

Tense, Aspect and Aktionsart

1. The Semantics of Tense, Part 1: Tense Logic

Overarching Question:

What does ‘tense morphology’ (in English) mean?

What is the core semantic difference between the sentences below?

(1) Present Tense vs. Past Tense vs. Future in English

- a. Dave is dancing.
- b. Dave was dancing.
- c. Dave will be dancing.

Classic Intuition:

The difference between these sentences concerns **the time** that they require the predicate ‘dance’ to hold of Dave.

(2) Traditional, Pre-Theoretic Semantic Characterization

- a. Present Tense (1a): The predicate holds of the subject *now*.
The predication holds ‘in the present’.
- b. Past Tense (1b): The predicate holds of the subject *at some prior/past time*.
The predication held ‘in the past.’
- c. Future (1c): The predicate holds of the subject *at some later/future time*.
The predication will hold ‘in the future’.

Historically, one of the first attempts to capture this ‘traditional’ understanding of tense semantics employed the formal theory of ‘tense logic’. (Arthur Prior)

1.1 ‘Tense Logic’ Semantics for Tense Morphology: The Basics

1.1.1 Models for Tense Logic

Core Innovation: Computing a semantic value includes reference to a set of ‘times’

What are ‘times’? Primitive elements.
However, they are strictly and totally ordered *wrt* each other, via the *temporal ordering* relation ‘<’

(3) **Model for Tense Logic**

$M_{TL} = \langle D, I, < \rangle$ A tuple consisting of
a domain of entities (D)
a set of times (I)
a total ordering relation on I ($<$)

1.1.2 Interpretation of Natural Language (a la Tense Logic Formulae)

How are the models in (3) used to interpret sentences of natural language?

(4) **Interpretation Function for English, Part 1**

The interpretation of an English sentence is relative to a ‘tense-logic model’ M ($= \langle D, I, < \rangle$), a variable assignment g , and a ‘time of evaluation’ $t \in I$.

Thus, interpretation is accomplished via a function ‘ $[[\]]^{M,g,t}$ ’, parameterized for Model (M), variable assignment (g) and time of evaluation (t)

How does this interpretation function ‘ $[[\]]^{M,g,t}$ ’ assign semantic values?

First, we need to state the rules for things that aren’t tenses...

(5) **Interpretation Function for English, Part 2: Semantics for Non-Tenses**

Central Claim:

Natural language predicates (verbs) hold of different entities at different times

a. Interpretation of Verbs

Verbs are of type $\langle et \rangle$, but their value depends upon the time evaluation

$[[\text{dance} \]]^{M,g,t} = \lambda x. x \text{ is dancing at } t$

b. Interpretation of Names

Names are of type e . For simplicity’s sake, we’ll assume their value is independent of the time of evaluation.

$[[\text{Dave} \]]^{M,g,t} = \text{Dave}$

With this machinery in place, let us now present the ‘tense logic’ analysis of the semantics of English tenses...

(6) **Interpretation Function for English, Part 3: Semantics for Tenses**

Central Claim:

(English) tense morphemes are, semantically, sentential operators which

- (i) existentially quantify over times (in I)
- (ii) *shift* the ‘time of evaluation’ of the verb in the sentence

a. Semantics for Past Tense

$$[[\text{PAST XP}]]^{\text{M,g,t}} = \exists t' . t' < t \ \& \ [[\text{XP}]]^{\text{M,g,t}'}$$

b. Semantics for Present Tense

$$[[\text{PRES XP}]]^{\text{M,g,t}} = \exists t' . t' = t \ \& \ [[\text{XP}]]^{\text{M,g,t}'}$$

c. Semantics for Future

$$[[\text{FUT XP}]]^{\text{M,g,t}} = \exists t' . t < t' \ \& \ [[\text{XP}]]^{\text{M,g,t}'}$$

(7) **Example Derivations**

a. Past Tense:

- i $[[\text{Dave danced}]]^{\text{M,g,t}}$ = (via syntax)
- ii $[[\text{PAST [Dave dance] }]]^{\text{M,g,t}}$ = (via (6a))
- iii $\exists t' . t' < t \ \& \ [[\text{Dave dance}]]^{\text{M,g,t}'}$ = (via Function Application)
- iv $\exists t' . t' < t \ \& \ [[\text{dance}]]^{\text{M,g,t}'} \ ([[\text{Dave}]]^{\text{M,g,t}'})$ = (via (5))
- v $\exists t' . t' < t \ \& \ [\lambda x . x \text{ is dancing at } t'](\text{Dave})$ = (via Lambda Conversion)

vi **$\exists t' . t' < t \ \& \ \text{Dave is dancing at } t'$**
 ‘There is some time in the past t' s.t. Dave is dancing at t' .’

b. Present Tense:

$$[[\text{Dave is dancing}]]^{\text{M,g,t}} = \text{(via syntax, (6b), FA, (5), LC)}$$

$\exists t' . t' = t \ \& \ \text{Dave is dancing at } t'$
 ‘Dave is dancing at the present time t' .’

c. Future:

$$[[\text{Dave will dance}]]^{\text{M,g,t}} = \text{(via syntax, (6c), FA, (5), LC)}$$

$\exists t' . t < t' \ \& \ \text{Dave is dancing at } t'$
 ‘There is some time in the future t' s.t. Dave is dancing at t' .’

2. Problems for the ‘Tense Logic’ Semantics for Tense Morphology

If only tense were this easy!...

Since the 1970’s, linguists and philosophers have observed a great many problems for this semantic analysis of real, natural language tense.

... We’ll focus only on two today...

2.1 Tense is ‘Referential’ / ‘Anaphoric’

The ‘tense logic semantics’ holds that tenses contribute *existential quantification* over times.

For simple sentences like ‘Dave danced’, this existential semantics seems to be a fair approximation of the meaning of the English...

However, when we combine tense with negation in English, we find that the meaning that you get is not what the existential semantics would predict. (Partee 1973)

Consider the truth of (8b) in the context described by (8a).

(8) Referential Use of Past Tense (Partee 1973)

- a. Context:
You’ve just baked some cookies, and are leaving to bring them over to a friend.
You realize, just as you are exiting your front door, that the oven is still on.
- b. Sentence:
(Oh no!) I didn’t turn off the stove!

Now, let’s consider what the ‘tense logic semantics’ predicts regarding the meaning of (8b).

Since (8b) contains negation, the meaning assigned will depend upon whether or not the negation has scope over the PAST morpheme.

(9) Possible Structures for (8b)

- a. Negation Has Narrow Scope
[PAST [NOT [Barbara t-o-s]]]
- b. Negation Has Wide Scope
[NOT [PAST [Barbara t-o-s]]]

Fact:

Neither the meaning predicted for (9a) nor that predicted for (9b) (by the ‘tense logic semantics’) corresponds to the observed meaning of (8b)

(10) **Meanings Predicted by Tense Logic Semantics**

a. Negation Has Narrow Scope:

$[[\text{PAST} [\text{NOT} [\text{Barbara t-o-s}]]]]^{\text{M,g,t}} =$

$\exists t' . t' < t$ & it's not the case that B. turned off the stove at t'

'There was some time in the past t' s.t. it's not the case that B. turned off the stove at t' .'

b. Negation Has Wide Scope

$[[\text{NOT} [\text{PAST} [\text{Barbara t-o-s}]]]]^{\text{M,g,t}} =$

It's not the case that $\exists t' . t' < t$ & B. turned off the stove at t'

'There doesn't exist a time in the past t' s.t. B. turned off the stove at t' .'

Observation 1:

First, the meaning in (10a) is far too weak, and doesn't seem to correspond to a possible reading of the sentence.

... Consider all the times at which it's true that you aren't 'joining the linguistics program at UMass' (this morning, for example).

Nevertheless, it would be false for anyone in the room to say 'I didn't join the linguistics program at UMass'.

Observation 2:

The meaning in (10b) is equivalent to something like 'Barbara never (in her life) turned off the stove'.

While it could be said that this meaning corresponds to a possible reading of (8b) (*cf.* "I didn't take steroids.")...

... it's clearly not the meaning that (8b) has in context.

(after all, we've all turned off a stove at some point in our life...)

What Sentence (8b) Really Seems to Mean:

The speaker of (8b) has a *particular* time in mind when they utter the sentence (*i.e.*, the period, say, between when they baked the cookies and left the house)....

Sentence (8b) says that *at that particular time*, it's false that B. turned off the stove.

Thus, past tense sentences like (8b) aren't *general* statements about the past (about the times preceding the present).

Rather, they are statements about *specific* times in the past.

Thus, in this sentence, tenses appear to be referential, to make reference to particular times.

2.2 Interactions Between Tense and Aspect

In the previous section, we saw that tense morphology (in English) contains a referential/anaphoric component that is not captured under the classic 'tense logic' semantics.

Another area where the tense logic semantics appears to fall short (particularly as compared to more current approaches to tense) concerns the semantic contribution of 'aspect'.

Fact: Besides tense morphology, 'aspectual morphology' also affects the way in which the predication described by the sentence is understood to hold over time.

(11) Contribution of Aspect to the Temporal Interpretation of the Sentence

- a. Simple Past (Perfective Aspect)
(When I was in the room,) Dave **ate** the cookie.
- b. Past Progressive (Imperfective Aspect)
(When I was in the room,) Dave **was eating** the cookie.

Observation:

In sentence (11a), the described 'cookie-eating event' is now over. The cookie is all gone.

In sentence (11b), the described 'cookie-eating event' might *still* be going on. The cookie might not be all gone.

...but both these sentences are 'past tense', and so it's not tense that contributes this information

Conclusion:

Whether the predicate of the sentence is in ‘perfective’ or ‘imperfective’ aspect *also* affects when the predication can be understood to hold of the subject.

We would like for our semantics of English to also capture this contribution of aspect, but the ‘tense logic semantics’ has nothing to say about it...

Aside: A Further Point Made by Klein (1994)

As shown by (11b), the situations described by past-tense sentences *could still be going on at the present time* (this is particularly clear for past tense imperfective sentences).

This fact challenges certain ‘traditional’ descriptions of the meaning of past tense, *e.g.* that it means that the event described is ‘in’ the past...

3. The Reichenbach-Klein (RK) Theory of Tense

History: In a 1947 book, the philosopher (of science) Hans Reichenbach developed a semantics for tense and aspect morphology in English (and related languages).

As we will see, the core insight behind this approach was the introduction of an entity referred to as the *Reference Time*

In the following decades, this semantics was intermittently discussed by linguists and philosophers (but wasn’t as popular as the more formal account provided by then-popular ‘tense logic’).

Reichenbach’s analysis began to receive more extensive consideration and scrutiny in the late 1970’s, through the 1980’s (Carlotta Smith, Norbert Hornstein)

The linguist Wolfgang Klein published a book in 1994 that featured a much revised and updated version of the basic ‘Reichenbachian story’.

Reichenbach’s *Reference Time* was renamed ‘Topic Time’ (by Klein), and explicitly analogized to linguistic topics elsewhere in NL.

For this reason, the following semantic picture is sometimes attributed (exclusively) to Reichenbach and sometimes (exclusively) to Klein.

We might as well call it the ‘R(eichenbach)-K(lein)’ Theory...

The Overarching Idea, Part 1:

(Contrary to centuries of grammatical tradition,) tense morphology in natural language doesn't describe the relationship between the 'time of speech' and the 'time of predication'.

Rather, tense describes the relationship between the 'time of speech' and a salient 'time under discussion' (Topic Time, Reference Time).

(12) Dramatis Personae in the RK Theory

- | | | |
|----|------------------------|---|
| a. | Utterance Time (UT) | 'time of speech, time the sentence is uttered' |
| b. | Event Time (ET) | 'time the predicate (VP) holds of the subject' |
| c. | Topic Time (TT) | 'time under discussion'
'time which the sentence is <i>about</i> ' |

What is this 'Topic Time'?

(13) The Concept of Topic Time

Every sentence of natural language (in context) makes reference to – is *about* – some particular 'span' of time.

- a. Topic Time Can be Explicitly Represented via Adverbials
- (i) At 3PM, my father was smoking.
(TT = 3PM)
 - (ii) When I was in the room the room, Dave ate a cookie.
(TT = the time I was in the room)
- b. Topic Time is Often Implicit
- (i) I didn't turn off the stove!
(TT = time between removal of cookies and leaving the house)
 - (ii) (I smell smoke.) Were you smoking?
(TT = time within the recent past)
 - (iii) Did you get a sweater for Christmas?
(TT = last Christmas)

(14) **The Relevance of TT to the Semantics of Tense Morphology**

Tense morphology contributes information regarding the *ordering* relationship between the UT and the TT.

Informally...

- a. 'Past Tense' = TT *precedes* UT b. 'Present Tense' = TT *is* UT

(15) **Examples**

- a. I didn't turn off the stove.

Past tense only tells you that the TT precedes the UT.

Context (8a) then narrows down TT to 'the time between removal of cookies and my departure'.

- b. When I was in the room, Dave ate a cookie.

The adverbial contributes the information that the TT is the time that the speaker spent in the room.

Since this occurred at a time prior to UT, TT precedes the UT, and past-tense is used in the main clause.

- c. Dave is eating a cookie.

Present tense tells you that the TT is the UT.

Thus, the sentence is 'about' the present time.

Crucial Question: If tense only contributes information about how the UT relates to the TT... *what in the sentence tells you about the relationship between the UT and the ET??*

After all, in sentences (15a,b), the ET is understood to occur prior to the UT as well, and nothing in our (informal) semantics captures that so far...

Answer: *That's aspect! (Well, it's partly aspect...)*

The Overarching Idea, Part 2:

Aspectual morphology describes the relationship between the salient 'time under discussion' (Topic Time), and the 'time of predication' (Event Time)...

(16) **The Relevance of TT to the Semantics of Aspect Morphology**

Aspect morphology contributes information regarding the *contained-ness* relationship between the TT and the ET.

Informally...

- a. 'Perfective Aspect' = TT *contains* ET
- b. 'Imperfective Aspect' = ET *contains* TT

An Aside about 'Containedness'

Wait! What does it mean for one time to contain another time?

We are now explicitly moving to an ontology where times have internal dimension, structure.

Thus, not only are times *orderable* w.r.t. each other, they also can *contain* each other. (Thus the temporal ordering now might not be total.)

Example:

The time identifiable as 'last week' contains the time identifiable as 'last Monday.'

Thus, our 'times' here are not temporal points, but are rather temporal intervals, spans.

This internal structure of our 'times' can be explicitly represented in the definition of our model structures (*cf.* Bennett & Partee 1978), but for our purposes here today, we needn't do that.

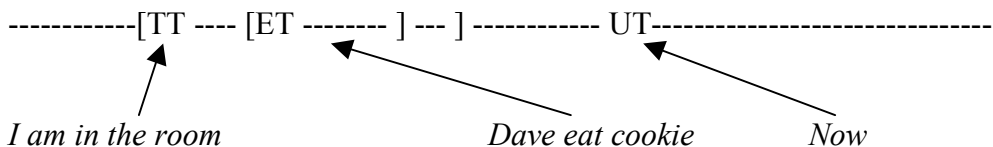
We will continue to consider 'times' as primitives, but relatable both via the *ordering* relation '<' and the *contained-ness* relation 'C'.

(17) **Example: Past Tense Perfective**

(When I was in the room,) Dave **ate** the cookie.

Past Tense: TT < UT Perfective Aspect: ET \subset TT

Picture:

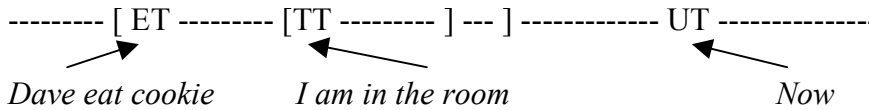


(18) **Example: Past Tense Imperfective**

(When I was in the room,) Dave **was eating** the cookie.

Past Tense: $TT < UT$ Imperfective Aspect: $TT \subset ET$

Picture:



Important Consequence :

The (informal) semantics in (16) can account for the fact that (i) sentence (19a) entails that the ‘cookie-eating event’ must now be over, but (ii) sentence (19b) allows that the ‘cookie-eating’ might still be going on.

(19) **Contribution of Aspect to the Temporal Interpretation of the Sentence**

- a. (When I was in the room,) Dave **ate** the cookie.
- b. (When I was in the room,) Dave **was eating** the cookie.

Explanation:

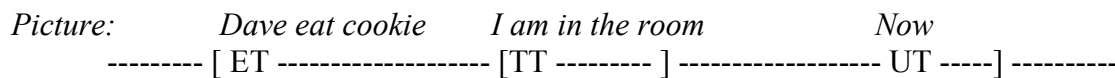
Given the semantics sketched in (17), the past-tense perfective in (19a) entails that (i) the ET is contained within the TT, and (ii) the (entire) TT precedes the UT.

It would follow, then, that if (19a) is true, the ET must precede the UT as well, and so the ET must be ‘over’ by the UT. (The cookie has already been eaten by the time of the utterance.)

However, given the semantics sketched in (18), the past-imperfective in (19b) entails that (i) the TT is contained within the ET, and the (ii) the TT precedes the UT.

It would follow, then, that (19b) would still be true if the ET were so large as to contain both the TT and the UT, as sketched in (20).

(20) **A Model Where (19b) is True**



The RK System (even informally stated) captures the fact that (19b) allows that Dave’s ‘cookie-eating’ could still be going at the UT (though (19a) doesn’t).

Thus, the system captures the way in which aspectual morphology affects the time that the predicate can be understood to hold of the subject.

4. A Formalization of the RK Theory

The RK-Theory can be given a more precise, compositional implementation.

The following system is that employed by Matthewson (2006), based upon Kratzer (1998).

(20) Model for Interpreting Tense and Aspect in Natural Language

$M = \langle D, I, <, \mathbf{C} \rangle$ A tuple consisting of

- a domain of entities (D)
- a set of times (I)
- an ordering relation on I ($<$)
- a containment relation on I (\mathbf{C})

(21) Interpretation Function for English, Part 1

The interpretation of an English sentence is relative to a model $M (= \langle D, I, <, \mathbf{C} \rangle)$, a variable assignment g , and a ‘time of evaluation’ $t \in I$.

Thus, we use the parameterized interpretation function ‘ $[[\]]^{M,g,t}$ ’.

(22) Interpretation Function for English, Part 2: Semantics for Tenses

Central Claims:

- Tense morphemes are *pronouns* referring to particular times $t \in I$ (i.e., the TT)
- Thus, they bear indices, and their particular value is relative to the variable assignment g .
- Moreover, tenses carry presuppositions, which constrains the kind of referent that the variable assignment g can assign to them.

a. Interpretation of Past Tense

$[[\text{PAST}_i]]^{M,g,t} = \begin{cases} g(i) & \text{if } g(i) < t \\ \text{undefined} & \text{otherwise} \end{cases}$

b. Interpretation of Present Tense

$[[\text{PRES}_i]]^{M,g,t} = \begin{cases} g(i) & \text{if } g(i) = t \\ \text{undefined} & \text{otherwise} \end{cases}$

(23) Analogy to Interpretation of Pronouns (with Gender)

$[[\text{he}_i]]^{M,g} = \begin{cases} g(i) & \text{if } g(i) \text{ is male} \\ \text{undefined} & \text{otherwise} \end{cases}$

(24) **Interpretation Function for English, Part 3: Semantics for Non-Tenses**

Core Idea in the New System:

Since tenses denote times (rather than operators), we will treat NL VPs as functions that take times as arguments.

Thus, we will interpret NL Vs as functions of type $\langle e, \langle it \rangle \rangle$

a. Interpretation of Verbs

Verbs are of type $\langle eit \rangle$

$$[[\text{dance}]]^{M,g,t} = \lambda x. \lambda t. x \text{ is dancing at } t$$

b. Interpretation of Names

Names are of type e .

$$[[\text{Dave}]]^{M,g,t} = \text{Dave}$$

(25) **Interpretation Function for English, Part 4: Semantics for Aspect**

Core Idea in the New System:

Aspect morphology takes the VP as sister and is of type $\langle it, it \rangle$.

a. Interpretation of Perfective Aspect

$$[[\text{PERF}]]^{M,g,t} = \lambda P_{\langle it \rangle} . \lambda t. [\exists t'. t' \subset t \ \& \ P(t')]$$

‘Takes a predicate of times P, and returns a predicate of times that is true of a time t if it *contains* a time t' at which P is true.’

b. Interpretation of Imperfective Aspect

$$[[\text{IMP}]]^{M,g,t} = \lambda P_{\langle it \rangle} . \lambda t. [\exists t'. t \subset t' \ \& \ P(t')]$$

‘Takes a predicate of times P, and returns a predicate of times that is true of a time t if it’s *contained in* a time t' at which P is true.’

(26) **Example Derivations**

a. The Interpretation of “Dave ate the cookie.”

- i $[[\text{Dave ate the cookie}]]^{M,g,t} = \text{(via syntax)}$
- ii $[[\text{PAST}_1 [\text{PERF} [\text{Dave eat-the-cookie}]]]^{M,g,t} = \text{(via FA)}$
- iii $([[\text{PERF}]]^{M,g,t} ([[\text{eat-the-cookie}]]^{M,g,t} ([[\text{Dave}]]^{M,g,t}))) ([[\text{PAST}_1]]^{M,g,t}) = \text{(via (24))}$
- iv $([[\text{PERF}]]^{M,g,t} ([\lambda x. \lambda t. x \text{ eat-the-cookie at } t](\text{Dave}))) ([[\text{PAST}_1]]^{M,g,t}) = \text{(via LC)}$
- v $([[\text{PERF}]]^{M,g,t} ([\lambda t. \text{Dave eat-the-cookie at } t])) ([[\text{PAST}_1]]^{M,g,t}) = \text{(via (25))}$
- vi $([\lambda P_{\langle it \rangle} . \lambda t. [\exists t'. t' \subset t \ \& \ P(t')]] ([\lambda t. \text{Dave eat-the-cookie at } t])) ([[\text{PAST}_1]]^{M,g,t}) = \text{(via LC)}$
- vii $(\lambda t. [\exists t'. t' \subset t \ \& \ \text{Dave eat-the-cookie at } t']) ([[\text{PAST}_1]]^{M,g,t}) = \text{(via LC)}$
- viii $\exists t'. t' \subset [[\text{PAST}_1]]^{M,g,t} \ \& \ \text{Dave eat-the-cookie at } t'] = \text{(via (22))}$

xi **$\exists t'. t' \subset g(1) \ \& \ \text{Dave eat-the-cookie at } t'$ (if $g(1) < t$; *undefined otherwise*)**

There is some time t' that $g(1)$ contains (where $g(1)$ must be in the past), and ‘Dave eat the cookie’ is true at t' .

b. The Interpretation of “Dave was eating the cookie.”

- i $[[\text{Dave was eating the cookie}]]^{M,g,t} = \text{(via syntax)}$
- ii $[[\text{PAST}_1 [\text{PERF} [\text{Dave eat-the-cookie}]]]^{M,g,t} = \text{(via FA, (24), LC, (25))}$
- iii $([\lambda P_{\langle it \rangle} . \lambda t. [\exists t'. t \subset t' \ \& \ P(t')]] ([\lambda t. \text{Dave eat-the-cookie at } t])) ([[\text{PAST}_1]]^{M,g,t}) = \text{(via LC)}$
- iv $\exists t'. [[\text{PAST}_1]]^{M,g,t} \subset t' \ \& \ \text{Dave eat-the-cookie at } t'] = \text{(via (22))}$

v **$\exists t'. g(1) \subset t' \ \& \ \text{Dave eat-the-cookie at } t'$ (if $g(1) < t$; *undefined otherwise*)**

There is some time t' that contains $g(1)$ (where $g(1)$ must be in the past), and ‘Dave eat the cookie’ is true at t' .

Interim Summary

The RK system - formalized in Section 4 – provides a compositional semantics for tense and aspect morphology in English that accomplishes the following:

- (a) It captures the ‘referential / anaphoric’ nature of tense revealed by sentences like (8b), “I didn’t turn off the stove” (Partee 1973).
- (b) It captures the way that aspectual morphology contributes to the overall ‘temporal interpretation’ of the sentence.

The RK System in a slogan:	Tense describes the ordering between TT and UT Aspect describes the containment between TT and ET
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5. The Semantics of the Future (in English)

NOTE: *Our R-K tense semantics in Sections 4 and 5 did not include an analysis of ‘future tense’.*

(27) Major Claim: The Future is not a ‘Tense’ (Jespersen 1924, Smith 1978, Enç 1996)

In English (and other languages), ‘future morphology’ is not a part of the ‘tense system’, but is rather a part of the ‘modal’ system.

(28) What does it Mean to Say that ‘Future is a Modal, not a Tense’?

- a. Syntactic Sense:
 - (i) Future is **not** expressed by a head that occupies the same syntactic position as ‘Past Tense’ and ‘Present Tense’
 - (ii) Future **is** expressed by a head that occupies the same syntactic position as modal auxiliaries like ‘must’, ‘can’, ‘may’, *etc.*
- b. Semantic Sense:
 - (i) Future morphology does not describe the relationship between TT and UT
 - (ii) The meaning of ‘future morphology’ involves quantification over possible worlds/situations

FACT:

- Typically, when people make the claim that ‘future is a modal, not a tense’, they have in mind claims (28ai), (28aii), and (28bi).
- *People don’t typically make the claim in (28bii), that ‘future’ involves quantification over possible worlds/situations (or, if they do, the semantics isn’t explicit).*¹

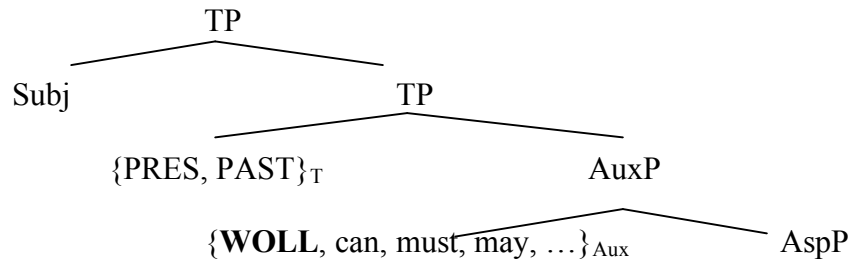
¹ Of the analyses I am familiar with, the one that comes closest to giving an explicit semantics incorporating claim (28bii) is that proposed by Copley (2002). Copley assumes a theory of modals whereby they quantify over ‘situations’, rather than entire worlds. In this system, future morphology can be understood as contributing universal quantification over all those situations that are possible developments of the topical situation.

(29) **Future as a Modal (Non-Tense): The Morpheme *WOLL***

English possesses an abstract, underlying root, *WOLL*.

a. Syntax of *WOLL*

WOLL is a modal auxiliary, and so occupies the same position as other modal auxiliaries in the language (directly below tense)



b. Morphology *WOLL*

- (i) When *WOLL* combines with *PRES* tense, it's pronounced as *will*.
- (ii) When *WOLL* combines with *PAST* tense, it's pronounced as *would*.

c. Semantics of *WOLL*

The auxiliary *WOLL* is of type $\langle it, it \rangle$ (like Aspect)

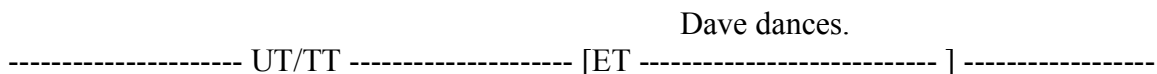
$$[[\text{WOLL}]]^{M,g,t} = \lambda P_{\langle it \rangle} . \lambda t. [\exists t'. t < t' \ \& \ P(t')]$$

(30) **Example Derivation: 'Will' = *WOLL* + *PRES***

- i $[[\text{Dave will dance}]]^{M,g,t} = \text{(via syntax)}$
- ii $[[\text{PRES}_1 [\text{WOLL} [\text{Dave dance}]]]]^{M,g,t} = \text{(via FA)}$
- iii $([[\text{WOLL}]]^{M,g,t} ([[\text{dance}]]^{M,g,t} ([[\text{Dave}]]^{M,g,t}))) ([[\text{PRES}_1]]^{M,g,t}) = \text{(via (24), LC)}$
- iv $([[\text{WOLL}]]^{M,g,t} ([\lambda t. \text{Dave dance at } t])) ([[\text{PRES}_1]]^{M,g,t}) = \text{(via (29c))}$
- v $([\lambda P_{\langle it \rangle} . \lambda t. [\exists t'. t < t' \ \& \ P(t')]] ([\lambda t. \text{Dave dance at } t])) ([[\text{PRES}_1]]^{M,g,t}) = \text{(via LC)}$
- vi $\exists t'. [[\text{PRES}_1]]^{M,g,t} < t' \ \& \ \text{Dave dance at } t' = \text{(via (22))}$

vii $\exists t'. g(1) < t' \ \& \ \text{Dave dance at } t' \quad \text{(if } g(1) = t ; \text{ undefined otherwise)}$

'Dave dances' is true at some time t' following $g(1)$ (where $g(1)$ must be the UT)



The derivation in (30) shows how the analysis makes the correct predictions regarding the meaning of English sentences containing ‘will’ ...

...But what about this idea that ‘would’ in English is WOLL + PAST?

Consider discourses like the following:

(31) **Evidence that English Auxiliary ‘Would’ is (/can be) a Past-Tense Version of ‘Will’**

- a. In 1981, Dave’s marriage was very stable.
- b. However, he **would** later learn (in 1987) that his wife was cheating on him.

Target Intuition:

In context, sentence (31b) means approximately the following:

‘In 1981, the following was true: *Dave will learn (in 1987) that his wife is cheating.*’

So, in this sense, ‘would’ does sometimes seem to have the meaning of a ‘past-tense’ will...

(32) **Example Derivation: ‘Will’ = WOLL + PAST**

- i $[[\text{Dave would learn that his wife was cheating}]]^{M,g,t} = \text{(via syntax)}$
- ii $[[[[\text{PAST}_1 [\text{WOLL} [\text{Dave l-t-h-w-c}]]]]]^{M,g,t} = \text{(via FA, (24), LC)}$
- iii $([[\text{WOLL}]]^{M,g,t} ([\lambda t. \text{Dave l-t-h-w-c at } t])) ([[\text{PAST}_1]]^{M,g,t}) = \text{(via (29c))}$
- iv $([\lambda P_{<it>}. \lambda t. [\exists t'. t < t' \ \& \ P(t')]] ([\lambda t. \text{Dave l-t-h-w-c at } t])) ([[\text{PAST}_1]]^{M,g,t}) = \text{(via LC)}$
- v $\exists t'. [[\text{PAST}_1]]^{M,g,t} < t' \ \& \ \text{Dave l-t-h-w-c at } t' = \text{(via (22))}$

- vi **$\exists t'. g(1) < t' \ \& \ \text{Dave learn-that-his-wife-cheats at } t'$**
(if $g(1) < t$; undefined otherwise)

There is some time t' following $g(1)$ (where $g(1)$ must precede the UT), and ‘Dave learn that this wife is cheating’ is true at t' .

Dave learns that his wife cheats
 ----- [TT (1981) -----] ----- [ET (1987) -----] ----- UT -----

(33) **General Properties of ‘Future Morphology’, Under this Analysis**

- a. It is **not** in complementary distribution with ‘tense morphology’ (PAST or PRES)
- b. Rather, when it combines with PRES, you get regular ‘future’ interpretation; when it combines with PAST, you get ‘future-in-the-past’ reading.
- c. It does **not** describe the relationship between TT and UT
- d. Rather, akin to an Aspect, it describes the relation between TT and ET (though it’s one of precedence rather than ‘contained-ness’)

Conclusion:

Under this analysis (which works well for English), ‘future morphology’ is not a ‘tense’.

NOTE:

Matthewson (2006) will on similar grounds claim that ‘future morphology’ in St’át’imcets is not a tense, and will instead adopt an analysis akin to (29c).

6. Aktionsart vs. Aspect

Under the R-K analysis in Sections 3 and 4, the following can be said regarding ‘Aspect’:

(34) **General Properties of ‘Aspect’ (Under the R-K Analysis)**

- a. A property of a clause (not of a bare VP or a single verb)
- b. Concerns the relation of TT to ET
- c. Comprises the categories ‘Perfective’ and ‘Imperfective’

Other Names for This Property:

Grammatical Aspect, View-Point Aspect

ISSUE TO BE AWARE OF:

This property, ‘aspect’, is often lumped together with a very different property: **Aktionsart**

(35) **General Properties of ‘Aktionsart’**

- a. A property of bare VPs (or verbs)
- b. Concerns (vaguely) the ‘internal structure’ of the situations described by the VP
- c. Comprises a hierarchy of category distinctions
(state vs. eventive; telic vs. atelic; durative vs. punctual)

Other Names for This Property:

Vendler Class, Eventuality Type, Aspectual Class, Internal Aspect, Lexical Aspect

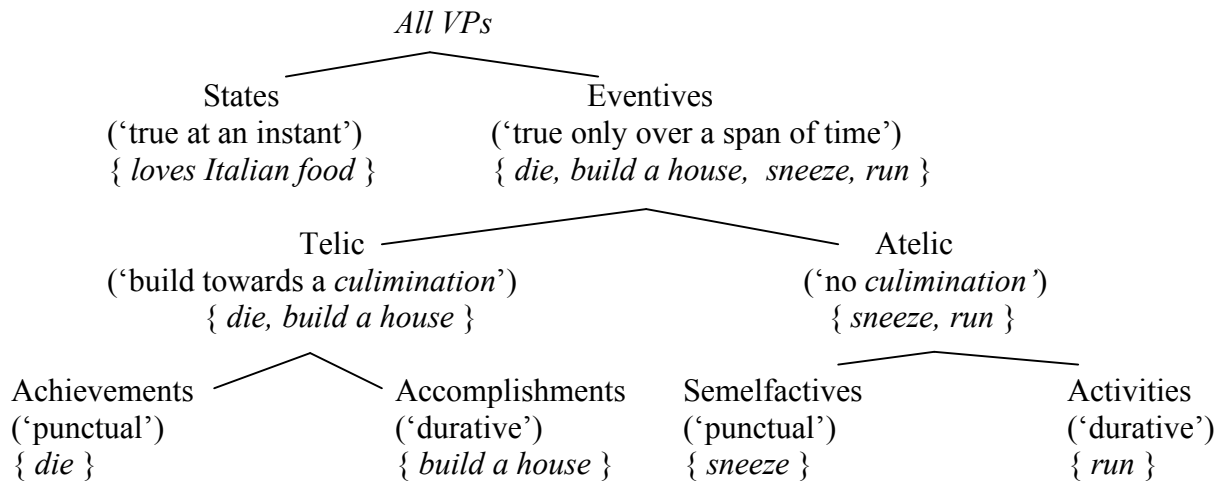
6.1 What is ‘Aktionsart’?

(36) Basic, Foundational Fact:

Every VP (in English) can be categorized according to certain **correlated** semantic and grammatical properties.

- (i) There are certain semantic properties that VPs (in English) can be observed to have, relating to the ‘internal structure’ of the ‘circumstances’ they describe.
- (ii) These semantic properties appear to be ‘grammatically relevant’; they appear to coincide with other (*esp.* ‘combinatorial’) properties that the VPs have.

(37) The Hierarchy of Aktionsart Categories



6.1.1 The Distinction between ‘States’ and ‘Eventives’

(38) Example of a State

- a. ‘loves Italian food’
- b. Key Semantic Property:
Imagine if we were to make everything in the world stop moving, that everything was standing perfectly still.
Intuitively, the VP ‘loves Italian food’ would still be true of things.
‘The VP can be true of entities at a single, infinitesimal point in time.’
- c. Key Grammatical Property:
 Sounds ‘funny’ or ‘get a special interpretation’ when in the progressive.
 (Normal, unmarked present tense form is the ‘simple present’.)
 ?? Dave is loving Italian food. (vs. ‘Dave loves Italian food’)

(39) **Other VPs with the Semantic Property in (38b)**

believe in UFOs, be Italian, fear the DHS

(40) **VPs Lacking the Semantic Property in (38b)**

build a house, sneeze, run

(41) **Crucial Observation for the Theory of Aktionsart**

The VPs with the semantic property in (38b) also share the grammatical property in (38c)

- a. ?? Dave is believing in UFOs. (vs. Dave believes in UFOs.)
- b. ?? Dave is being Italian. (vs. Dave is Italian.)
- c. ?? Dave is fearing the DHS. (vs. Dave fears the DHS.)

The VPs *without* the property in (38b) also lack the grammatical property in (38c)

- a. Dave is building a house. (Dave builds a house.)
- b. Dave is sneezing. (Dave sneezes.)
- c. Dave is running. (Dave runs.)

Conclusion:

The semantic property of *being true at a single infinitesimal point* correlates with the grammatical property of *sounding ‘funny’ when put in the progressive*.

These two correlated properties, then, function to split the VPs into two classes:

- (a) Those having the properties in (38): ‘states’
- (b) Those lacking the properties in (38): ‘eventives’

6.1.2 The Distinction Between ‘Telic’ and ‘Atelic’ Eventives

The ‘eventive’ VPs can be further divided into those that are ‘telic’ and those that are ‘atelic’

(42) **Example of an Atelic Eventive**

- a. ‘run’
- b. Key Semantic Property:
For all x, “x is running” entails “x ran”.
- c. Key Grammatical Property:
When in the simple past, easily combines with the adverbial ‘for an hour’:

‘Dave ran for an hour.’

(43) **Other VPs with the Semantic Property in (42b)**

dance, sneeze, scratch, drink milk

(44) **VPs Lacking the Semantic Property in (42b)**

build a house, eat a sandwich, die

(45) **Crucial Observation for the Theory of Aktionsart**

The VPs with the semantic property in (42b) also share the grammatical property in (42c)

- a. Dave danced for an hour.
- b. Dave sneezed for an hour.
- c. Dave drank milk for an hour.

The VPs *without* the property in (42b) also lack the grammatical property in (42c)

- a. ?? Dave built a house for an hour.
- b. ?? Dave ate a sandwich for an hour.
- c. ?? Dave died for an hour.

Conclusion:

The semantic property in (42b) correlates with the grammatical property in (42c).
These two correlated properties, then, function to split the VPs into two classes:

- (a) Those having the properties in (42): ‘atelic’
- (b) Those lacking the properties in (42): ‘telic’

6.1.3 The Distinction Between ‘Semelfactives’ and ‘Activities’

The ‘atelic’ VPs can be further divided into the ‘semelfactives’ and the ‘activities’.

(46) **Example of an Semelfactive**

- a. ‘sneeze’
- b. Key Semantic Property:
Takes place in a very short span of time ; virtually (though not completely) instantaneous.
- c. Key Grammatical Property:
For all x, “x was sneezing” entails “x sneezed repeatedly.”

(47) **Other VPs with the Semantic Property in (46b)**

cough, blink, twitch

(48) **VPs Lacking the Semantic Property in (46b)**

run, dance, drink milk

(49) **Crucial Observation for the Theory of Aktionsart**

The VPs with the semantic property in (46b) also share the grammatical property in (46c)

- a. “Dave was coughing” entails “Dave coughed repeatedly.”
- b. “Dave was blinking” entails “Dave blinked repeatedly.”
- c. “Dave was twitching” entails “Dave twitched repeatedly.”

The VPs *without* the property in (46b) also lack the grammatical property in (46c)

- a. “Dave was running” *doesn't* entail “Dave ran repeatedly.”
- b. “Dave was dancing” *doesn't* entail “Dave danced repeatedly.”
- c. “Dave was drinking milk” *doesn't* entail “Dave drank milk repeatedly.”

Conclusion:

The semantic property in (46b) correlates with the grammatical property in (46c).
These two correlated properties, then, function to split the VPs into two classes:

- (a) Those having the properties in (46): ‘semelfactives’
- (b) Those lacking the properties in (46): ‘activities’

6.1.4 The Distinction Between ‘Achievements’ and ‘Accomplishments’

We saw above that the property of ‘being virtually instantaneous’ (punctual) divided the atelic VPs into two classes: the semelfactives (punctual) and the activities (non-punctual, durative).

Briefly, this same property can similarly divide the telic VPs into two classes:

- (i) Achievements: punctual telic VPs (e.g. ‘die’, ‘win’)
- (ii) Accomplishments: durative telic VPs (e.g. ‘build a house’, ‘draw a picture’)

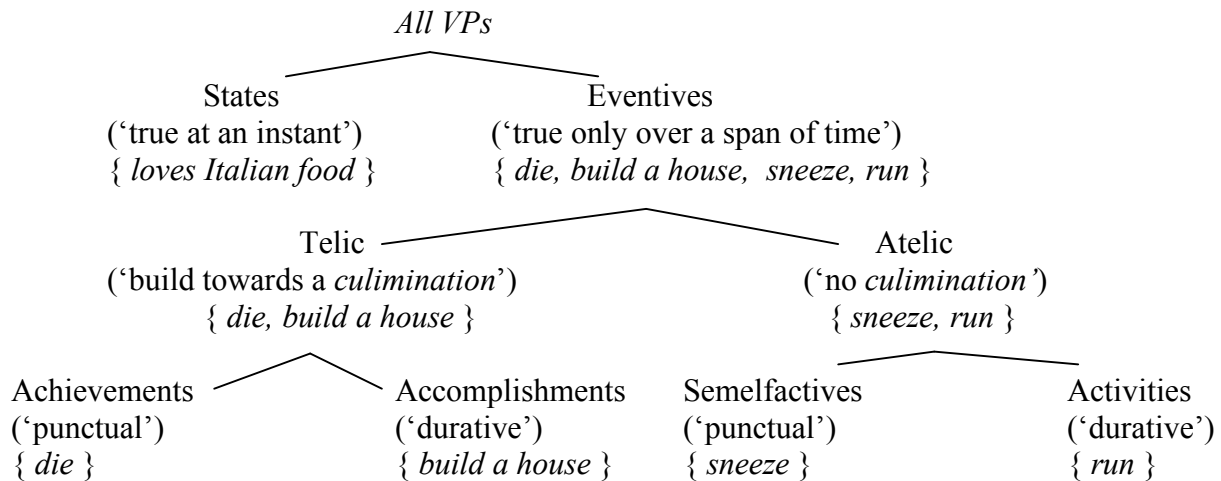
... With this little bit as background, we can see in greater detail how the hierarchy of ‘Aktionsart classes’ in (37) categorize VPs in English ...

6.2 Summary of The Theory of Aktionsart

(50) Central Claim

Certain correlated semantic and grammatical properties set up a network of categories that can function to classify VPs (of English)...and this classification is something the grammar of English seems to care about.

(51) The Hierarchy of Aktionsart Categories



In this context, recall again the distinctions we drew earlier between ‘Aktionsart’ and ‘Aspect’...

Important Fact:

These same categories set up for English in (51) have been found to be relevant to the grammars of many other languages!...

As discussed by Matthewson (2006), there are ways of identifying these same categories in the grammar of St’át’imcets...

... and these classes have been argued to be relevant for ‘tense interpretation’ in some languages that lack overt tense morphology...