Hypothetical facts and hypothetical ideals in the temporal dimension

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Outline

1. Two compositionality problems with hypothetical ideals

2. The interpretation of tenses in bare conditionals—a primer

3. Temporal interpretation of (priority) modals

4. Anankastics in the temporal dimension

Two types of modalized conditionals
Hypothetical-fact vs. hypothetical-ideal conditionals

(1) a. If that guy just jaywalked, he has to pay a fine.   HFC
       ↪ *makes a hypothesis about a fact (what he did)*
     b. If jaywalking is illegal, that guy has to pay a fine.   HIC
       ↪ *makes a hypothesis about an ideal (what is legal).*

(2) a. If you (ever) go to Harlem, you should see the Apollo Theater.
       ↪ *makes a hypothesis about a fact (where you go)*
     b. If you (ever) want to go to Harlem, you should take the A train.
       ↪ *makes a hypothesis about an ideal (what your goals are).*

The problem with HICs

(H) If you (ever) want to go to Harlem, you should take the A train.

Sæbø (1985, 2001):
- *Anankastic conditionals* (ACs) like (H) pose challenges for compositional interpretation.
- Intuitively, the sentence conveys that **taking the A train** is necessary for **going to Harlem**.

Sæbø's compositionality problem

How does (H) manage to express a relationship between a proper part of the antecedent and a proper part of the consequent?

The problem with HICs
Kratzer-style

(H) If you (ever) want to go to Harlem, you should take the A train.

Sæbø (1985, 2001):

- In a Kratzerian analysis, the problem is: How do we get the antecedent to interact with the ordering source of the modal in the right way?
- Somehow, the inner antecedent **you go to Harlem** must end up in the ordering source.
- von Fintel and Iatridou (2005): Same problem for (3).

(3) If jaywalking is illegal here, this guy has to pay a fine.

> **Sæbø's compositionality problem**
>
> How do we get the antecedent to influence the ordering source of the modal in the right way?

Solution, part one: Nested modality

- Solution from Frank (1997) (von Fintel and Iatridou 2005, Huitink 2008, Condoravdi and Lauer 2014): Assume that the **if**-clause *does not restrict the modal in the consequent*, but instead a higher (covert) modal.
- Schematically:

  $\textsc{Nec}$(**you want to go to Harlem**)($\textsc{Should}$(**you take the A train**))

- $\textsc{Nec}$ is whatever modal operator is present in conditionals without overt modals.
- This gets the inner antecedent into the ordering source.
- But by itself, it has problematic consequences.

Solution, part two: Action-relevant preferences

Condoravdi and Lauer (2014): A fully compositional analysis of ACs is possible with . . .

- . . . a nested modal analysis.
- . . . a suitable semantics for **want**.
  - In ACs, **want** has a reading on which it refers to *action-relevant preferences*.
  - Multiple action-relevant preferences can be taken into account.

Bonus: Various kinds of 'near'-anankastics also can be treated.

The temporal interpretation of HFCs and ACs

- Sæbø observed that there is an intuitive difference in the *relative temporal location of the eventualities* of ACs and HFCs.

(4) If you (ever) go to Harlem, you should see the Apollo theater.
   ↪ **you go to Harlem ≤ you see the Apollo theater**

(5) If you (ever) want to go to Harlem, you should take the A train.
   ↪ **you go to Harlem ≥ you take the A train**

Sæbø's generalization

Sæbø's generalization

- For HFCs, the prejacent β of the modal in the consequent must be true <u>no earlier than</u> the the time of the antecedent α.
  $(\forall t_1 \subseteq t)[t_1 \in \alpha \supset (\exists t_2 \subseteq t)[end(t_2) \geq end(t_1) \wedge t_2 \in \beta]]$
- For ACs, the prejacent β of the modal in the consequent must (start to) be true <u>no later</u> than the *inner antecedent* α.
  $(\forall t_1 \subseteq t)[t_1 \in \alpha \supset (\exists t_2 \subseteq t)[start(t_2) \leq start(t_1) \wedge t_2 \in \beta]]$

(The HFC constraint is from Cresswell (1977), who proposes it for conditionals *without (overt) modals*.)

Compositionality problem in the temporal dimension?

The HFC-constraint relates the time of the full antecedent and the time of the consequent:

(6) If you go to Harlem, you should see the Apollo theater.
   $end(\textbf{you go to Harlem}) \leq end(\textbf{you see the Apollo theater})$

The AC-constraint, by contrast, relates the time of *inner antecedent* and the consequent (prejacent of the modal).

(7) If you want to go to Harlem, you should take the A train.
   $start(\textbf{you go to Harlem}) \geq start(\textbf{you take the A train})$

Temporal compositionality problem

According to Sæbø's conjecture, ACs impose a constraint on the temporal relationship between a proper part of the antecedent and the prejacent of the modal in the consequent.

Plot

NEC(**you want to go to Harlem**)(SHOULD(**you take the A train**))

- Determine what the predictions of the nested-modal analysis are.
  - Plausible assumptions about the temporal interpretation of *bare* conditionals.
  - Plausible assumptions about the temporal interpretation of priority modals like **should**.
  - Putting the two together.
- Evaluate the resulting predictions for HICs, and ACs in particular.

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Outline

Bare conditionals

- Bare conditionals (BCs): Indicative conditionals without any modal operator are NEC-conditionals:

$$\text{NEC}(\textit{Antecedent})(\textit{Consequent})$$

- Their temporal interpretation is intricate, but surprisingly little work on this.
- We will draw here mostly on Crouch (1993), Kaufmann (2005), Schulz (2007, 2008) and Grønn and von Stechow (2011).
- Set aside:
  - ‘Generic’ readings of conditionals, those might well contain another operator.
  - ‘Scheduling’ readings of the present tense.
  - **will**-conditionals, which might be modal.

Past tense antecedents: Boring!
(mostly)

- BCs with past tense in the antecedent: Look as if both tenses are just deictic.
- Past-Past: No constraint on the relative temporal location.

(8) a. If John left at five, he arrived at six.
    b. If John arrived at six, he left at five.

- Past-Present: Consequent tense locates eventuality at speech time, now.

(9) If John finished his paper, he is on vacation (now / #next week).

- Usual restrictions on unembedded present tense apply (e.g., eventives only with a ‘scheduling’ reading).

Present tense antecedent: More interesting

- Present tense antecedents can be about the utterance time, or any future time:

(10) If he arrives tomorrow, . . .

- Usual restrictions do not apply: Eventuality can be located anywhere in the interval $[\text{now}, \infty)$.
- Eventive predicates: Mandatory forward-shift.
- Stative predicates: Optional forward-shift, strong tendency towards now-interpretation.
  - But shiftable by overt adverbs or contextual clues.

(11) If he is in Utrecht, . . .

(12) If he is in Utrecht tomorrow, . . .

Present tense antecedent: More interesting
Present-Past

Present in the antecedent, past in the consequent:

- Past tense in the consequent can get a 'shifted' past-in-the-future reading (Crouch 1993).

(13) If John comes out smiling, the interview went well.

Present tense antecedent: More interesting
Present-Present

Present in the antecedent, present in the consequent:
- Two possibilities:

(14) If the letter arrives tomorrow, it is in the mail (now).
↪ Deictic present (now) in the consequent.

(15) a. If the coin comes up heads, you get the money.
     b. (I sent you the final paperwork.) If you sign it, the house is yours.
↪'Shifted' present-in-the-future in the consequent.

Aside: For BCs with morphological present tense in the consequent, the shifted reading is actually quite restricted:

(16) (I am sure he is miserable now, but) If all goes well tomorrow, he #is happy (then).

Assumptions about the tenses

- Simple(-minded?) analysis of the tenses:

(17) $[\![\textsc{Pres}]\!]^i = \lambda P.\lambda w.\textsc{Inst}(P, i, w)$

(18) $[\![\textsc{Past}]\!]^i = \lambda P.\lambda w.\textsc{Inst}(P, (-\infty, i), w)$

$i = $ now in unembedded uses, can be shifted by embedding environment.

(19) $\textsc{Inst}(P, i, w) = \begin{cases} \exists e : P(e, w) \ \& \ \tau(e, w) \subseteq i & \text{if } P \text{ eventive} \\ P(i, w) & \text{if } P \text{ temporal} \end{cases}$

- $\tau(e, w)$: The 'run-time' of e at w.
- Assumption: Statives denote temporal predicates that are true of an interval iff the state overlaps with it.

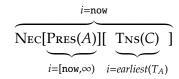## Recipe for present tense antecedents
Shifted consequent reading

- Nec has now as its temporal perspective.
- its modal base is restricted to worlds that make the antecedent true at some subinterval t_A of $[\text{now}, \infty)$.
- at each world, it sets the *earliest* such interval as the interval of evaluation for the consequent.

$$\overbrace{\textsc{Nec}[\underbrace{\textsc{Pres}(A)}_{i=[\text{now},\infty)}][\ \underbrace{\textsc{Tns}(C)}_{i=earliest(T_A)}\ ]}^{i=\text{now}}$$

(See Kaufmann (2005),Schulz (2007),Grønn and von Stechow (2011) for steps towards a compositional implementation of this—though only Schulz enforces the 'earliest' part.)

Upshot
for Pres-stative, Pres-stative BCs

(20) If John is at home, he is happy.

- If the antecedent state holds at now, the consequent state must hold at now, as well.
- If the antecedent state holds only *after* now, the consequent state can hold at now, or, in restricted circumstances, at the earliest time at which the antecedent state holds.

Outline

Modals

Temporal perspective vs. instatiation time
- *Temporal perspective:* Intuitively, the time at which the necessity holds.
- *Instantiation time:* The time within which the prejacent is required to hold.

Assumptions (cf. Condoravdi (2002) for non-root modals):
- Modals occur in the scope of tense, which sets their temporal perspective (↪ modals denote predicates of times, like statives).
- Modals combine with *untensed* radicals.
- Modals set the instantiation time of the radical to $[i, \infty)$, where i is their temporal perspective (↪ modals 'forward-expand' the instantiation time).

Modals: the semantics

- Kratzerian setting.
  - ▶ Both modal backgrounds are relativized to times.
  - ▶ Both modal backgrounds get passed the temporal perspective of the modal.

Semantics for the modals

$$\text{SHOULD}_{B,O} = \lambda P.\lambda i.\lambda w.\forall w' \in \text{Opt}(B, O, i, w) : \text{INST}(P, [i, \infty), w')$$

- Making the limit assumption:
$$\text{Opt}(B, O, i, w) := \left\{ w \in B(i, w) \mid \neg\exists v \in B(i, w) : v <_{O(i,w)} w \right\}$$

Modals: an example

Semantics for the modals

$$\textsc{Should}_{B,O} = \lambda P.\lambda i.\lambda w.\forall w' \in \text{Opt}(B,O,i,w) : \textsc{Inst}(P,[i,\infty),w')$$

(21) You should take the A train.
$PRES(\textsc{Should}_{B,O}(\text{you take the A train}))$

- $B(i,w)$: The historical alternatives of w at i.
- $O(i,w)$: The addressee's action-relevant preferences at i in w
- Time of evaluation: now

(21) paraphrased

"Among the historical alternatives at now, the ones where your action-relevant preferences are (eventually) satisfied best are such that you take the A train at some time within $[\text{now},\infty)$."

want

- Assumption: **want** also forward-expands the instantiation time of its complement.
- Setting aside the possibility that at i,w, Ad has a wrong belief about what time it is (cf. Abusch, Heim, von Stechow, Ogihara, and many others):

Semantics of **want**

$w \in [\![\textsc{Pres}(\text{you want to go to Harlem})]\!]^i$ if at i,w, Ad prefers that $[\![Ad \text{ go to Harlem}]\!]$ is instantiated at some time within $[i,\infty)$.

- That **want** has a 'futurate' interpretation with respect to its complement is an old idea, at least since Heim (1992, n. 26).

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Putting things together

(22) If you want to go to Harlem, you should take the A train.

- **should** is in the scope of tense. Which one?
- Past tense variant indicates that it is PRES:

(23) If you wanted to go Harlem, you should take the A train.

- Temporal perspective of **should** in (23) must be now.
- To backshift, we need to use the perfect:

(24) If you wanted to go to Harlem, you should have taken the A train.

- Note contrast with attitude embeddings:

(25) Last year, John thought Mary should drop out of school.

Putting things together
Shifted reading

(26) If you want to go to Harlem, you should take the A train.

$$\textsc{Nec}(\textsc{Pres}(\text{want(Harlem)}))(\textsc{Pres}(\textsc{Should}(\text{take A train})))$$

- For a given antecedent-world v, let t_A be the earliest time in $[\text{now}, \infty)$ at which the addressee has a preference for going to Harlem in $[t_A, \infty)$.
- Then (26) requires that $v \in [\![\textsc{Pres}(\textsc{Should}(\text{take A train}))]\!]^{t_A}$
- i.e. that in all historical alternatives to v at t_A in which Ad realizes his action-relevant preferences optimally, Ad takes the A train within $[t_A, \infty)$.

↪ **you go to Harlem** and **you take the A train** are simply required to be located within the same time interval $[t_A, \infty)$.
↪ *NO* constraint on their relative temporal location!

Putting things together
Upshot

- We predict no semantic constraint on the temporal ordering of inner antecedent and prejacent.
- The only temporal constraint concerns the time at which the agent has the specified goal (i.e., the time of the full antecedent).
- We don't derive Sæbø's conjectured constraint.

A welcome prediction: near-anankastics

- We don't derive Sæbø's conjectured constraint.
- This is a good thing.
- Condoravdi and Lauer (2014): Conditionals of the form **if want** p, **should** q can convey different types of relations between p and q.

(27) If you want to go to Disneyworld, you should stay at least five days.
  you go to Disneyworld < you stay at least five days in Disneyworld

A welcome prediction: near-anankastics

(28) If the government ever wants to privatize here, they have to bulldoze everything.

- Without context, ambiguous as to temporal relation between privatizing and bulldozing.
- Both disambiguations possible via adverbials:

(29) If the government ever wants to privatize here, . . .
  a. . . . they have to bulldoze everything first.
  b. . . . they have to bulldoze everything afterwards.

- The implied temporal relation is interdependent with the implied connection between p and q (means-of/precondition/consequence).

Vindicating Sæbø's intuition
The temporal dimension of ACs

Sæbø (2001, p. 447):

"The requirement that [the inner antecedent of an AC] must be (weakly) preceded, not succeeded, by the consequent would be rather ad hoc if it were postulated as a property of conditionals. However, it can be anchored to a general temporal feature of ordering source propositions. [Inner antecedents of ACs] are special instances of normative ordering source propositions, and, in a rough sense, intentions are 'in the future'. The general idea is that propositions that are to be necessities must be 'late' in relation to facts but 'early' in relation to ideals."

Vindicating Sæbø's intuition
The temporal dimension of ACs

- Sæbø was right that such considerations play a role in the interpretation of ACs.
- They are taken into account in the hearer's figuring out what relation between inner antecedent and consequent underwrites the truth of the conditional.
- But they are not part of the semantic meaning of the AC.

Vindicating Sæbø's intuition
Purpose constructions

Purpose constructions like (29) in fact obey something like Sæbø's constraint:

(30) To go to Harlem, you should take the A train.

(31) #To go to Disneyworld, you have to stay at least five days there.

(32) To privatize here, the government has to bulldoze everything #afterwards.

ACs ≠ purpose constructions

- Purpose constructions semantically require (weak) temporal precedence.
- Anankastic conditionals do not.
- This provides a rather direct argument against analyses that aim to reduce ACs to (elliptical) purpose constructions (von Fintel and Iatridou 2005, von Stechow, Krasikova and Penka 2006), i.e. against analyzing the Harlem sentence as in (33).

(33) If you want to go to Harlem, you should take the A train ~~to go to Harlem~~.

Anankastic conditionals are just conditionals

- A uniform temporal interpretation for HFCs and HICs yields the correct (weak) constraints on the temporal location of inner antecedent and prejacent.
- As Condoravdi and Lauer (2014) have it, anankastic and near-anankastic conditionals are just what they seem: regular, hypothetical, indicative conditional sentences.

Condoravdi, C.: 2002, Temporal interpretation of modals: Modals for the present and for the past, *in* D. Beaver, L. C. Martínez, B. Clark and S. Kaufmann (eds), *The Construction of Meaning*, CSLI Publications, Stanford, CA, pp. 59–88.

Condoravdi, C. and Lauer, S.: 2014, Anankastic conditionals are just conditionals. Ms., Stanford University and University of Konstanz.

Cresswell, M.: 1977, Interval semantics and logical words, *in* C. Rohrer (ed.), *On the Logical Analysis of Tense and Aspect*, Gunter Narr, Tübingen, pp. 7–29.

Crouch, R.: 1993, *The temporal properties of English conditionals and modals*, PhD thesis, University of Cambridge, Cambridge, UK.

Frank, A.: 1997, *Context Dependence in Modal Constructions*, PhD thesis, Stuttgart University. Published in 'Arbeitspapiere des Sonderforschungsbereichs 340, Sprachtheoretische Grundlagen für die Computerlinguistik, Nr. 91'.

Grønn, A. and von Stechow, A.: 2011, On the temporal organisation of bare indicative conditionals. Handout, 2011-06-15.

Heim, I.: 1992, Presupposition Projection and the Semantics of Attitude Verbs, *Journal of Semantics* **9**(3), 183–221.

Huitink, J.: 2008, *Modals, conditionals and compositionality*, PhD thesis, Radboud University Nijmegen.

Kaufmann, S.: 2005, Conditional truth and future reference, *Journal of Semantics* **22**(3), 231–280.

Sæbø, K. J.: 1985, Notwendige Bedingungen im Deutschen: Zur Semantik modalisierter Sätze, *Technical report*, Universität Konstanz, Sonderforschungsbereich 99: Linguistik.

Sæbø, K. J.: 2001, Necessary conditions in a natural language, *in* C. Féry and W. Sternefeld (eds), *Audiatur Vox Sapientiae: A Festschrift for Arnim von Stechow*, Akademie-Verlag, Berlin, pp. 427–449.

Schulz, K.: 2007, *Minimal Models in Semantics and Pragmatics. Free Choice, Exhaustivity, and Conditionals*, PhD thesis, Universiteit van Amsterdam.

von Fintel, K. and Iatridou, S.: 2005, What to do if you want to go to Harlem: Anankastic conditionals and related matters. ms., MIT.

von Stechow, A., Krasikova, S. and Penka, D.: 2006, Anankastic conditionals again, *in* T. Solstad, A. Grønn and D. Haug (eds), *A Festschrift for Kjell Johan Sæbø: In Partial Fulfilment of the Requirements for the Celebration of His 50th Birthday*, Forfatterne, Oslo, pp. 151–171.