(7)   **Core Hypotheses Behind Event Semantics**

        a.   Sentences are predicates of *events* (a new semantic type, different from *e* or *t*)

        b.   Adverbs are also predicates of events

        c.   Adverbs semantically modify the event that is described by the sentence

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*We'll now work towards implementing these core hypotheses using the tools already at our
disposal!...*

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2.   Basic Implementation of Event Semantics

(8)   **Expanding Our Semantic Types**

- In addition to the types e and t, we will have the type ε, for events.
- Consequently, the domain of a function can be D_ε (the set of all events)

(9)   **The Semantics of Adverbs**

As previewed above (7b), we'll view adverbs as denoting predicates of events.
- That is, the extension of an adverb is a function of type $\langle \varepsilon, t \rangle$

a.   [[quickly]]   =   [λe_ε : e is quick]

b.   [[around South College]]   =   [λe_ε : e is around South College]

c.   [[before 3PM]]   =   [λe_ε : e is before 3PM]

(10)   **The Semantics of Intransitive Verbs**

As previewed above (7a), a sentence should also end up being of type $\langle \varepsilon, t \rangle$
- Therefore, an intransitive verb like *walks* should be of type $\langle e, \langle \varepsilon, t \rangle \rangle$

[[walked]]   =   [λx_e : [λe_ε : e is an event of walking and x is the agent of e]]

- Note: The 'agent' of an event is the 'doer', the thing that brings the event about.
             (You may have discussed such 'theta roles' in LING 401)

(11)   **Problem: Type Mismatch in Modified VP**

If intransitive Vs like *walk* are type $\langle e, \langle \varepsilon, t \rangle \rangle$ and adverbs are type $\langle \varepsilon, t \rangle$, then:
- Their meanings cannot be combined via Function Application
- Their meanings cannot be combined via Predicate Modification
- **We need a new rule!**
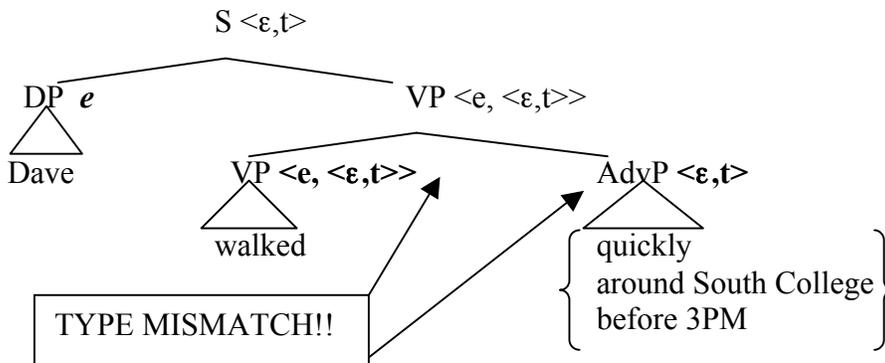
(12)   **Solution: The Rule of Event Identification (EI)**

If XP has two daughters, YP and ZP, [[YP]] $\in D_{\langle e, \langle \varepsilon, t \rangle \rangle}$, and [[ZP]] $\in D_{\langle \varepsilon, t \rangle}$, then

[[XP]]   =   [λy_e : [λe_ε : [[YP]](y)(e) = T and [[XP]](e) = T]]

(13)   **Illustration of Event Identification**

    a.   [[walked quickly]]   =   (by EI)

    b. $[\ \lambda y_e : [\ \lambda e_\varepsilon : \underline{[[walked]](y)(e) = T \text{ and } [[quickly]](e) = T}\ ]\ ]$ =   (by TN)

    c. $[\ \lambda y_e : [\ \lambda e_\varepsilon :$

         $\underline{[\ \lambda x_e : [\ \lambda e_\varepsilon : e \text{ is an event of walking and } x \text{ is the agent of } e\ ]\ ](y)(e) = T} \text{ and}$
         $\underline{[[quickly]](e) = T}\ ]\ ]$

                                                              =   (by LC)

    d. $[\ \lambda y_e : [\ \lambda e_\varepsilon : \underline{e \text{ is an event of walking and } y \text{ is the agent of } e}$
            $\underline{\text{and } [[quickly]](e) = T}\ ]\ ]$ =   (by TN)

    e. $[\ \lambda y_e : [\ \lambda e_\varepsilon : \underline{e \text{ is an event of walking and } y \text{ is the agent of } e}$
            $\underline{\text{and } [\ \lambda e_\varepsilon : e \text{ is quick }](e) = T}\ ]\ ]$ =   (by LC)

    f. $[\ \lambda y_e : [\ \lambda e_\varepsilon : \underline{e \text{ is an event of walking and } y \text{ is the agent of } e \text{ and } e \text{ is quick}}\ ]\ ]$

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(14)   **Major Semantic Predictions**

    a.   [[[ₛ Dave walked]]]   =   (by FA)

         $[\ \lambda e_\varepsilon : \underline{e \text{ is an event of walking and Dave is the agent of } e}\ ]$

    b.   [[[ₛ Dave [ᵥₚ walked quickly]]]]   =   (by EI and FA)

         $[\ \lambda e_\varepsilon : \underline{e \text{ is an event of walking and Dave is the agent of } e \textbf{ and } e \textbf{ is quick}}\ ]$

    c.   [[[ₛ Dave [ᵥₚ walked [before 3PM]]]]]   =   (by EI and FA)

         $[\ \lambda e_\varepsilon : \underline{e \text{ is an event of walking and Dave is the agent of } e \textbf{ and } e \textbf{ is before 3PM}}\ ]$

    d.   [[[ₛ Dave [ᵥₚ walked [around South College]]]]] =   (by EI and FA)

     $[\ \lambda e_\varepsilon : \underline{e \text{ is an event of walking and Dave is the agent of } e\ \textbf{ and } e \textbf{ is around South College}}\ ]$

2.   Introducing Event Quantification

(15)   **A Problem with the Types of Sentences**

To make all these proposals work with the rest of our semantics, we need to arrange things so that (complete) sentences come out being type *t* again (and not type $<\varepsilon,t>$)

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(16)   **A Possible Solution**

- We could imagine that sitting right above the subject in the sentence is *some kind of phonologically empty thingy*.

- If this 'phonologically empty thingy' were of type $<<\varepsilon,t>, t>$, then it could take the rest of the sentence as argument, and deliver a Truth-value as the extension of the complete sentence!

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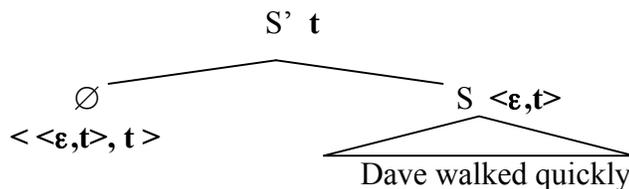
(17)   **Obvious Follow Up Question**
But what would this phonologically null thingy actually mean? What would it denote??

- To develop an answer, let's lay out some assumptions regarding the truth-conditions of sentences like the ones in (2).

(18)   **Assumptions Regarding the Truth-Conditions of the Sentences in (2)**

a.   [[∅ Dave walked quickly]] = T *iff*
         There is an event e such that e is an event of walking and Dave is the agent of e and e is quick.

b.   [[∅ Dave walked around South College]] = T *iff*
         There is an event e such that e is an event of walking and Dave is the agent of e and e is around South College.

c.   [[∅ Dave walked before 3PM]] = T *iff*
         There is an event e such that e is an event of walking and Dave is the agent of e and e is before 3PM.

With these truth-conditions, and the assumption that ∅ is of type $<<\varepsilon,t> t>$, we can deduce [[∅]]

(19)   **Deducing the Extension of '∅'**

- By (18a), we assume that:

    [[∅ Dave walked quickly]] = T *iff*

        There is an event e such that e is an event of walking and Dave is the
        agent of e and e is quick.

- Therefore, by FA and the assumed types, we know that:

    [[∅]]([[Dave walked quickly]]) = T *iff*

        There is an event e such that e is an event of walking and Dave is the
        agent of e and e is quick.

- Therefore, by (14b), we know that:

    [[∅]]([λe_ε: <u>e is an event of walking and Dave is the agent of e and e is quick</u>]) = T *iff*

        There is an event e such that e is an event of walking and Dave is the
        agent of e and e is quick.

- Therefore, by the 'cool trick' with our notation, we know that:

    [[∅]]([λe_ε: <u>e is an event of walking and Dave is the agent of e and e is quick</u>]) = T *iff*

        There is an event e such that
        [λe_ε: <u>e is an event of walking and Dave is the agent of e and e is quick</u>](e) = T

- Therefore, [[∅]] takes as argument a function *P* from events to truth-values, and
  returns T *iff*
        There is an event e such that P(e) = T

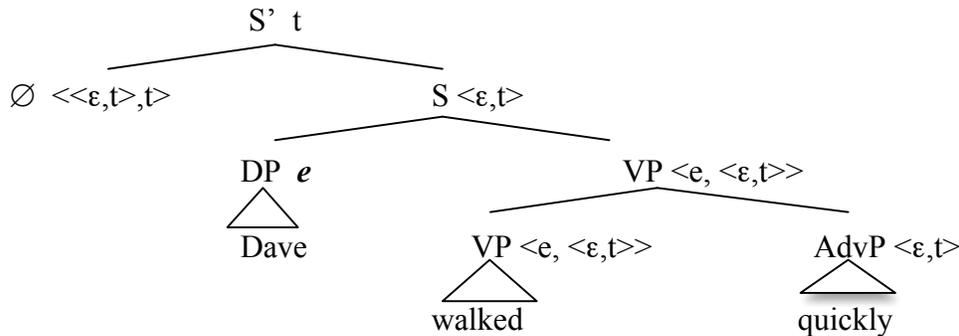(20)   **The Deduced Semantics**

    [[∅]]   =   [$\lambda P_{<\varepsilon, t>}$: <u>there is an event e such that P(e) = T</u>]

(21)   **Illustration**

    a.   <u>Sentence:</u>   Dave walked quickly.

    b.   <u>Syntax:</u>

```
                    S'  t
         _____/_____
        /                          \
  ∅  <<ε,t>,t>                    S <ε,t>
                        _____/_____
                       /                          \
                    DP  e                    VP <e, <ε,t>>
                     /\              _____/_____
                    /  \            /                            \
                  Dave          VP <e, <ε,t>>              AdvP <ε,t>
                                    /\                        /\
                                 walked                    quickly
```

    b.   <u>Predicted Truth Conditions:</u>

        [[S']] = T *iff*   There is an event e such that e is an event of walking and
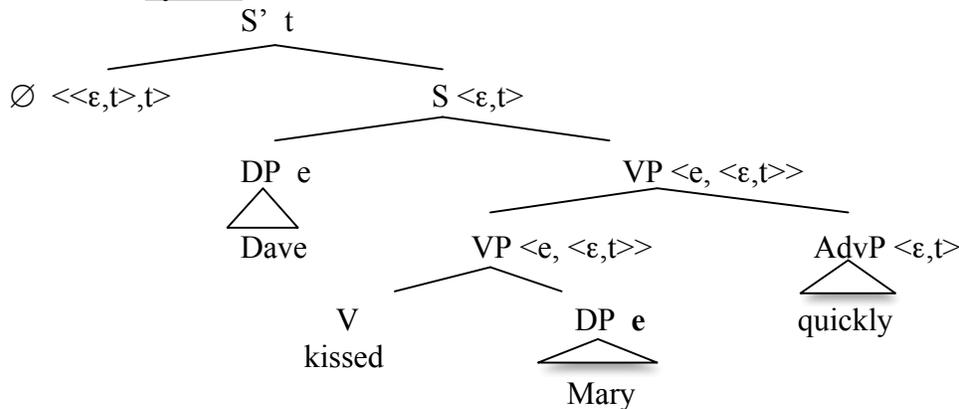   Dave is the agent of e and e is quick

3.   Extending This to Transitive Verbs

Under the regime of ideas above, we would need to assume that transitive sentences like (22a) have the syntax in (22b).

(22)   **Event Semantics and Transitive Verbs: Syntax**

    a.   <u>Sentence:</u>   Dave kissed Mary quickly.

    b.   <u>Syntax:</u>

```
                    S'  t
         _____/_____
        /                          \
  ∅  <<ε,t>,t>                    S <ε,t>
                        _____/_____
                       /                          \
                    DP  e                    VP <e, <ε,t>>
                     /\              _____/_____
                    /  \            /                            \
                  Dave          VP <e, <ε,t>>              AdvP <ε,t>
                             _____/_____                  /\
                            /              \              quickly
                           V              DP  e
                        kissed              /\
                                           /  \
                                         Mary
```

Consequently, we can deduce that transitive verbs in this system must be of type **<e,<e,<ε,t>>>**
- We can assume that they have a lexical semantics akin to that in (23)

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(23)   **Event Semantics and Transitive Verbs: Semantics**

[[kissed]]   =
[λy. [λx . [λe . <u>e is an event of kissing and x is the agent of e, and y is the theme of e</u>]]]

- Note: The 'theme' of an event is the 'do-ee', the thing affected by the event.
  (Recall your discussion of theta roles in LING 401)

(24)   **Predicted Truth-Conditions of Transitive Sentences**

[[(22b)]] = T *iff*

There is an event e such that e is an event of kissing and Dave is the agent of e and Mary is the theme of e and e is quick.