ANANKASTIC CONDITIONALS

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1. Plot\(^1\)

Anankastic conditionals (ACs). (Sæbø, 1986). (Bech, 1955/57)

(1) a. You have to take the A train if you want to go to Harlem.
   b. If you don’t take the A train you can’t go to Harlem.
   c. To go to Harlem you have to take the A train.

The main difficulty: modal in the antecedent.

Our proposal:

(2) a. If you want to go to Harlem, you have to take the A train to do this.
   b. If you want to go to Harlem, you have to take the A train to go to Harlem.

Task: Finding a semantics for the main clause, which is a conditional with a purpose clause as antecedent and which contains no “want”.

(3) The nearest worlds where you go to Harlem, are contained in the worlds where you take the A train.

\(^1\) We wish to thank Orin Percus, Sigrid Beck and Wolfgang Klein for inspiring discussion of the topic. It is obvious that we owe crucial insights to the authors quoted in this study; a warm thanks to them.
2. WHAT IS AN ANANKASTIC CONDITIONAL?

(Bech, 1955/57):

(4) Wenn Müller mit Schmidt verhandeln will/soll, muss er nach Hamburg fahren.
‘If Müller wants/is to negotiate with Schmidt he has to go to Hamburg’

Sentence (4) means that the only or best way for Müller to negotiate with Schmidt is to meet him in Hamburg.

Hare’s contrast (1971):

(5) a. If you want sugar in your soup, you should ask the waiter.
   b. If you want sugar in your soup, you should get tested for diabetes.

(Sæbø, 2001): ACs with require subject control.

(6) a. If David is to recover we must find him a maid.
   b. If David wants to recover we must find him a maid.
   c. If we want David to recover we must find him a maid.

(Bech, 1955/57:102). Determinative vs. causal to clause.

(7) a. Wenn Müller mit Schmidt verhandeln will/soll, muss er nach Hamburg fahren.
   ‘If Müller wants/has to negotiate with Schmidt he has to go to Hamburg’
   b. Müller muss nach Hamburg fahren, um mit Schmidt zu verhandeln.
   ‘Müller has to go to Hamburg to negotiate with Schmidt’

(8) Müller travels to Hamburg to negotiate with Schmidt.

Anankastic conditionals have a “contraposed” paraphrase:

(9) Wenn Müller nicht nach Hamburg fährt, kann er nicht mit Schmidt verhandeln.
   ‘If Müller doesn’t go to Hamburg he can’t negotiate with Schmidt’

(10) Müller kann nicht mit Schmidt verhandeln, ohne nach Hamburg zu fahren.
    ‘Müller can’t negotiate with Schmidt, without going to Hamburg’

A note to the terminology. *if*-clause (antecedent) = restriction of an overt or covert modal; 
the modalised proposition = consequent.

3. PREVIOUS ANALYSES OF ANANKASTIC CONDITIONALS

3.1. Sæbø’s Analysis

(Kratzer, 1981).

(11) Ordering relations²:
Let g be an ordering source and let u,v,w be worlds:
   \[ v <_g(w) u \iff \{ p \in g(w) : p(u) \} \subseteq \{ p \in g(w) : p(v) \} \]

The *if*-clause of indicative conditionals restricts the modal base in the sense that \( f(w) \) is intersected with the proposition it expresses.

(12) If you want to go to Harlem you have to take the A train.

² We assume a simplified definition of the ordering source due to Irene Heim (lecture notes) that presupposes the Limit Assumption.
(13) 

\[(\forall w' \in f(w)) \text{you want to go to Harlem in } w' \land (\exists w'' \in f(w)) \text{you go to Harlem in } w'' \land w' < g(w') \implies \text{you take the A train in } w'\]

where \(f(w)\) contains relevant facts, e.g. train schedules, and \(g(w)\) is a set of your goals/wishes in \(w\).

Sæbø: if-clause restricts the ordering source

(14) 

\[\text{(Sæbø, 2001:442)}\]

\[\| (if \alpha)((must)) \| \overset{\text{f}}{\text{g}} = \| \text{must} \| \overset{\text{f}+\text{g}+}{\text{where if } \alpha \text{ expresses } \varphi \text{ then for any } w,} \]

\[(\text{i}) \quad f^-(w) = f(w) \cup \bigcap_{v \in g} F(v) \text{ and } g^-(w) = g(w) \]

where \(F\) is the general modal base (‘the facts’, ‘what is the case’), or

\[(\text{ii}) \quad f^+(w) = f(w) \text{ and } g^+(w) = g(w) \bigcup \bigcap_{\varphi \in g} G_\alpha(v) \]

where \(G_\alpha\) is the ordering source expressed in \(\alpha\) (e.g., ‘what you want’).

V. Fintel & Iatridou’s criticism:

(15) The Hoboken Scenario

a. You want to go to Hoboken.

b. Harlem and Hoboken are conflicting goals, e.g. for time reasons you can’t visit both places on one day.

c. The PATH train goes to Hoboken.

d. The A train goes to Harlem.

(Stechow et al., 2004) brought up the same point independently by discussing the following sentence from (Kratzer, 1981: 315):

(16) If you want to become the mayor, you must go to the pub regularly.

(17) The mayor scenario

a. You want to become the mayor.

b. You don’t want to go to the pub regularly.

c. You become the mayor only if you go to the pub regularly.

3.2. von Stechow’s analysis

he antecedent is added to the circumstantial modal base, which is a circumstantial one, i.e., it expresses facts of the actual world. The analysis can cope with both the Hoboken problem and the Mayor problem. It is not entirely compositional, because the contribution of “want” in the antecedent remains unclear. If the second parameter would be a bouletic ordering source, we would obtain Huitink’s problem as well.

3.3. von Fintel and Iatridou’s Analysis

(Fintel and Iatridou, 2004) discuss three different solutions of the Hoboken problem. Their final choice is the ‘designated goals’ analysis, which we will discuss in the following (for the critical review of the remaining two alternatives see (Stechow et al., 2004)).

There should be a mechanism that makes the proposition expressed by the complement of \(\text{want}\) or by the \(\text{to}\)-clause in the infinitival construction ‘override’ any other goals in the ordering source.

(18) von Fintel & Iatridou’s analysis
(19) The Ruud von Nistelrooy scenario  
  a. To go to Harlem, you can take the A train or the B train.  
  b. You want to go to Harlem.  
  c. You want to kiss Ruud van Nistelrooy (Dutch soccer star).  
  d. Ruud van Nistelrooy is on the A train.  

The designated goal analysis would predict that the Harlem sentence is true at least in its ought-version:

(20) If you want to go to Harlem you ought to take the A train.

Huitink follows Sæbø in assuming that the internal antecedent of the conditional is added to the ordering source. She assumes that the antecedent alone constitutes the ordering source.

Discussion. There are two possible problems with Huitink’s analysis. The first is that the internal antecedent has to be consistent with the modal base. Otherwise true anankastic conditionals would predicted to be false. The compatibility requirement does not follow from the architecture of Kratzer’s semantics for modality. The orderings source typically contains propositions that are not compatible with the ordering source. The second problem is the question of which relevant facts are in the ordering source. If this question is not answered, the theory is virtually empirically empty.

Problem 1: The internal antecedent has to be compatible with the ordering source.

Assume a situation w in which the proposition ¬p = ‘this water doesn’t boil’ is true. Suppose the modal base includes this fact. The following anankastic condition is false in w:

(21) If this water is to boil, its temperature ought to be 100°C Celsius.

(22) In every world where this water doesn’t boil and..., its temperature is 100°C Celsius.

It has to be explained why it is not possible that a goal is in conflict with this very salient fact and the modal base in general.

Problem 2: Which are the relevant facts in the modal base?  
Consider (20) again. There are many ways to go to Harlem. You can take the A train, you can take a taxi, you can ask someone to give you a ride, you can walk all the way through Manhattan, you can pretend to be an emergency and call for the ambulance and so on. In other words, it is not only a fact that you will reach Harlem, if you take the A train. It is a fact as well that you will reach Harlem if you walk through Manhattan and so on. If all of these where equally relevant for the evaluation of the truth of (20), the anankastic conditional would be predicted to be false under Huitink’s analysis. So how do we know that of all these facts the only thing that matters is the fact that you will reach Harlem if you take the A train?
4. A “COUNTERFACTUAL” ANALYSIS

4.1. Where we are now

- The hypothetical fact in the antecedent is the most decisive factor in the evaluation. But it is embedded under the bouletic modal, so not directly accessible. If one treats it as a wish/goal, but not as a relevant fact, one has to give it precedence over whatever else is in the teleological ordering source or one has to define the ordering source in a completely new way. (F&I and we contra Sæbø)

- Ranking accessible worlds on the basis of the teleological ordering source is problematic. What is best with respect to your goals is not always what is necessary. (Huitink)

4.2. Anankastic Conditionals as Lewis-Counterfactuals

We rank worlds on the basis of comparative similarity to the actual world, in the sense of (Lewis, 1973b). f is an empty modal base if f(w) is the necessary proposition W for any world w, and g is totally realistic if \( \cap g(w) = \{ w \} \) for any w.

(23) Anankastic necessity

to p, ought to/have to q is true in w with respect to modal base f(w) and ordering source g(w) iff all the g(w)-best worlds in f(w) where p is true are q-worlds (iff all the g(w)-best worlds where p is true are q-words)

(24) “To go to Harlem you have to take the A train” is true in w with respect to g iff you take the A-train in every g(w)-best world where you go to Harlem.

(25) If you want to go to Harlem and kiss Ruud van Nistelroy, you have to take the B train.

4.3. Anankastic conditionals as conditional speech acts?

The function of the if-clause is similar to that of a relevance conditional, the syntax is more like that of a factual conditional.

Relevance conditional:

(26) a. If I may be honest, you are not looking good. (Bhatt and Pancheva, 2004: [95])

= To be honest, you are not looking good.

b. If you want to know, 4 isn’t a prime number.

c. If you are thirsty, there is beer in the fridge.

The following example is a factual conditional:

(27) a. My friend Joe, whom you haven’t met, is very smart.(Bhatt and Pancheva, 2004: [97])

b. Oh yeah? If he’s so smart why isn’t he rich?

(28) a. If Oswald did not kill Kennedy, then someone else did.

b. If Oswald had not killed Kennedy, then someone else would have.

(29) The appropriateness condition
Let c be a context of use. Then \( [[\text{if } \alpha \beta]] \) is only defined if c \( \subseteq [[\alpha]] \).
If defined, \( [[\text{if } \alpha \beta]] = [[\beta]] \).

(30) *If you don’t want to go to Harlem, you have to take the A train to go to Harlem.*

(31) *If you don’t want to go to Harlem, you have to take the A train for not going there.*

4.4. **Ellipsis resolution: the implicit restriction of the anankastic modal**

von Fintel and Iatridou

(32) If you want to go to Harlem, you have to take the A train *to do that.*

= If you want to go to Harlem, you have to take the A train to go to Harlem.

LF for ACs:

(33) If you want to go to Harlem [you *have* [ to go to Harlem] to take the A train]

(34) In all the worlds where the goal that you go to Harlem is achieved and which make as many of the facts true as possible, you take the A train.

(35) Entry for the anankastic have to

\[ [[\text{have to}]]^{f,g,c}(w) \text{ is only defined if c is a Stalnaker common ground, } f(w) = W \text{ and } g(w) \text{ is totally realistic. When defined,} \]

\[ [[\text{have to}]]^{f,g,c}(w) = \lambda_{p_{st},c} \subseteq \text{goal}(p) : \lambda_{q_{st}} (\forall w' \in f(w))(p(w') \& (\neg \exists w''(w'' <_{g(w)} w' \& w'' \in p) \rightarrow w' \in q)) \]

Given that \( f(w) = W \), the truth condition boils down to

\[ \lambda_{p_{st},c} \subseteq \text{goal}(p) : \lambda_{q_{st}} (\forall w' \in p) (\neg \exists w''(w'' <_{g(w)} w' \& w'' \in p) \rightarrow w' \in q), \text{ i.e., q is true in the nearest } p\text{-worlds.} \]

4.5. **Comparing anankastic conditionals and would-conditionals**

(36) You have to take the A train to go to Harlem

=? If you will go to Harlem, you must take the next A train.

(37) a. If Otto behaved himself, he would be ignored. (Lewis, 1973b)

b. For Otto to behave himself, he has to be ignored.

(38) a. If kangaroos had no tails, they would topple over. (Lewis)

b. For kangaroos to have no tails, they have to topple over.

Decreasing anankasticity:

(39) a. In order to go to Harlem, you have to take the A train.

b. In order to go to Harlem, you have to take a train.

c. In order to go to Harlem, you have to wait.

d. In order to go to Harlem, you have to breath.

e. In order to go to Harlem, you have to be a person.

(40) \( \phi \square \rightarrow \psi \) is true in world w with respect to the ordering relation \( \leq \) iff \( \psi \) holds in every \( \leq\)-next \( \phi\)-world.

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Henceforth we use the convention for formulating presuppositions adopted in (Heim and Kratzer, 1998). Our definition must be read as follows:

\[ [[\text{have to}]]^{f,g,c}(p)(q) \text{ is defined iff } c \subseteq \text{goal}(p). \text{ If defined, } [[\text{have to}]]^{f,g,c}(p)(q) = 1, \text{ iff } (\forall w' \in p)(\neg \exists w''(w'' <_{g(w)} w' \& w'' \in p) \rightarrow w' \in q) \]
\[\phi \rightarrow \psi \text{ is true in world } w \text{ with respect to the ordering relation } \leq \text{ iff } \psi \text{ holds in some } \leq-\text{next } \phi-\text{world.}\]

(41) No strengthening of the antecedent
\[\phi \rightarrow \psi \Rightarrow \phi \land \chi \rightarrow \psi\]

(42) If you want to go to Harlem, you have to take the A train.
\[\therefore \text{ If you want to go to Harlem and see Ruud van Nistelroy, you have to take the A train.}\]

(43) Failure of transitivity
\[\phi \rightarrow \psi \land \psi \rightarrow \chi \Rightarrow \phi \rightarrow \chi\]
For Otto to go to the party, Anna has to go.
For Anna to go to the party, Waldo has to go.
\[\therefore \text{ For Otto to go to the party, Waldo has to go.}\]

(44) Failure of contraposition
\[\phi \rightarrow \psi \Rightarrow \neg \psi \rightarrow \neg \phi\]
For Boris to go to the party, Olga has to go.
\[\therefore \text{ For Olga not to go to the party, Boris has not to go.}\]

(45) To go to Harlem, you would have to take the A train.

(46) If this water is to boil, its temperature must be 100°C.

(47) \[\phi \rightarrow \psi :\leftrightarrow \phi \rightarrow \psi \land \psi R \phi, \text{ where } R \text{ means "is a means for achieving"}\]

4.6. Strengthening the meaning of the anankastic modal?

(48) \[\phi \rightarrow \psi :\leftrightarrow \phi \rightarrow \psi \land \neg \psi \rightarrow \neg \phi?\]
We know that contraposition doesn’t hold of \(\phi \rightarrow \). The anankastic conditional (38b) would still be true.

(49) You can’t go to Harlem without taking the A train.

(50) \[\phi \rightarrow \psi :\leftrightarrow \phi \rightarrow \psi \land \neg (\phi \rightarrow \neg \psi)?\]

(51) \[\phi \rightarrow \psi \text{ ist rue in } w :\leftrightarrow \text{Sim}_w(\phi) \subseteq \text{Sim}_w(\psi)?:\]

(52) If combustion is to occur, oxygen must be present.(Huitink).

We have no better idea of how to define the relation R. So either you take the relation “is a means for achieving” as a primitive, or you stick to the meaning rule in (35).

4.7. “Want” vs. “be to”

(53) Entry for the anankastic control have to:
\[\begin{array}{c}
[[\text{have to}]] = \lambda P \in D_{s(\text{et})}. \lambda q \in D_{s(\text{et})}. \lambda x \in D_c : \lambda w'. P_w'(x) \text{ is a goal of } x \text{ in } w.
\lambda w'. P_w'(x) \text{ is true in } g(w)-\text{nearest } \lambda w'. P_w'(x)-\text{worlds.}
\end{array}\]

(54) If you want to go to Harlem you have to take the A train.

\[\text{Here and in the rest of the definitions we ignore the assignment function.}\]
(55) $t$ : 

- $\text{you}$
- to take the A train
- to go to Harlem
- have

(56) If David is to recover we must/have to find him a maid.

(57) For David to recover, we must/have to find him a maid.

(58) LF for (57)

(59) “If David is to recover we have to find him a maid ” is true in $w$ with respect to $g$ iff $\text{Sim}_w(\lambda w. \text{David recovers in } w) \subseteq \lambda w. \text{we find David a maid in } w$.

4.8. Other types of anankastic sentences

(60) a. Wer schön sein will, muss leiden.
   ‘Whoever wants to be beautiful has to suffer’

   ‘You have to give the books you want to borrow to the librarian’

(61) a. Wer schön sein will, muss leiden, um schön zu sein.
   ‘Whoever wants to be beautiful has to suffer to be beautiful’

Die Bücher, die du ausleihen willst, musst du dem Bibliothekar geben, um sie auszuleihen.
   ‘You have to give the books you want to borrow to the librarian to borrow them’

(62)
(63) „Wer schön sein will, muss leiden“ ist true in w with respect to g iff 
\[ \forall x[\text{person}(x) \land x \text{ wants to be beautiful}] \rightarrow \]
Sim_w(\(\lambda w. x \text{ is beautiful in w}\)) \(\subseteq \lambda w. x \text{ suffers in w}\)

(64) a. Whatever is to be beautiful must also be sensible.
b. Alles muss bewusst sein, um schön zu sein.
    ‘Everything must be sensible to be beautiful’

(65) Alles, was schön sein soll, muss bewusst sein, um schön zu sein.
    Everything, that is to be beautiful, must be sensible to be beautiful.

(66)
4.9. "Contraposition":

(67) If you don’t take the A train, you can’t go to Harlem.

(68) There is no nearest world where you don’t take the A train but where you nevertheless go to Harlem.

= The nearest non-A-train worlds are disjoint from the Harlem worlds

(69) Sim_w(λ.w.you don’t take_w the A train) ∩ λ.w.you go_w to Harlem = Ø

= ¬(¬ψ ⊃ φ)

This is only a consequence of the anankastic must-conditional, and we are content with that. In fact, the truth condition is very weak. It is satisfied by two disjoint propositions φ and ψ that are false in the actual world. We would obtain a statement that is equivalent to the AC if the LF were ¬(φ ⊃ ¬ψ). Recall the discussion concerning (50). But it we cannot see how this could be derived from the syntax.

4.10. Restricting the Modal Base?

(70) If you want to go to Vladivostok you have to take the Chinese train.

(71) If you want to go to Vladivostok you should take the Chinese train.

(72) a. If you want to go to Vladivostok comfortably you have to take the Chinese train.
    b. To go to Vladivostok comfortably you have to take the Chinese train.

(73) To go to Harlem you have to take the A train, unless you have enough money for a taxi.

5. Conclusion

The counterfactual analysis of anankastic conditionals solves the puzzles we have encountered so far in connection with these constructions. Compared to competing modal analysis it has the advantage of being precise about the modal base: it contains the nearest antecedent worlds.

After ellipsis resolution, the analysis is entirely compositional. The role played by “want” or “to be” is to introduce a felicity condition on the use of the conditional. These modals do not contribute to the truth condition of the anankastic conditional.

The account over-generates. It classifies conditionals as anankastic that are intuitively weird. Our conjecture was that this has to do with the circumstance that we don’t understand the relation “being a means for”. More generally, we should have a better understanding of the semantics of purpose clauses about which we know nothing. We think similar difficulties arise with the competing modals approaches as well. They are simply not addressed there.

6. Appendix: A Note on Our Semantics

(74) [sleeps_{et}] = λ.w.λ.x.x sleeps in w

(75) Intensional Functional application.
Suppose we are given a functor $\phi$ of type (sa)b and an argument $\alpha$ of type a. Then the tree $[\phi \alpha]$ has the meaning $\lambda w.[[\phi][[w][\lambda w'.[[\alpha][[w']]]]]] = \lambda w.[[\phi][[w][[\alpha]]]]$.

REFERENCES


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