What temporal orientation tells us about conditional modality

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Temporal orientation in conditionals: The modal flavor of conditionals plays a role in temporal interpretation of its component clauses even more than previously thought.

▶ future orientation ⇔ eventive ⇔ metaphysical modality
▶ present orientation ⇔ stative ⇔ epistemic modality

Modality in conditionals: The three-way correlations above have some surprising consequences for our understanding of modality in conditionals.
Some terminology

(1) If Zoe is cranky, Tasha will get cranky.

antecedent: *Zoe be cranky*

consequent: *Tasha get cranky*

\[ t^*_{\text{ant}}: \text{temporal argument of the antecedent (}= \text{speech time}) \]

\[ t^*_{\text{cons}}: \text{temporal argument of the consequent} \]

\[ t-\text{sit}_{\text{ant}}: \text{situation time (cf. Klein (1997)) of the antecedent} \]

\[ t-\text{sit}_{\text{cons}}: \text{situation time of the consequent} \]

future orientation (FO): t-sit after \( t^* \)

present orientation (PO): t-sit overlaps \( t^* \)
Temporal orientation in conditionals

- Basic temporal orientation facts
- The present eventive constraint: an explanation?
- “Future-oriented” statives aren’t really
- “Epistemic” eventives aren’t really
Basic temporal orientation facts (antecedents)

Antecedents with eventives

(2)  a. **If it rains tomorrow,** Max will get sick.  \(\text{ant. FO}\)
    b. #It rains tomorrow.

(3)  Tate plays chess with Xander tomorrow.  \(\text{futurate reading}\)

(4)  **If it rains,** Max will get sick.  \(\text{ant. FO only, *ant. PO}\)
    \(\neq \text{‘If it’s raining right now, Max will get sick.’}\)

⇒ Eventives are FO in antecedents.
Basic temporal orientation facts (antecedents)

Antecedents with statives

(5)  

a. **If Marissa is cranky right now,** Tasha will get cranky.

b. **If Marissa is cranky tomorrow,** Tasha will get cranky.

⇒ Statives are either PO or FO in antecedents.
Basic temporal orientation facts (cf. modals)

(6)  
   a. Tate may get sick.  
       eventive, only FO; \( \neq \) ‘may be going’  
   b. Tate may be cranky right now.  
       stative, PO  
   c. Tate may be cranky tomorrow.  
       stative, FO
Basic temporal orientation facts (consequents)

Eventive antecedent, eventive consequent

(7) If it rains, Max will get sick. cons. FO

t-sit$_{cons}$ begins at least a little after t-sit$_{ant}$ begins.

(8) a. It will start raining exactly when Max gets sick.
b. Exactly when it starts raining, Max will get sick.

(9) If Marissa leaves, she will leave quickly.
Eventive antecedent, stative consequent

(10) a. If John gets mad, Celeste will be mad (then). \(cons.\ PO\)
    b. If John gets mad, Celeste will be mad (afterwards). \(cons.\ FO\)

From this slide and the last: \(t^*_cons\) is the beginning of \(t-sit_{ant}\)
Basic temporal orientation facts (consequents)

Stative PO antecedent, eventive and stative consequent

(11)  
  a. If Xander is cranky now, Zoe will get cranky too.  
      eventive cons., FO
  b. If Xander is cranky now, Zoe will be cranky now too.  
      stative cons., PO
  c. If Xander is cranky now, Zoe will be cranky the next day.  
      stative cons., FO
Stative FO antecedent, eventive and stative consequent

(12)  

a. If Xander is cranky tomorrow, Zoe will get cranky.
   eventive cons., FO

b. If Xander is cranky tomorrow, Zoe will be cranky then too.
   stative cons., PO

c. If Xander is cranky tomorrow, Zoe will be cranky the next day.
   stative cons., FO
So far: eventives are FO, statives can be PO or FO

The traditional explanation for this fact is the **Present eventive constraint (PEC):** Eventives cannot be PO because there is some problem with predicating an event of an instantaneous “now”.

We will see now that statives cannot really be FO, which means that the PEC is no longer terribly explanatory.
“Future-oriented” statives aren’t really

(13) a. Zoe will be cranky (right now). ‘epistemic will;’ PO
    b. Zoe will be cranky at 4 tomorrow. FO

(14) Zoe will be cranky.
“Future-oriented” statives aren’t really

(15)  a. At 4, Zoe will be cranky.
     b. When you see Zoe, she will be cranky.
     c. If you see Zoe, she will be cranky.

**Anchoring** with a temporal adverbial or a *when*-clause does what the eventive antecedent does to the consequent: it shifts $t^*_{cons}$ forward.

Not t-sit:

(16)  (At 4/When you see Zoe/If you see Zoe), she will have been cranky.
“Future-oriented” statives aren’t really

Return to antecedents to check “FO” statives:

(17) a. If Zoe is cranky, ... PO (FO with context)
b. If Zoe is cranky at 4 tomorrow, ... FO
c. If, when you see her, Zoe is cranky, ... FO
“Future-oriented” statives aren’t really

If anchor is absent, statives have to be PO!

(18) a. Zoe will be cranky.
    b. Zoe will leave.

Do eventives shift too? Yes!

(19) If it rains, Max will get cranky.

(20) At 4, Max will get cranky.
“Future-oriented” statives aren’t really

(21) Statives:
  a. \( t_u, t^*, t\text{-sit} \)  
     e.g., Zoe will be cranky now.
  b. \( t_u \rightarrow t^*, t\text{-sit} \)  
     e.g., Zoe will be cranky at 4.
  c. \textbf{NOT POSSIBLE:} \( t_u, t^* \rightarrow t\text{-sit} \)

(22) Eventives:
  a. \( t_u, t^* \rightarrow t\text{-sit} \)  
     e.g., Zoe will leave.
  b. \( t_u \rightarrow t^*, t\text{-sit} \)  
     e.g., If Max shows up, Zoe will leave 
     (only possible with \textit{when} or \textit{if} anchors)
Could the explanation be modal?

future orientation ↔ eventives
present orientation ↔ statives

So the Present Eventive Constraint (which only gives a reason for why eventives can’t be present) doesn’t explain the whole picture. What could? Perhaps modal flavor.

(23)  a. Mary will get cranky tomorrow.  metaphysical, FO, eventive
     b. Mary will be cranky right now.  epistemic; PO, stative
BUT Condoravdi (2001) claims (for modal complements, but the claim extends to antecedents and consequents of conditionals) that there are epistemic eventives.

I’m going to argue that these ARE epistemic, but that they are actually derived statives that are present-oriented. So modal flavor DOES correlate with temporal orientation and Aktionsart, and a modal explanation for temporal orientation is thus likely.
Epistemic “eventives” aren’t really

(24)  a. It hasn’t been decided yet who he will meet with.
    b. He may see the dean. He may see the provost.

    metaphorical

(25)  a. It has been decided who he will meet with but I don’t
    know who it is.
    b. He may see the dean. He may see the provost.

    epistemic

(26)  a. Who does he see tomorrow?
    b. Someone. Let’s see. Darn, I can’t find the book. He
    may see the dean, he may see the provost. I don’t
    know. Go ask him.

    epistemic
Epistemic “eventives” aren’t really

(27)  
  a.  Toby likes the dean.  
      describes current event  
  b.  #Toby sees the dean.  
      does not describe current event

(28)  
  a.  (Right now,) Toby sees the dean on Mondays.  
      habitual  
  b.  (Right now,) Toby sees the dean tomorrow.  
      simple futurate

I claim that (28b), a derived stative, is the complement of the modal in (25b).
Epistemic “eventives” aren’t really

(29) a. Toby sees the dean on Mondays.  
    b. Toby is seeing the dean right now. 
    c. Toby is seeing the dean tomorrow.

(30) Everyone has a special administrator who they see for advice. He may see the dean, he may see the provost, I don’t know.

(31) He may be seeing the dean. He may be seeing the provost.
Basic temporal orientation facts
The present eventive constraint: an explanation?
"Future-oriented" statives aren’t really
Could the explanation be modal?
Epistemic "eventives" aren’t really

Epistemic "eventives" aren’t really

(32) If Mary leaves on Monday, I’ll give her a call.
    ant.: FO, eventive, metaphysical

(33) a. I thought Mary was already out of town.
b. No, she leaves on Monday.
c. Oh, well, if Mary leaves on Monday, I’ll give her a call today.
    ant.: PO, stative, epistemic
Epistemic “eventives” aren’t really

Thus: no real epistemic “eventives”. These are statives.

future orientation ⇔ eventive ⇔ metaphysical modality
present orientation ⇔ stative ⇔ epistemic modality
Modality in conditionals

- Original question: how to explain temporal orientation in conditionals?
- Original answer: Present Eventive Constraint.
- But there are no real future statives, so the original answer is unsatisfying.
- Could the correlation with modality be a possible explanation?
- Yes, because there are no real epistemic eventives.

future orientation ⇔ eventive ⇔ metaphysical modality
present orientation ⇔ stative ⇔ epistemic modality
Antecedents have their own modal flavor

Important to note: each part of the conditional has its own independent modal flavor.

(34)  a. If Tate is sick, Zoe will be cranky. \(\text{ant. epistemic, cons. epistemic}\)
     b. If Tate gets sick, Zoe will get cranky. \(\text{ant. metaphysical, cons. metaphysical}\)

(35)  a. If Tate is sick, Zoe will get cranky. \(\text{ant. epistemic, cons. metaphysical}\)
     b. If Tate gets sick, Zoe will (already) be cranky (then). \(\text{ant metaphysical, cons. epistemic}\)
Antecedents have their own modal flavor

(36) stative
   a. If it’s cold out right now, . . .
   b. If it’s true that it’s cold out right now, . . .

(37) eventive
   a. If it rains tomorrow, . . .
   b. #If it’s true that it rains tomorrow, . . .
Antecedents have their own modal flavor

(38) anchored “FO” stative
   a. If it’s raining at 4 tomorrow, . . .
   b. #If it’s true (now) that it’s raining at 4 tomorrow . . .

(39) If at 4 tomorrow it’s true that it’s raining (at that time)
    . . .
Antecedents have their own modal flavor

So, antecedents have their own modal flavor, independent of the modal flavor of the consequent. This is contra Kratzer (1991). It will require us to come up with a theory of conditionals that will be able to handle mixed modality.
Towards a modal explanation

The goal is to come up with a modal explanation of temporal orientation in conditionals, utilizing the correlations I have been arguing for:

future orientation $\iff$ eventive $\iff$ metaphysical modality
present orientation $\iff$ stative $\iff$ epistemic modality
Towards a modal explanation

Metaphysical modality is about events happening.
Epistemic modality is about true propositions being added to the current knowledge base.
But how to do modality without propositions? AND how do we make it play nice with epistemic modality in conditionals?
Towards a modal explanation

A thought experiment...

(40) \( \lambda w . \lambda p \in D_{\langle w, t \rangle} . \lambda q \in D_{\langle w, t \rangle} . \) for all \( w' \) accessible from \( w \) such that \( p(w'), q(w') \)

(41) \( \lambda e . \lambda p \in D_{\langle e, t \rangle} . \lambda q \in D_{\langle e, t \rangle} . \) for all \( e' \) accessible from \( e \) such that \( p(e'), q(e') \)
Towards a modal explanation

- How do epistemic and metaphysical modality play nice together?
- Why are eventives shifted forward in time?
- What would it mean for an event to be accessible from another event?
- What is the event argument of the antecedent? Surely not the speech event!
- A world is something like a course of events, so worlds are not analogous to events.
- We don’t want $p$ and $q$ to be predicated of the same event.
- We do want a way to pick a single event out of a course or chain of events.
Conditionals are essentially causal (!)

(42) \[ \lambda C . \lambda p \in D_{\langle e,t \rangle} . \lambda q \in D_{\langle e,t \rangle} . \text{all } e' \text{ causally accessible from } e \text{ such that } p(e') \text{ are such that: all causally accessible courses of events from } e' \text{ include a } e'' \text{ such that: } q(e'') \]
Conditionals are essentially causal (!)

Ordering source: all \( e' \) best causally accessible from \( e_C \) such that \( p(e') \) are such that: all best causally accessible courses of events from \( e' \) include a \( e'' \) such that: \( q(e'') \)

What does "best" mean here? Normal, inertial (cf. Dowty (1979)) ; the starting situation is allowed to develop according to the laws of physics, etc., without interference from outside sources.
Conditionals are essentially causal (!)

How to translate between epistemic and metaphysical modality:

\[(43) \quad \text{ADD}(e) = \lambda C . \lambda p \in D_{\langle C,t \rangle} . e \text{ is an event of adding } p \text{ to } K_C\]

ADD is an event predicate that is true of an event e just in case e is an event of adding the proposition to the contextually salient set of known propositions \( K_C \).

Is ADD for real? Quite possibly; it looks as though it might be useful in the meanings of evidential morphemes.
Conditionals are essentially causal (!)

(44) If a creature has a heart, it will have a liver.
‘If we find out a creature has a heart, we will find out (or be able to deduce) that it has a liver’

‘All the best causally accessible courses of events from e_C such that they include an e’ such that e’ is an event of adding \( [x \text{ has a heart}] \) to K_C are such that: all best causally accessible courses of events from e’ include an e” such that: e” is an event of adding \( [x \text{ has a liver}] \) to K_C \( \cup [x \text{ has a heart}] \) ’
Conditionals are essentially causal (!)

(45) If John gets sick, Mary will be sick.
‘If John ends up getting sick, we will find out (or be able to deduce) that Mary is sick’

‘All e’ best causally accessible from e_C such that \( [John\; gets\; sick] (e’) \) are such that: all best causally accessible courses of events from e_C include a e” such that: e” is an event of adding \( [Mary\; is\; sick] \) to K_C’
Back to temporal orientation

- Eventives are FO with respect to $t^*$ because causal accessibility requires the antecedent event $e'$ to happen after $e_C$.

- Stative antecedents are PO with respect to $t^*$ because events of adding propositions to the knowledge base happen instantaneously.

- Eventive antecedents shift $t^*_{cons}$ forward because causal accessibility requires the antecedent event $e'$ to happen after $e_C$, and the consequent event $e'$ to happen after $e''$.

- Stative antecedents do not appear to shift $t^*_{cons}$ forward because events of adding propositions to the knowledge base happen instantaneously.
Conclusion

There is a three-way correlation between temporal orientation, Aktionsart, and modal flavor in conditionals:

- future orientation ⇔ eventive ⇔ metaphysical modality
- present orientation ⇔ stative ⇔ epistemic modality

This suggests a theory of conditional modality that:

- can deal with the fact that antecedents and consequents have independent modal flavors, and
- has a causal denotation for conditionals, and requires the notion of “causal accessibility” between events.

I have sketched out such a theory here; the ontological implications have yet to be worked out.


