

ANANKASTIC CONDITIONALS AGAIN

ARNIM VON STECHOW, SVETA KRASIKOVA & DORIS PENKA

UNIVERSITÄT TÜBINGEN

arnim.stechow@uni-tuebingen.de, d.penka@uni-tuebingen.de,
svetlana.krasikova@student.uni-tuebingen.de

1 Plot¹

The object of our investigation is expressing necessary conditions in natural language, particularly in a certain kind of conditional sentences, the so-called Anankastic Conditionals (ACs)², a topic brought into the linguistic discussion by the seminal papers (Sæbø, 1986) and (Sæbø, 2001). A typical AC is the following sentence, Sæbø's standard example:

- (1) If you want to go to Harlem, you have to take the A train.

Sæbø analyses the sentence by means of the modal theory in (Kratzer, 1981), according to which a modal has two contextual parameters, a modal base $f(w)$ and an ordering source $g(w)$. The modal base contains relevant facts and the ordering source contains an ideal like wishes, moral laws and the like. Normally, the antecedent of a necessity-conditional is added to the modal base. Sæbø's new proposal for the analysis of the AC is that the antecedent without the information 'you want', called *inner antecedent*, is added to the ordering source.

Sæbø's analysis had remained almost unnoticed in the literature for more than a decade. But recently, quite a number of semanticists have discussed his theory. Every alternative account contains one or other material modification of Sæbø's theory.

Our proposal will be this. The inner antecedent is not added to the ordering source. It rather is the antecedent of a Lewisian necessity-conditional. Equivalently, it can be added to a circumstantial modal base that contains all the facts compatible with the antecedent. Furthermore, the construction is analyzed as a conditional speech act: the sentence expresses an assertion in a context in which you want to go to Harlem.

The structure of the paper is as follows. In section 2 we will have a closer look at the data, section 3 will be a review of the literature on ACs and in section 4 we will present a counterfactual account.

2 What is an anankastic conditional?

In this section we say what ACs are and that it is easy to confuse them with causative purpose constructions, which have a different meaning. The relevant observations are due to (Bech, 1955/57: 102 ff.), and it is Sæbø's merit to have rescued them from oblivion. In fact, Sæbø's example (1) is a transposition of the following sentence by Bech:

¹ This paper was originally written as a reaction to (Sæbø, 2001). In the meantime, it has undergone various changes. 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 The term is due to (von Wright, 1963).

- (2) 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'

Here is a list of different variants of the AC in (1).

- (3) 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.

Sæbø assumes that these sentences are truth conditionally equivalent and express the idea that taking the A train is a necessary condition for getting to Harlem. This is the most natural interpretation though not the only one. Sentences like (3)a are not restricted to the anankastic interpretation. Compare the following pair from (Hare, 1971):

- (4) 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.

Whereas (4)a shows all the symptoms of being an AC, (4)b would sound weird on this reading. Rather, it is a normal *must*-conditional saying that in view of the medical facts, in any situation in which you want sugar in your soup and respect the speaker's advice you get tested for diabetes.

An important observation due to Bech and highlighted by Sæbø is the fact that *um/to*-clauses are ambiguous when they occur together with a modal: they either restrict the modal and thereby produce an AC, or they simply express a goal. Bech calls the first use of *um/to* DETERMINATIVE, the second INDETERMINATIVE. When the *um/to*-clause restricts the modal, it provides the range of worlds over which the quantifier expressed by *must/muss* quantifies. Thus, (2), which we repeat below in (5)a, is a paraphrase of (5)b on its anankastic reading:

- (5) a. 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'
b. Müller muss nach Hamburg fahren, um mit Schmidt zu verhandeln.
'Müller has to go to Hamburg to negotiate with Schmidt'

Indeed, the sentences in (5) seem to express the same meaning, namely, that the complement of *must* is a necessary condition for the truth of the proposition 'Müller negotiates with Schmidt'.

Under the INDETERMINATIVE interpretation, the *to/um*-clause expresses a goal. (5)b then means something like: 'Müller has to go to Hamburg because he wants/is obliged to negotiate with Schmidt'. The purpose interpretation has nothing to do with the overt modal *muss/must*. Indeed, we can omit the modal and still obtain a purpose reading:

- (6) Müller is going to Hamburg to negotiate with Schmidt.

This can be paraphrased as: 'Müller goes to Hamburg with the aim of negotiating with Schmidt'. Here the *to*-clause expresses a *causa finalis*. If we adopt Lewis's (1973a) analysis of causation, we can paraphrase (6) roughly³ as:

³ This is not quite correct. The paraphrase gives us what Lewis calls causal dependence. Causation should be

- (7) ‘Müller is going to Hamburg, and he wants to negotiate with Schmidt, and if he didn’t want to negotiate with Schmidt, he would not be going to Hamburg’

In sentences without modals, only the causative reading exists, but sentences with overt modals + *um/to*-clauses are ambiguous, and the anankastic reading is easily overlooked.

ACs have a ‘contraposed’ paraphrase:

- (8) 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’

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

According to Sæbø, (8) and (9) are equivalent to (5). We think that this is not entirely correct; rather they are entailed by it. The semantics for anankastic *must/have to* should account for this meaning relation.

A note on the terminology is in order. Following common practice, we conceive of the *if*-clause of a conditional as the restriction of an overt or covert modal. The *if*-clause is called the antecedent of the conditional and the proposition or property embedded under the modal is called the consequent of the conditional. In (8), the antecedent is “if Müller doesn’t go to Hamburg”, and the consequent is the infinitival “he negotiate with Schmidt”. The modal *can* expresses the logical relation between the two. In the example given, the entire construction is negated in addition. The negation is not part of the consequent. We extend the terminology to modals that are modified by *um/to*-clauses. For instance, (5)b is a conditional with the antecedent “to negotiate with Schmidt” and the consequent ‘Müller to go to Hamburg’. The two are mediated by the anankastic modal *must*.

To summarize, an AC consists of a modal *must/have to*, which is either restricted by an *if*-clause containing an expression of intention or obligation or by a *to*-clause. This restriction is the antecedent of the conditional. The restriction expresses a goal of the subject. The entire construction expresses the idea that the consequent has to be true if the goal is to be true. The construction has a *can*-variant. Then it means that the goal can be achieved by making the consequent true. The construction must not be confused with normal purpose constructions that have a different meaning.

3 Different analyses of anankastic conditionals

In this section we give an overview of some approaches to the analysis of ACs. Since (Sæbø, 1986) the goal has been to develop an adequate analysis for this kind of conditionals within the theoretical framework of (Kratzer, 1981). (von Stechow and Iatridou, 2005)⁴ and (von Stechow et al., 2004) refuted Sæbø’s analysis by independently showing that it fails in face of inconsistent goals. Their solutions are criticized in (Huitink, 2005), who discusses certain scenarios with consistent goals and considers them problematic for the former two accounts. By doing this Huitink brings up an important property of ACs – a restricted notion of a necessary condition. Let us look at these analyses more closely and see what lessons we can draw from them.

analysed as a chain of causal dependencies.

⁴ This is the latest version of the paper. Earlier versions go back at least to 2004.

3.1 Sæbø's analysis

Sæbø was the first to identify ACs as problematic data for (Kratzer, 1981). According to Kratzer, the two contextual parameters for the interpretation of modals are a realistic modal base f and an ordering source g . For a given world w , $f(w)$ and $g(w)$ are defined as sets of propositions. $f(w)$ is a set of facts in w , i.e. $w \in \cap f(w)$, hence $f(w)$ is a circumstantial modal base, and $\cap f(w)$ are the accessible worlds. $g(w)$ contains goals, wishes, regulations that are used to order accessible worlds:

- (10) Ordering relations:
 Let g be an ordering source and let u, v, w be worlds
 $v <_{g(w)} u$ iff $\{p \in g(w) : p(u)\} \subset \{p \in g(w) : p(v)\}$, where \subset is proper inclusion.

The *if*-clause of indicative conditionals restricts the modal base, i.e. the proposition it expresses is added to $f(w)$.

If we apply this semantics to the AC in (11), it is predicted true in w with respect to f and g iff the condition in (12) holds:

- (11) If you want to go to Harlem you have to take the A train.
 (12) $(\forall w' \in \cap f(w))$ you want to go to Harlem in w' & $(\neg \exists w'' \in \cap f(w))$ you go to Harlem in w'' & $w'' <_{g(w)} w'$ \rightarrow 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 .

According to (12), the sentence is true iff in all accessible worlds in which you want to go to Harlem and in which as many of your goals are achieved as possible, you take the A train. This fails to capture the intuitive meaning of (11) as Sæbø correctly observes. This is so for the following reason. The relevant fact is that you get to Harlem only if you take the A train and not that you want to go to Harlem only if you take the A train.

To make Kratzer's analysis work for ACs, Sæbø suggests that it is the ordering source that grows as a result of processing the *if*-clause, not the modal base. *Want* in the *if*-clause indicates that the internal antecedent, i.e. the complement of *want*, is added to $g(w)$ but not to $f(w)$ as it would be in ordinary conditionals.

Sæbø's revised semantics for conditionals consists of two clauses - the first one applies to normal conditionals, the second takes care of the ACs:

- (13) (Sæbø, 2001: 442):
 $\llbracket (if \alpha)(must) \rrbracket^{f,g} = \llbracket must \rrbracket^{f+,g+}$ where if α expresses φ then for any w ,
 (i) $f+(w) = f(w) \cup \cap_{v \in \varphi} F(v)$ and $g+(w) = g(w)$
 where F is the general modal base ('the facts', 'what is the case'), **or**
 (ii) $f+(w) = f(w)$ and $g+(w) = g(w) \cup \cap_{v \in \varphi} G_\alpha(v)$
 where G_α is the ordering source expressed in α (e.g., 'what you want')

The idea behind the qualification (i) is that $\cap_{v \in \varphi} F(v)$ is $\{\varphi\}$, i.e. the singleton containing the external antecedent, and this set is added to the modal base $f(w)$ for non-ACs.⁵ The

⁵ We understand that $F(v) = \{p \mid v \in p\}$, i.e. the set of all facts in v . Therefore, $\cap_{v \in \varphi} F(v) = \{\varphi\} = \{p \mid (\forall v \in \varphi) p\}$

qualification (ii) for ACs is best understood by considering the standard example (1). G_α is the information “you want”, i.e., $G_\alpha(v) = \{p \mid \text{you want } p \text{ in } v\}$. If the content of the wanting is closed under entailment, $\bigcap_{v \in \varphi} G_\alpha(v)$ is the set $\{p \mid \text{that you go to Harlem} \subseteq p\}$. This set of propositions is to be added to the ordering source $g(w)$.⁶ Recall Kratzer’s definition of *must*:

$$(14) \quad w \in \llbracket \text{must} \rrbracket^{f,g}(p) \text{ iff } (\forall j \in \bigcap f(w))(\exists k \in \bigcap f(w))(\forall l \in \bigcap f(w))(l \leq_{g(w)} k \rightarrow l \in p)^7$$

We see two problems with Sæbø’s analysis. Firstly the formulation conceals the fact that the interpretation for the anankastic case is not compositional. The problematic feature is the parameter G_α . For the example given, G_α is the information ‘you want’. There is no systematic procedure to obtain this from the sentence ‘you want to go to Harlem’. Since we need a syntactic procedure anyway, a more honest way of formulating the rule is the following:

- (15) Sæbø restated:
 Consider a complex modal of the form [if α must].
 Suppose α splits into $\beta + \gamma$, where β expresses an ordering source, i.e. something like “You want”, “Kjell wishes”, etc. Then
 (i) $\llbracket \text{if } \alpha \text{ must} \rrbracket^{f,g} = \llbracket \text{must} \rrbracket^{f,g+}$ with $g+(w) = g(w) \cup \{ \llbracket \gamma \rrbracket^{f,g} \}$ for any w .
 Otherwise,
 (ii) $\llbracket \text{if } \alpha \text{ must} \rrbracket^{f,g} = \llbracket \text{must} \rrbracket^{f+,g}$ with $f+(w) = f(w) \cup \{ \llbracket \alpha \rrbracket^{f,g} \}$, for any w .

The first case is the anankastic one. Clearly, the syntactic expression of the ordering source must somehow be detected syntactically, and there is no procedure for doing this. Note that the only effect of (i) is that the internal antecedent γ is added to the ordering source. The second part of the definition is more or less identical to the definition of (Kratzer, 1981).

The second problem, in our opinion, is that Sæbø underestimates the complexity of the ordering source and the role of the internal antecedent as a hypothetical fact. To show why, it is enough to construct a scenario where the goal expressed in the antecedent is in conflict with the real goals of the subject. In this case, the conditional comes out false under Sæbø’s analysis, which should not be the case.

One such scenario for sentence (11) is discussed in (von Stechow and Iatridou, 2005) (henceforth vF&I) under the title ‘The Hoboken Problem’:

- (16) 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.

$\in F(v)$ }, i.e., φ is the proposition that is a fact in every φ -world.

⁶ Suppose $\varphi =$ that you want to go to Harlem and $\psi =$ that you go to Harlem. Then $\bigcap_{v \in \varphi} G_\alpha(v) = \{p \mid (\forall v) \text{ If you want to go to Harlem in } v, \text{ then you want } p \text{ in } v\}$. In every φ -world, ψ is the case. Hence ψ , the internal antecedent, belongs to this set. By closure under entailment, the consequences of ψ are in the set, too.

⁷ We gave a somewhat simplified version of Kratzer, which makes it equivalent with Lewis’ semantics, i.e. with the formulation

$$i \in A \square \rightarrow C \text{ iff } (\forall j) j \notin A \vee (\exists k \in A)(\forall l \leq_i k) l \in [A \rightarrow C],$$

where “ \rightarrow ” stands for material implication.

- c. The PATH train goes to Hoboken.
- d. The A train goes to Harlem.

vF&I show that if (11) is uttered in a situation like (16) Sæbø's analysis fails. According to this analysis, the sentence is true iff in all the best worlds you take the A train. The best worlds are the Harlem worlds and the Hoboken worlds. But it does not follow from the relevant facts that you take the A train if you go to Hoboken. So you don't take the A train in all the best worlds. There are some worlds in which you take the PATH train, viz. the Hoboken worlds. Therefore the conditional is false, which is a wrong prediction. (von Stechow et al., 2004) brought up the same point independently by discussing the following sentence from (Kratzer, 1981: 315):

- (17) If you want to become the mayor, you must go to the pub regularly.
- (18) The mayor scenario
 - a. You want to become mayor.
 - b. You don't want to go to the pub regularly.
 - c. You will become the mayor only if you go to the pub regularly.

If we follow Sæbø and add the proposition 'you become the mayor' to $g(w)$ without any restriction of $f(w)$, we get the same problem again. The sentence is incorrectly predicted to be false, because there are $g(w)$ -best worlds in which the consequent does not hold. To see this, call the wish expressed by (18)a m and that expressed by (18)b $\neg p$. Suppose these are the only wishes of the subject. Therefore $g(w) = \{m, \neg p\}$. Call the fact (18)c $m \leftrightarrow p$. We first notice that the set $\{m, \neg p, m \leftrightarrow p\}$ is inconsistent. It entails p and $\neg p$. Therefore this set cannot be satisfied by any world. It follows that any optimal world satisfies the set $\{m, m \leftrightarrow p\}$ or $\{\neg p, m \leftrightarrow p\}$. But in a world of the second kind the consequent p is false, i.e., you don't go to the pub regularly.

3.2 von Stechow's analysis

In his 2003 lecture notes (von Stechow, 2004), von Stechow proposes that the *want* in the antecedent is empty at LF. The antecedent is added to the circumstantial modal base. So it plays the role of a hypothetical fact. Since ACs have the form of indicative conditionals, the antecedent has to be consistent with the modal base. The analysis can cope with both the Hoboken problem and the mayor problem. As Sæbø's analysis, it is not compositional, because the contribution of *want* in the antecedent remains unclear.

3.3 von Fintel and Iatridou's analysis

vF&I are guided by the intuition that the antecedent of an anankastic conditional contributes a 'designated goal' to the semantics. Crucially, there should be a mechanism that makes the proposition expressed by the complement of *want* or by the *to*-clause 'override' any other goals in the ordering source. Following this idea they suggest that teleological modals are restricted by the designated goal argument. Their proposal is this:

- (19) (von Fintel and Iatridou, 2005: 15):
 - a. *to p, ought to q* is true in w relative to modal base $f(w)$ and ordering source $g(w)$ iff all the $g(w)$ -best worlds in $f(w)$ where p is achieved are q -worlds.

- b. *to p, must q* is true relative to modal base $f(w)$ iff all the worlds in $f(w)$ where p is achieved are q -worlds.

The goal expressed by the *if*-clause of ACs contributes the designated goal by filling the relevant argument slot, since it is contextually salient.

If we consider the Harlem sentence, the designated goals analysis correctly predicts that in all circumstantially accessible worlds, in which your goal of going to Harlem is achieved, you take the A train.

This analysis is successful in solving the problem with inconsistencies in the ordering source. In fact, the ordering source doesn't play any role for the analysis. However, the claim that the analysis is compositional is not justified. It works no better in this respect than von Stechow's analysis. *Want* does not contribute to the meaning of the sentence. At the end of their paper, von Fintel and Iatridou speculate on how the external antecedent could be integrated into the truth conditions. One possibility considered is the introduction of a second silent epistemic modal, something like: [If you want to go to Harlem MUST [to go to Harlem, must you to take the A train]]. Or the *if*-clause expresses an additional modification of the circumstantial modal base. None of these proposals solves the compositionality problem, because *want* is ignored for the essential part of the truth conditions, viz. (19).

We cannot see any difference between (19)a and von Stechow's analysis, except for wording. The designated goal is treated precisely as if it were the antecedent of a conditional with circumstantial modal base and teleological ordering source, i.e., it plays the role of a hypothetical fact.

One of the advantages of vF&I's proposal is that it distinguishes between *must*-conditionals and weaker *ought*-conditionals. The difference is that the latter are evaluated with respect to the teleological ordering source, whereas for the former the ordering source can be empty. There is one particular feature in the analysis that strikes us as being correct: the authors assume that the main clause of the anankastic conditional is elliptic: the restriction for the modal is determined by the context and perhaps the *if*-clause itself. We will stick to that idea in the following.

3.4 Huitink's analysis

(Huitink, 2005) is another attempt to solve the puzzle of ACs. Huitink argues that if there are several non-conflicting goals at stake and several ways to achieve the goal in the antecedent, the anankastic reading cannot obtain. So ACs should be false in such cases. However, they are predicted true under vF&I's and von Stechow's analyses. The scenario that should make the argument clear is the following:

- (20) The Ruud van 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:

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

What we get is that in the best Harlem worlds, i.e. the worlds in which you kiss Ruud van Nistelrooy, you take the A train. So the sentence is true but it shouldn't, because taking the A train is not a necessary condition for getting to Harlem in the described scenario.

Huitink follows Sæbø in assuming that the internal antecedent of the conditional is added to the ordering source. In view of potential inconsistencies, she has to make a crucial modification. She assumes that the antecedent alone constitutes the ordering source. This draws on the idea that the ordering source, in contrast to the modal base, must be explicitly stated.

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 ACs would be predicted false. The compatibility requirement does not follow from the architecture of Kratzer's semantics for modality. The ordering source typically contains propositions that are not compatible with the modal base. The second problem is how to answer the question about 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 $\neg p =$ 'the water in the pot doesn't boil' is true. Suppose the modal base includes this fact. Huitink (incorrectly) predicts the following AC to be false in w :

(22) If the water in the pot is to boil, its temperature ought to be 100⁰ Celsius.

The worlds quantified over by the modal are all $\neg p$ -worlds. The goal p cannot be added because it is inconsistent with the modal base. Therefore the truth conditions of the AC is the following statement, which is false:

(23) In every world where the water in the pot doesn't boil, its temperature is 100⁰ Celsius.

It has to be explained why it is not possible for a goal to be 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 (21) 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 even pretend to be an emergency and call for the ambulance. In other words, the facts are that you will reach Harlem, by taking the A train, by walking through Manhattan and so on. If all of these were equally relevant for the evaluation of the truth of (21), the AC would be predicted false under Huitink's analysis. So how do we know that of all these facts the only thing that matters is that you will reach Harlem if you take the A train? We think the answer is that taking the A train is the easiest way to get to Harlem. The other ways mentioned are more remote possibilities. So we really need a theory that chooses the least remote possibility among several possibilities. We think that Lewis's theory of counterfactuals does precisely this.

Huitink's conclusions are important in one more respect. She insists on the purely anankastic reading which is not available in scenarios like (20). But anankastic sentences are not always false in such scenarios. Quite often we actually have to deal with pseudo anankastic readings in the sense that we restrict the domain in which necessary conditions hold. We will discuss this point in section 4.5.

4 A “Counterfactual” analysis

4.1 Anankastic conditionals as Lewis-counterfactuals

The idea behind our proposal is simple. Let us assume that we are dealing with a different source of ordering in the case of ACs. We rank worlds on the basis of comparative similarity to the actual world, in the sense of (Lewis, 1973b). As with counterfactuals, we restrict accessible worlds to those that are closest to the actual world, i.e. make as many of its facts true as possible. To keep pace with the preceding discussion, we remain in Kratzer’s framework, where a counterfactual is formalized as a modality with an empty modal base and a totally realistic ordering source. f is an empty modal base if $f(w)$ is the singleton containing the necessary proposition W for any world w , and g is totally realistic if $\cap g(w) = \{w\}$ for any w . Formally, the truth conditions look exactly as the semantics that vF&I state for *ought to* in (19), which is repeated for convenience:

- (24) 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 -worlds)

The $g(w)$ -best p -worlds are the p -worlds that are as similar to w as they can be. This semantics is a reformulation of Lewis’ (1973b) semantics for the counterfactual operator $\square \rightarrow$ in Kratzer’s terms.⁸ The definition neglects the qualification for vacuous truth and assumes Stalnaker’s limit assumption. The truth conditions for the AC (3)c then read as follows:

- (25) ‘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.

Note that the problem discussed in (Huitink, 2005) does not arise under this account. Recall the scenario in (20). If there are two trains going to Harlem, whatever your preferences are, the sentence is false in this situation. We are considering the next Harlem worlds. Not in all such worlds you take the A train, in some of them you take the B train. However, the following sentence comes out true in the given scenario, which is a correct prediction:

- (26) If you want to go to Harlem and kiss Ruud van Nistelroy, you have to take the A train.

This analysis strikes us as attractive. We don’t need to invent a new semantics for ACs – we treat them as instances of counterfactuals.

4.2 Ellipsis resolution: the implicit restriction of the anankastic modal

As vF&I have observed, anankastic *want*-conditionals are elliptic. An explicit statement of the Harlem example was given above and is repeated here:

⁸ For a comparison between Kratzer’s and Lewis’ semantics for counterfactuals, see (Lewis, 1981).

- (27) 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.

The truth conditions we have given in section 4.1 were intended for the main clause that doesn't contain *want*. One function of the *if*-clause is that it delivers the antecedent for the ellipsis. The LF of the sentence is something like this:

- (28) If you want to go to Harlem [you have [to go to Harlem] to take the A train]

We claim that it is the *to*-clause that functions as the restriction of *have to*, not the *if*-clause. The complex main clause alone expresses the following AC, and that is all we need:

- (29) 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.

It seems to us that this is precisely what vF&I and Huitink have in mind. But we have said more than they have, namely what the relevant facts in the modal base are. The relevant facts are those that are “cotenable with the antecedent”.⁹

As for the role of the *if*-clause, we do not think that it is a part of the AC proper. We assume that the *if*-clause in ACs figures as the antecedent of what has been called a conditional speech act in the literature. However, neither of the two kinds of such conditionals studied in the literature - RELEVANCE or FACTUAL conditionals¹⁰ - seem to form a natural class under which ACs could fall according to the standard tests known from the literature.¹¹ Therefore, we have to leave the precise status of the construction open.

We suggest that the function of the *if*-clause is to reaffirm that the context is appropriate for the following elliptic anankastic statement. It has to follow from the context that the antecedent is somebody's goal or wish for an AC to be felicitous. For our purposes the following crude rule of use is sufficient.

- (30) The appropriateness condition
 Let c be a context of use. Then $\llbracket \text{if } \alpha \beta \rrbracket^c$ is only defined if $c \subseteq \llbracket \alpha \rrbracket$.
 If defined, $\llbracket \text{if } \alpha \beta \rrbracket^c = \llbracket \beta \rrbracket$.

This trivial pragmatics makes it possible to account for the role of ‘you want’ in the construction. Consider example (1). α corresponds to the clause ‘if you want to go to Harlem’. So the entire sentence can be used only in contexts, where you want to go to Harlem. It follows that the “inner antecedent” expresses a goal of the subject of *want*. This explains the oddness of the following sentence:

⁹ For the notion of cotenability, see (Lewis, 1973b: 2.6). χ is cotenable with premise ϕ in world w if either (1) $\chi = W$ or (2) χ holds throughout some ϕ -permitting sphere around w . A counterfactual $\phi \square \rightarrow \psi$ is true in world i iff there is an auxiliary premise χ cotenable with ϕ in world i such that ϕ and χ together logically imply ψ . χ may be regarded as the circumstantial modal base that is needed for the modal analysis of Huitink to work. Each counterfactual can be reformulated as a strict conditional along these lines, but we have a price to pay: the cotenable premise depends on the antecedent of the conditional. Different conditionals require a different cotenable premise. For the same reason the circumstantial modal base cannot be provided by the context alone: it depends on the antecedent. If we assume that the modal base $f(w)$ is just the smallest ϕ -permitting sphere, we are back to the counterfactual analysis.

¹⁰ The terms *factual/relevance* conditionals are taken from (Bhatt and Pancheva, 2004). Presumably, the terms go back to (Iatridou, 1991).

¹¹ See (Bhatt and Pancheva, 2004: 37 ff.)

- (31) #If you don't want to go to Harlem, you have to take the A train to go to Harlem.

The *if*-antecedent tells us that the context of use implies the proposition that the addressee doesn't want to go to Harlem. It would be impolite or pointless to utter the consequent, which contradicts the intention of the addressee.

To return to first role of the *if*-clause, i.e. providing the antecedent for the ellipsis, it is instructive to note that there are other types of clauses that have this function. Consider the following example with a free relative clause containing *want*:

- (32) Wer schön sein will, muss leiden.
'Whoever wants to be beautiful has to suffer'

This sentence is clearly anankastic. Our analysis for anankastic conditionals immediately extends to it. We suggest that (32) contains an elided *to*-clause, and after ellipsis resolution corresponds to:

- (33) Wer schön sein will, muss leiden, um schön zu sein.
'Whoever wants to be beautiful has to suffer to be beautiful'

4.3 Comparing anankastic conditionals and *would*-conditionals

On hearing the term 'counterfactual analysis' one could think that every AC is expressible as a *would*-conditional. This, however, is not so, and this fact might serve as an objection against our proposal. Recall, however, that the Stalnaker/Lewis counterfactual semantics covers both subjunctive and indicative conditionals, though these seem to have quite different meanings. The difference in meaning is explained by the difference in the felicity conditions: the antecedent of an indicative conditional must be compatible with the common ground.¹² Counterfactuals "carry some sort of presupposition that the antecedent is false" (Lewis, 1973b: 3), i.e., the antecedent of a subjunctive conditional must be incompatible with the common ground. The ACs considered so far are indicative conditionals and are therefore used in contexts different from those of *would*-counterfactuals. A further distinction is that the restriction of *have to* is an infinitival. Infinitivals under modals are future oriented if they express a non-stative Aktionsart, and *to*-infinitivals seem to be future oriented quite generally.

In many respects, the logical properties of ACs are the same as those of Lewis' counterfactuals. To improve readability, let us use Lewis' notation for counterfactuals instead of Kratzer's:

- (34) $\phi \Box \rightarrow \psi$ is true in world w with respect to the ordering relation \leq iff ψ holds in every \leq -next ϕ -world.
 $\phi \Diamond \rightarrow \psi$ is true in world w with respect to the ordering relation \leq iff ψ holds in some \leq -next ϕ -world.

¹² Here is a relevant quote from (Stalnaker, 1976) making the point clear: "It is appropriate to use an indicative statement or supposition only in a context which is compatible with the antecedent." Subjunctive conditionals, on the other hand, are argued to presuppose the falsity of their antecedent.

Recall that the ordering relation \leq can be defined via an ordering source g . Let us denote the anankastic relation by means of the symbol $\circ \rightarrow$. Our account suggests that the two relations are the same. Indeed, neither of the two relations allows for strengthening of the antecedent, transitivity or contraposition.

- (35) No strengthening of the antecedent
 $(\phi \circ \rightarrow \psi) \not\equiv ((\phi \ \& \ \chi) \circ \rightarrow \psi)$

Consider a scenario in which it takes 3 and a half hours to get to Harlem. Then the following argument does not hold:

- (36) To be in Harlem before noon you have to leave at 8 a.m.
 \therefore To be in Harlem at 9 a.m. you have to leave at 8 a.m.

Transitivity does not hold for $\circ \rightarrow$ either. We can show that by using Lewis' examples.

- (37) Failure of transitivity
 $((\phi \circ \rightarrow \psi) \ \& \ (\psi \circ \rightarrow \chi)) \not\equiv (\phi \circ \rightarrow \chi)$
 For Otto to come to the party, Anna has to come.
For Anna to come to the party, Waldo has to come.
 \therefore For Otto to come to the party, Waldo has to come.

The argument is invalid for reasons similar to those given in (Lewis, 1973b: 33). Contraposition cannot hold either, as an adaptation of another example of Lewis shows:

- (38) Failure of contraposition
 $(\phi \circ \rightarrow \psi) \not\equiv (\neg \psi \circ \rightarrow \neg \phi)$
For Boris to come to the party, Olga has to come.
 \therefore For Olga not to come to the party, Boris must not come.

The invalidity of these arguments speaks in favour of the identification of the two relations.

However, trying to paraphrase Lewis' standard example by an AC suggests that there is a real difference in truth conditions between the two constructions:

- (39) a. If kangaroos had no tails, they would topple over.
 b. For kangaroos to have no tails, they have to topple over.

Here both the antecedent and the consequent are states, and straining our intuitions somewhat, the second sentence may have a simultaneous interpretation, even a tenseless one. We have the feeling that the two mean different things. The second sentence suggests that the habit of toppling over might cause the state of having no tails. This is an absurd idea. Therefore (39)b appears either nonsensical or false. (39)a on the other hand is true. Our analysis cannot explain the difference.

Let us summarize the discussion in this section. With respect to strengthening of the antecedent, transitivity and contraposition, the anankastic relation $\circ \rightarrow$ and the counterfactual relation $\square \rightarrow$ behave alike. An identification of the two relations could explain the behaviour. On the other hand, a plain modal account would have to say something about why these logical properties don't hold.

We observe, however, that *would*-conditionals cannot be paraphrased as ACs and we have to explain why this should be so.

Differences in meaning might come from the different felicity conditions and the difference in temporal orientation.

So far we have been assuming that ACs are indicative conditionals and therefore subject to Stalnaker's restriction. But it is not clear that indicativity is an essential restriction, for ACs can be put into the subjunctive:

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

The only important difference that might yield an explanation is the difference in temporal orientation. If the antecedent and the consequent of a *would*-conditional are both about the present, the antecedent will typically be true before the consequent. For an AC, the typical temporal relation is exactly the other way round. The internal antecedent, i.e. the *to*-clause, will be true after the consequent. This fact suffices to guarantee the difference in meaning in many cases.

This, however, cannot explain all weird examples. The kangaroo-example cannot be blocked because the sentence expresses a sort of law and is therefore timeless. The same can be said for other laws:

(41) If the water is to boil, its temperature must be 100⁰ Celsius.

This is an AC. It would seem then that we need a further relation R that strengthens the counterfactual relation $\phi \square \rightarrow \psi$. Let us therefore symbolize this strengthened relation in the following way:

(42) $(\phi \circ \rightarrow \psi): \Leftrightarrow ((\phi \square \rightarrow \psi) \& (\psi R \phi))$

The question is of course, what R could be. The first idea that comes to the mind is that the $\psi R \phi$ means something like 'ψ is a means for achieving φ'. But does this make sense?

- (43) a. Um einen Führerschein zu haben, musst du 18 Jahre alt sein.
'To have a driving license, you must be 18 years old.'
- b. Um Bundeskanzler zu sein, musst du Deutscher sein.
'To be the chancellor, you must be German.'

Being 18 years old is a precondition for having a driving license. The age alone is no means for getting into the possession of the license. A similar consideration applies to (43)b. So the notion "means for achieving" doesn't always make sense. The consequent of the AC is just a necessary condition for achieving the purpose expressed by the antecedent. It is no more than that. But perhaps the anankastic relation should be defined in a stricter way. We have to leave it as an open question here, what kind of strengthening is necessary for ACs, if any.

4.4 "Contraposition" and existential conditionals

Following (Bech, 1955/57), Sæbø considered a "contraposed" paraphrase to which we turn now:

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

Recall that Lewis' *could*-conditional is defined as the dual of the *would*-conditional:

- (45) $w \in (\phi \diamond \rightarrow \psi)$ iff $w \in \neg(\phi \square \rightarrow \neg\psi)$
 i.e. $(\exists u \in \phi)(\exists v)[v \leq_w u \ \& \ v \in \phi \ \& \ \psi]$, where \leq_w is comparative similarity with respect to w
 Roughly: $\text{Sim}_w(\phi) \cap \psi \neq \emptyset$

The formalization of (44) would therefore be the following:

- (46) a. $\neg(\neg\text{you take the A train} \diamond \rightarrow \text{you go to Harlem})$
 b. iff $(\neg\text{you take the A train} \square \rightarrow \neg\text{you go to Harlem})$

Strictly speaking, (46)a is the dual of the contraposition of (3)a, i.e. (46)b.

According to Bech and Sæbø, (44) means precisely the same as (3)a. Under our analysis it is only a consequence of the AC. The intuitively correct paraphrase of the truth conditions is this:

- (47) 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

In Stalnaker/Lewis' terms, the truth conditions should be this:

- (48) $\text{Sim}_w(\lambda w.\text{you don't take}_w \text{ the A train}) \cap \lambda w.\text{you go}_w \text{ to Harlem} = \emptyset$

In order to see that (48) is only a consequence of the anankastic *must*-conditional, assume that the A-train worlds (A) intersect with the closest Harlem worlds (H) without including them. Furthermore, there are H-worlds closer to the real world than any of the H&A-worlds. This makes the *can*-conditional true but falsifies the *must*-conditional (3). Since it is difficult to find an example of this kind, we leave it open whether our prediction is born out.

4.5 Restricting the Modal Base?

Expressing necessary conditions is a context-sensitive matter. One should speak of a necessary condition relativized to certain facts. The following sentence (by Wolfgang Klein, p.c.) illustrates this idea:

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

Now assume the following scenario: there are two trains, the Russian train and the Chinese train. The Chinese one offers a much better service. For W. Klein, the conditional is true in this situation. But is it an AC? For Orin Percus, the conditional is false in the given scenario. He would have to use the modal "should" for obtaining a true statement:

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

This is not an AC meaning "The only way to go to Vladivostok is to take the Chinese train".

On the other hand, we obtain true anankastic conditionals if we make the condition „to have good service“ explicit in the antecedent:

- (51) 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.

It is an empirical question whether (49) means the same as (51)a,b in the given scenario. If ACs were context dependent in this sense, one would have to restrict the modal base, or strengthen the antecedent, by adding additional facts. In our example $f(w)$ would contain information about your preferences, viz. that you travel by trains with the best service. In any case, *should*-conditionals are interpreted with respect to such a personal modal base.

In general, the restriction of the modal base seems to be needed quite often, and not only for *should*-conditionals. One can come up with scenarios where *to*-infinitive constructions or *can*-conditionals have to be weakened in a similar way.

Consider the following example in which the restriction is introduced explicitly:

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

The hypothetical fact introduced by the *unless*-clause „you don’t have enough money for a taxi“ restricts the modal base. It is not empty anymore but contains an additional antecedent. The sentence is true iff in all the next worlds, in which you go to Harlem and don’t have enough money for a taxi, you take the A train.

5 Conclusion

The counterfactual analysis of ACs solves most puzzles we have encountered so far in connection with these constructions. We have criticized Sæbø’s innovation that the antecedent is added to the ordering source. We claim that it has to be added to the (Lewisonian) modal base, i.e., it is the antecedent of a counterfactual. In this respect, our proposal is different from all other proposals in the literature. It could turn out that wishes don’t play any role at all in the semantics of ACs. The puzzles seem to arise if one assumes that the ordering source consists of wishes. For us, at least the primary ordering source is simply a set of facts whose intersection is the singleton containing the world of the context. Wishes play a pragmatic role.

After ellipsis resolution, our analysis is entirely compositional. The role of the *if*-clause with *want/be to* is to introduce a felicity condition on the use of an AC. These modals do not contribute to the truth conditions of an AC.

As we have mentioned above, our approach is not so different from vF&I’s or Huitink’s. If we make the underlying assumption that for an AC of the form ‘*to φ you ought ψ* ’, $f(w)$ should be the smallest φ -permitting sphere (cf. fn. 9) explicit and if the inner antecedent is added to $f(w)$, the approaches become equivalent.

Still, the role of the *want* in the *if*-clause of the AC in (1) remains somewhat mysterious. Our proposal of analyzing the construction as a conditional speech act is certainly open to criticism, because it doesn’t meet the usual syntactic tests for these constructions.

If the criticism put forward in the recent literature is warranted, Sæbø’s innovation is not tenable, but the increasing interest in the subject demonstrates the fruitfulness of his proposal.

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