Another modal interpretation of tense in X-marked conditionals

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1 Introduction

The topic of the paper is the linguistic puzzle known as Fake Tense.\(^1\) This notion refers to the observation that in certain English conditionals the Simple Past, and also the Past Perfect appear not to be interpreted as semantic past tense or past perfect. The goal of the paper is to contribute to a better understanding of why these tense markers occur in conditionals and what their function is.

This makes the current project part of the more general enterprise of understanding the semantic anatomy of conditional sentences. Within the field of semantics this is a topic that has gained more and more attention during the last 20 years. Recent publications include Kaufmann 2005 and Stechow & Gronn 2010 on the semantics of English indicative conditionals, and Iatridou 2000, Ippolito 2003, 2006, 2013, Arregui 2007, 2009, Stechow & Gronn 2008, Khoo 2015, Mackay 2018 on the semantics of English subjunctive conditionals. In line with these publications the present manuscript hopes to contribute to our understanding of the interaction of the semantics of conditionals with other operators occurring in these sentences.

A bit of terminology. Before we can start, we first need to introduce some terminology. For the purpose of this article, a conditional sentence consists of main clause and a subordinate clause starting with If. We will refer to the subordinate clause as the If-clause of the conditional. Antecedent will refer to the proposition in scope of If and consequent to the proposition in scope of the modal verb in the main clause.\(^2\)

We distinguish for English three conditional constructions. Ippolito (2013) uses the terms indicative conditionals, simple past subjunctive conditional and past perfect subjunctive conditionals. We will follow Sabine Iatridou and Kai von Fintel and replace the term subjunctive conditional by X-marked conditionals to avoid confusion with the subjunctive mood. Thus, we will use the notions simple past X-marked conditional (SPC for short) and past perfect X-marked conditional (PPC). An SPC contains one of the modals would, could, might, ought or should as finite verb in the main clause. The finite verb in the antecedent is in its Simple Past form (1-b) or

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\(^1\) The name has been coined in Iatridou 2000.
\(^2\) As will be discussed later, we will assume that there is always a modal verb in the main clause of a conditional.
were is used (1-c). A PPC contains additionally in the antecedent and the consequent perfect markings (1-d)-(1-e). An *indicative conditional* is a conditional sentence that does not contain as finite verb-form in the consequent *would, could, might, ought* or *should* (1-a).

(1) a. If Peter left in time, he will be in Frankfurt this evening.
   b. If Peter left in time, he would be in Frankfurt this evening.
   c. If Peter were to leave in time, he would be in Frankfurt this evening.
   d. If Peter had left in time, he would have been in Frankfurt this evening.
   e. If you had been in Paris next week, we could have met.

**Fake Tense.** Think about the temporal location of the eventualities described in the *If*-clause of the examples. In the indicative conditional (1-a) the finite verb in the antecedent carries Simple Past morphology. The tense morphology is interpreted as temporal anteriority: the eventuality described in the antecedent is localised in the past with respect to the utterance time. Compare this to the second sentence (1-b). This SPC has exactly the same antecedent as the indicative conditional (1-a). But in this case the antecedent cannot be interpreted as referring to the past. Instead, Peter’s leaving has to be understood as taking place in the future (relative to the speech time). It looks like the past morphology in (1-b) does not contribute to the meaning of the sentence; at least not in the expected way. It seems to be fake. In the PPC (1-e) there appear to be even two layers of fake morphology. The antecedent is marked with the Past Perfect. According to standard accounts of the semantics of the English tenses this means that the described eventuality is located in the past of some contextually given past time. But again, the antecedent talks about the future. So, both layers of past morphology, the Simple Past and the Perfect, appear to be fake. In (1-d), on the other hand, the Perfect still seems to have a temporal function: the eventualities described by antecedent and consequent are localised in the past.

This phenomenon is called in Iatridou 2000 *fake tense* or *fake past*. As we see, it is a problem of X-marked conditionals. But this surprising behaviour of tense morphology is not restricted to conditionals sentences. It also occurs, for example, in counter-to-fact wishes, complement clauses of a comparison starting with ‘like’ or ‘as if’, the scope of verbs like ‘suppose’, ‘assume’, and other constructions. Furthermore, there is a large number of different languages that all display fake tense in certain contexts (see James 1982 for more details). However, while there is

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3 The same point can be made with the consequent as well, though in this case the effect is less transparent because of the involved modal.

4 In some dialects of American English (1-c) is preferred to (1-b). Speakers of British English generally prefer (1-b) to (1-c). However, the point relevant for the present discussion can be made as well for (1-c). Also in this case the antecedent carries past tense markings on the finite verb ("were") that appear to be not interpreted.
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a lot of cross-linguistic variation concerning the contexts in which fake tense occurs, in all of these languages it is used in the conditional constructions they can use to express counterfactuals (see Ippolito 2013: 23 for more references). So, this context seems to be at the heart of the phenomenon. Therefore, it is not surprising that the vast majority of the literature focusses on explaining fake tense in conditionals.

The literature. In the literature two strategies for how to approach the problem can be distinguished: Past-as-past approaches (PaP) and Past-as-modality approaches (PaM). The central claim of PaP approaches is that even though it looks like the past tense is not interpreted temporally in X-marked conditionals, it still is. It just contributes its meaning in an unexpected way. Approaches that fall in this group are Dudman 1984, Tedeschi 1981, Ippolito 2013, 2006, Arregui 2007, 2009, Khoo 2015, but you find related ideas also in the philosophical literature (cf. Edgington 2004). The central idea behind PaP approaches is that in order to evaluate X-marked conditionals, one has to go back in time to some point when it was still open whether the antecedent would become true or not. At this past time it is then evaluated whether in case the antecedent turned out to be true, the consequent would be true as well. The Past tense expresses the involved backshift in time.

Though PaP approaches strongly dominate in the formal semantics literature on fake tense, overall the majority of the approaches are of the PaM variety (see Palmer 1986, Fleischmann 1989, Dahl 1997, Iatridou 2000, Schulz 2014, Mackay 2018 and many more). The claims made by proposals in this group diverge largely. However, they all share the idea that in time in X-marked conditionals the past tense receives a mood or modality meaning, often paraphrased as distance from reality. The general problem of approaches along this line is that the proposals made stay on a very general, intuitive level and are not worked out in full detail. In consequence, they are hard to test and difficult to criticise. Proposals like Iatridou 2000, Schulz 2014 and Mackay 2018 try to overcome this limitation of PaM approaches.

This paper. In this paper we will offer a new approach to fake tense in X-marked conditionals. This proposal is strongly inspired by recent publications on the topic. A main motivation for the proposal made here is the criticism brought forward in Mackay (2015) against the PaM approach of Iatridou (2000) and Schulz (2014). This very interesting criticism led to a recent counter-proposal by Mackay (2018). We will discuss both, the criticism and the new proposal and argue that even though the criticism is sound, the alternative is not convincing. We will then propose an alternative approach to fake tense that is based on a modified version of Kratzer (2012)’s restrictor approach to conditionals. For the most part of the paper we will
focus on fake tense in SPCs. But we will also sketch an approach to the second layer of past tense morphology in PPCs at the end of Section 4.

2 A review of the recent debate in the PaM camp

In this section we will quickly run through the explanation for Fake Past proposed in Iatridou (2000) and Schulz (2014). We will then have a look at Mackay (2015)’s argument against this line of approach, extend the criticism a bit further and outline the alternative PaM approach proposed in Mackay (2018). This is for the most part just a review of the literature, so we will keep it short and only reproduce the central lines of the proposals and the criticism.

2.1 The PaM approach of Iatridou (2000).

The classical PaM-proposal for Fake Past in the semantics literature is Iatridou (2000). The proposal of Schulz (2014) is very similar in spirit, but provides a more detailed composition semantics. As this is not our concern here, we will focus on Iatridou (2000).

According to Iatridou (2000) the past morpheme in English expresses a restriction on the interpretation of the variable \(x_T\) that this past morpheme is attached to. The restriction relates the value of this variable \(x_T\) to its deictic center \(x_C\). The relevant relation is exclusion: the past tense morpheme marks that the value of \(x_T\) cannot equal the value of the deictic centre \(x_C\). If, for instance, the past tense morpheme is attached to a variable marking the temporal location of some eventuality, it expresses that the described eventuality took place at a time \(t_T\) that differs from the utterance time \(t_C\). Iatridou (2000) infers form this, together with the assumption that past or present are the only tenses\(^5\), that \(t_T\) needs to be a past time. But, she continues, the exclusion feature can also be applied to the modal domain. In this case, the past tense morphology is attached to the world-variable of a sentence and states that this variable excludes “… the worlds that for all we know are the worlds of the speaker” (Iatridou 2000:247). We will take “what is known in the utterance context about the utterance world” to be the factive common ground: the set of worlds that are consistent with what is known in the utterance context about the utterance world.\(^6\)

Iatridou adopts a standard similarity approach to the meaning of counterfactuals. In the antecedent of X-marked conditionals, the exclusion feature applies to the

\(^5\) Iatridou (2000) assumes that the future tense expresses a modal claim.

\(^6\) Other interpretations are possible. Which one is chosen doesn’t matter for the point Mackay (2015) makes. We choose the interpretation as factive common ground, because this is also a central notion in Mackay 2018. There the factive common ground is a set of propositions. The set of worlds we are referring to here can be obtained from this set of propositions by set intersection.
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worlds the antecedent talks about, i.e. the worlds most similar to the actual world that make the antecedent true. For these worlds it is then stated that they exclude the factive common ground. If \( f(A) \) denotes the worlds selected by the antecedent and \( E \) the factive common ground, then the feature states that \( f(A) \cap E = \emptyset \). The same holds for the consequent (it talks about the same set of worlds that the antecedent talks about and states that these worlds make the consequent true). The exclusion feature by itself does not yet entail that the antecedent and the consequent are counterfactual. The only thing conveyed so far is that they talk about a set of worlds that excludes the actual world (according to what is known in the utterance context). The actual world could still make the antecedent true. In Iatridou (2000) the counterfactuality of the conditional is derived as a conversational implicature: "... if the speaker chooses to predicate \( p \) of worlds other than the actual one, it is because he or she does not think that the actual worlds is a \( p \)-world." (Iatridou 2000: 248).

2.2 The criticism of Mackay (2015).

Mackay (2015) argues that this line of approach to fake tense is too restrictive. He illustrates the problem using the sentences in (2-a) and (2-b).

\[(2) \quad \begin{align*}
(a) & \quad \text{If Jones had taken arsenic, things wouldn’t be quite as they actually are.} \\
(b) & \quad \text{If Jones had taken arsenic, everything would be exactly as it actually is.}
\end{align*}\]

According to Iatridou (2000) the Past Tense expresses that the worlds selected by the antecedent, the topic worlds in her terminology, exclude the factive common ground. This set necessarily contains the actual world. Thus, Iatridou (2000) predicts that the topic worlds exclude the actual world. If we add the additional assumption that different worlds cannot be identical with respect to the facts that hold in them, it follows that Iatridou (2000) assigns trivial truth conditions to the sentences (2-a) and (2-b) (the first is trivially true, the second trivially false). This prediction doesn’t fit intuitions. The sentences in (2-a) and (2-b) appear to express non-trivial claims. Intuitively, (2-a) is false and (2-b) true in the given context. It looks like the idea to understand fake tense as excluding a set of worlds that contains the actual world doesn’t work. The examples (2-a) and (2-b) seem to show that the actual world can be among the worlds the antecedent of an X-marked conditional selects.

One possible strategy of defence for Iatridou (2000) and Schulz (2014) could be the following (Iatridou, p.c.): Mackay (2015) is not really showing that there is a problem with the semantics assigned by Iatridou (2000) to (2-a) or (2-b). The author observes that the sentences are informative, even though the proposed semantics predicts trivial truth conditions. But there are many possible (pragmatics) reasons

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7 Even without this assumption we run into trouble. If there are worlds with identical interpretations to the actual world, these worlds should be part of the factive common ground as well. There is no way differentiate between them in terms of knowledge.
why a sentence might be informative even though it is trivially true/false by its semantics. Mackay (2015) isn’t giving us any arguments why this shouldn’t be the case here. Even though this is a viable defence, it is a comparatively weak move. We would like to have a stronger foot to stand on than just pointing to the bottomless waste-basket of pragmatics. Furthermore, as we will discuss below, the problem noticed by Mackay (2015) is more general. The line of defence sketched here, however, doesn’t work in general.

A stronger possible line of defence is to argue that relevant for the contribution of the past tense in X-marked conditionals is not the factive common ground, but the doxastic state of some relevant agent. When a speaker utters (2-a) or (2-b) she is, for the sake of the argument, adopting the doxastic state of the opponent that she wants to convince that Jones took arsenic. This opponent believes that the symptoms were not caused by arsenic poisoning. Hence, given the doxastic state of the agent with respect to which the conditional is uttered the worlds the antecedent talks about indeed exclude the actual world (according to the beliefs of this agent). That would explain the use of the tense markers in accordance with the proposals of Iatridou (2000) and Schulz (2014). The question is whether indeed we can switch so easily between different doxastic states when making assertions. It seems impossible to shift the deictic centre for the interpretation of other types of deictic expressions, like pronouns or temporal/spatial particles. We will, therefore, assume that we have to explain (2-a) or (2-b) as referring to the factual common ground.

2.3 The problem is bigger than Mackay (2015) thought.

Consider (3-a) and the reply given in (3-b). (3-b) appears to be a sound reply to what was said in (3-a). But that means that facts of the actual world can be used to deny the X-marked conditional uttered in (3-a). How is this possible if Iatridou (2000) and Schulz (2014) are right and these conditionals explicitly mark that they are talking about worlds that exclude the actual world?

(3) a. If Heather had left before 9am, she would have made it to the meeting.
   b. Well, you’re wrong. She did leave before 9 and still didn’t make it.
   c. ?Well, you’re wrong. She did leave before 9 am, but there was an earthquake and she didn’t make it.

Notice, furthermore, that not all claims about the truth value of antecedent and consequent in the actual world can be used to deny the conditional in (3-a). The reply in (3-c) seems odd. In other words, if the actual world is an abnormal antecedent world, then the world doesn’t count against the X-marked conditional. The generalisation that seems to emerge here is that facts of the actual world can falsify X-marked

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8 These examples are variations of an example taken from the slides of a talk Sabine Iatridou gave in the fall of 2016.
conditionals, at least as long as the actual world counts as a most similar world that makes the antecedent true. But that means that also for X-marked conditionals the actual world can be among the worlds selected by the antecedent. This goes directly against the core idea of the proposals of Iatridou (2000) and Schulz (2014).  

2.4 Kratzer’s restrictor approach in a nutshell

The observations discussed so far provide evidence against the proposals of Iatridou (2000) and Schulz (2014), not against PaM approaches in general. They also don’t show that there is something wrong with the idea that the Past Tense in X-marked conditionals expresses distance from the deictic centre. It just might be that these authors select the wrong type of the deictic centre or the wrong order. This is exactly what Mackay proposes in his attempt to overcome the problems of Iatridou (2000) and Schulz (2014). But his approach uses in a crucial way Kratzer’s restrictor approach to conditional sentences. Therefore, and also because this will play a central role in the next section, we will quickly summarise this approach here.

According to Kratzer (2012), the interpretation of modals depends on two variables: a modal base $f$ and an ordering source $g$. Formally, both are modelled as functions that map the world (or situation) in which the modal statement is evaluated to a set of propositions. The modal base $f$ pins down the conversational background for the interpretation of the modal. It fixes the facts of the evaluation world or the body of information that is used to validate the modal claim. The ordering source $g(w)$ sets a standard of normalcy for the interpretation of the modal. The propositions in $g(w)$ are used to rank possible worlds according to their compliance with $g(w)$: $w_1 \preceq_{g(w)} w_2$ iff $\{p \in g(w) : w_2 \models p\} \subseteq \{p \in g(w) : w_2 \models p\}$. The truth conditions of the modal claim depend additionally on the force of the modal. A

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9 Notice that the second line of defence sketched above against the argument of Mackay (2015) also works for the example given here. We can say that the speakers of (3-a) and (3-b) make their claims with respect to different doxastic states. The speaker of (3-a) makes her claim believing that the antecedent is false (or expects the antecedent to be false). Therefore, she needs to use the X-marked form. The speaker of (3-b), however, believes the antecedent to be true and would have used the indicative form for the same conditional claim.

10 I will refer to the book published in 2012 and not to the original articles, because I want to use the most recent version of Kratzer’s theory.

11 "... a conversational background contributing the premises from which conclusions are drawn", (Kratzer 2012:31).

12 "Stereotypical conversational backgrounds can be used to rank worlds according to how close they come to the normal course of events in the worlds of evaluation, given a suitable normalcy standard. In that case, they function as ordering sources." (Kratzer 2012:39). Kratzer introduces ordering sources specifically to account graded and comparative notions of possibility. Such notions "... emerge when we rank worlds that are compatible with a body of facts according to how close they come to some norm or ideal." (Kratzer 2012:38).
necessity statement \( \Box \phi \), for instance, is interpreted as claiming that \( \phi \) has to be necessarily true in all the best \( g(w) \) worlds of the \( \bigcap f(w) \) worlds (see below).

\[
(A) \quad \square \phi^{f,g}(w) = 1 \text{ iff } \forall w' \in \bigcap f(w) \forall w'' \in \bigcap f(w) (w'' \not<_{g(w)} w') \rightarrow \square \phi^{f,g}(w') = 1
\]

Kratzer (2012) proposes that conditionals should be analysed as modal statements. Their logical form is roughly \((If .......), (MODAL .......)\); "... an adjoined if-clause modifies a sentence that has a modal sitting in its left periphery." (Kratzer 2012:64). The matrix clause is interpreted just like any other modal claim, following the semantics outlined above. The function of the if-clause is to restrict the modal base of the modal in the matrix clause. Kratzer (2012) proposes as a preliminary definition \( B \) (Kratzer 2012:65).

\[
(B) \quad \square (\text{IF } \alpha \beta)^{w,f,g} = \square \beta^{f*,g}, \text{ where } \forall w' \in W : f^*(w') = f(w) \cup \{\square \alpha^{f,g}\}
\]

Different interpretations of the variables \( f \) and \( g \) lead then to different meanings for conditionals. We are particularly interested in how Kratzer proposes to account for counterfactual conditionals. On this topic she says: "A counterfactual is characterized by an empty modal base \( f \) and a totally realistic ordering source \( g \)." (Kratzer 2012:66). A totally realistic ordering source is defined to be a function from worlds to sets of propositions such that for any \( w \in W \), \( \bigcap f(w) = \{w\} \), i.e. it is a set of propositions that characterises this world uniquely. Kratzer emphasises that there a many possible realistic ordering sources and that this is a major source of vagueness for counterfactuals (Kratzer 2012:33 and the references there). In other papers that deal explicitly with the semantics of counterfactual, like Kratzer (1981b, 1989, 1991) she sticks to this analysis. The modal base is ignored in the definition of the truth conditions for counterfactuals given and conditionals take only one function from worlds to sets of propositions as argument, which contributes to the truth conditions of counterfactuals the same way the ordering source does in the general definition given above.

13 Kratzer doesn’t claim that all conditionals contain a modal element, just that this is often the case. "In Kratzer[12] and Kratzer[13] I argued that many conditionals involve modals in an explicit or implicit way." (Kratzer 2012:64).

14 Kratzer doesn’t commit to this particular implementation of the mechanism. "There are various possibilities for fleshing out the informal characterisation of conditional modality above. Much depends on how exactly conversational backgrounds enter into the interpretation of sentences with modals. Are they arguments of modals that might be syntactically represented? ... More research is needed to settle the issue." (Kratzer 2012:65).
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2.5 The proposal of Mackay (2018).

Now, back to Mackay (2018)’s proposal for how to account for fake past. As said before, also this proposal fits the tradition of PaM-approaches to Fake Tense. The author adopts the lines of approach of Iatridou (2000) and Schulz (2014). The past tense is said to operate on structures of the form \( \langle I, <, i^* \rangle \), where \( I \) is a set that is ordered by \(<\) and \( i^* \) is the deictic centre. Mackay (2018) differs form Iatridou (2000) and Schulz (2014) in how he interprets \( I, < \) and \( i^* \) in the modal case. As indicated above, Mackay (2018) builds on the restrictor approach. In particular, he assumes that conditionals are overtly or covertly modalised in the main clause. But contra to Kratzer (2012) he assume that at the level of LF the \( \text{If} \)-clause is a direct argument of the modal in the matrix clause. As a consequence, the contribution of the modal claim and the \( \text{If} \)-clause that come in two independent interpretation rules A and B in Kratzer (2012) are now combined into one interpretation rule of the modal: C (see Mackay 2018:6). An important effect for our discussion is that, while in Kratzer (2012)’s approach when the modal is interpreted the relevant modal base already contains the information of the antecedent, this is not the case given C.

\[
\text{(C)} \quad \boxed{\square_{f,o}(p, q)}_{c,w,g} = 1 \iff \forall w' \in (\bigcap \boxed{f}_{g} \cap \boxed{p}_{c,w,g}) \forall w'' \in (\bigcap \boxed{f}_{g} \cap \boxed{p}_{c,w,g}) (w'' \notin \boxed{[o]_{g}} w' \rightarrow \boxed{q}_{c,w',g} = 1).
\]

To account for Fake Past, Mackay (2018) proposed that in case of a modal interpretation of the past tense, the structure \( \langle I, <, i^* \rangle \) is instantiated as follows: \( I \) is the modal base of the modal in the main clause of the conditional, the order is simply strict set inclusion \( \subset \), and the deictic centre \( i^* \) is the factive common ground: the factive presuppositions hold in the utterance context. Notice, that both, the modal base and the factive context are formalised as sets of sets of possible worlds, thus taking set inclusion as order makes sense here. The predicted meaning for Fake Past in its modal interpretation is that the modal base of the conditional is a strict subset of what is known in the utterance context. Or, in other words, some available information is not taken into account when evaluating an X-marked conditional. This is implemented at the level of LF by proposing that the past tense morpheme takes scope over the modal construction. The resulting logical form \( \text{PAST}(\square_{f,o}(p, q)) \) is interpreted according to Rule D, where \( C^T \) is the set of true propositions presupposed in in the utterance context.

15 This assumption is made very often in applications of the restrictor approach, see, for instance, also Ippolito (2006).
16 Leaving aside the differences between presupposition and knowledge, see (Mackay 2018:5).
17 Mackay (2018) deviates here a bit from the general description of PaM approaches given at the beginning. The logical form proposed here doesn’t interpret the tense morphology in situ.
(D) \([\{\text{PAST}(\Box f, o(p, q))\}]^{c, w, g} := [\{\Box f, o(p, q)\}]^{c, w, g}, \text{ if } [f]^{g} \subset C^T\)
and undefined otherwise.

Intuitively, this makes a lot of sense. X-marked conditionals seem to be about giving up some of the available information. In case of a counterfactual, this is necessary to make room for the counterfactual antecedent. Even in case the X-marked conditional is not counterfactual, it seems to involve giving up some of the expectations or beliefs of the speaker in the utterance context. This proposal can also account for the critical examples discussed above. Giving up some of your beliefs doesn’t necessarily mean that you exclude the actual world from the modal base. It also makes intuitively sense for the arsenic cases. The point here is that even though you might believe that the patient took arsenic and that lead to the symptoms she is showing, for the sake of the X-marked conditional, you suspend these beliefs – this is what the Fake Past marks. Then you hypothetically assume the antecedent and reason what kind of symptoms you would expect in such case. These predictions are then compared to what you actually observe (and suspended for the hypothetical reasoning).

There are some issues with the LF assumed in D. For instance, one might wonder what happened with the past tense marker in the \(if\)-clause.\(^{18}\) But working with the restrictor approach makes a SOT approach to the tense in the \(if\)-clause quite plausible.\(^{19}\) Thus, this doesn’t seem to be a major issue. There is also the problem that the rule in D is in a strict sense not compositional: the past tense operator is looking inside the formula in its scope to find its target. But we can restate the rule Kratzer style using co-indexing (see E) and do away with this problem as well. Notice that this rule fits nicely the format of standard interpretation rules for the past tense.

(E) \([\text{PAST}_i \phi]^{c, w, g} := [\{\phi\}]^{c, w, g}, \text{ if } g(i) \subset C^T\) and undefined otherwise.

Though these problems don’t pose a real challenge for the approach, there is a more fundamentally conceptual problem with the approach – which eventually will force us to dismiss the proposal. But in order to get to this point, it is first useful to have a closer look on how this approach interprets the restrictor approach.

\(^{18}\) Mackay (2018) claims that it is common in both, PaP and PaM approaches that subjunctive conditionals take a wide-scope past tense (Mackay 2018:5). This is actually not completely true for PaM approaches. Iatridou (2000), for instance, doesn’t assume the restrictor approach and lets the Past take wide scope over a covert modal. In her approach the tense morphology is interpreted locally in antecedent and consequent.

\(^{19}\) See Romero (2014) for such a proposal.
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3 We are still not there

3.1 X-marked conditionals everywhere.

As said above, the proposal of Mackay (2018) builds on Kratzer (2012)’s restrictor approach to conditionals. But there are some differences. The most important difference is a direct consequence of Mackay (2018) approach to fake tense. He proposes that the meaning of indicative conditionals complements that of X-marked conditionals. While X-marked conditionals presuppose that the modal base is a strict subset of the factive common ground, indicative conditionals implicate that the modal base equals the factive common ground. In other words, he endorses Claim F.

\[ (F) \text{ A conditional is marked as indicative iff its modal base is the full factive common ground.} \]

With this claim Mackay (2018) substantially deviates from Kratzer (2012)’s approach to modals and conditionals. The variability of the modal base, which is an important part of the theory of Kratzer (1981a) and supported by various observations, is completely obliterated. This is a high price to be payed for this account of fake tense.

But endorsing F also leads to empirical problems. According to Mackay (2015)’s proposal there is only a very loose relation between the conditional statement made and the choice of the modal base. The only restriction we have – because (Mackay 2018) adopts Rule B as part of his Rule C – is that if the antecedent contradicts the factive common ground, then the modal base of the conditional has to be a strict subset of this set. Otherwise, it wouldn’t be possible to add the antecedent to the modal base. But if the antecedent is consistent with the factive common ground, the choice of the modal base is not constricted by the content of the conditional. The speaker is still free to choose the full factive common ground or any strict subset. This is crucial for his account of the examples (2-a) and (2-b). Here, you want to allow for X-marked conditionals, even thought the antecedent is consistent with the factive common ground.

However, in his attempt to cover the arsenic cases, Mackay (2018) overshoots. If a speaker wants to utter a conditional for which she doesn’t need the full factive common ground as modal base, there is nothing in the theory that prevents her from choosing a modal base that is a subset of the factive common ground. If she makes that choice, Mackay (2018)’s theory forces her to use an X-marked conditional. Such a theory predicts far more X-marked conditionals than we observe. Suppose, 20

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20 This can be either explained as the contribution of a modally interpreted present tense or as an effect of the principle Maximise Presupposition, see Mackay (2015), Section 2.3.
for instance, I want to utter a conditional of the form \( If \, p, \, then \, p \), where \( p \) itself is consistent with what we know about the actual world. We make claims of this form; think, for instance, of statements like (4-a). Now, there is nothing in Kratzer (2012)’s or Mackay (2015)’s theory banning me from choosing an empty modal base for such a conditional claim. It seems quite natural. I don’t need any additional information to derive \( p \) from \( p \). According to claim F I am now obliged to use the X-marked form to express this statement. But this form of the conditional (see (4-b)) seems to be generally unacceptable, independent of the utterance context.

(4)  
   a. If you win, you win.
   b. ?If you won/were to win, you would win.

In other words, Mackay (2018) cannot explain what makes the arsenic examples special. According to his theory they should be all over the place. Mackay (2018) could try to repair his approach by adding a pragmatic theory that cuts away the superfluous X-marked conditionals his semantic theory predicts. But such a pragmatic theory would then have to do what originally was the purpose of his semantic theory: draw the correct line between when an X-marked conditional is used and when not. He would appeal to pragmatics to disguise the fact that the proposed semantic solution failed.

On top of that Mackay (2018) also predicts too many acceptable indicative conditionals. Consider, for instance, the original Arsenic example (5). In the relevant context the antecedent of (5) is consistent with the factual common ground. So, nothing stops us from choosing the entire factual common ground as modal base when uttering this conditional. But then it should be at least possible to utter (5) in the indicative form. However, as discussed extensively in the literature, an acceptable indicative version of (5) doesn’t exist.

(5) If Jones had taken arsenic, he would have shown just exactly those symptoms which he does, in fact, show.

We saw in this section that the proposal made by Mackay (2018) isn’t descriptively adequate. Still, the basic idea seems to be sound: the past tense in X-marked conditionals conveys that in the interpretation of the conditional some facts we took as granted need to be given up. But Mackay (2018) doesn’t connect the contribution of the tense to the actual content of the conditional. He misses the fact that information needs to be given up because of the antecedent. This is the idea that we will work out in the forth section.

3.2 A new Kratzerian approach.

Another differences between Kratzer’s restrictor approach and Mackay (2018) is that Mackay doesn’t commit to Kratzer’s assumption that the modal base is empty in case of counterfactuals. Let’s think, for a moment, what could have motivated
Kratzer to make this assumption. Why should in case of a counterfactual the body of information relevant for the modal claim be empty and everything hinging on the standard of normalcy? At first view this seems to be a natural move, as it transforms the restrictor approach into the similarity approach for counterfactuals (Stalnaker (1968), Lewis (1973b)); everything depends on the order introduced by the ordering source. But it also conflates the two sources of information for the interpretation of modals or conditionals that Kratzer so carefully distinguished. On the one hand there are facts of (or knowledge about) the evaluation world that matters for the interpretation of modals. This is what goes into the modal base. On the other hand there is a standard of normalcy. This is what constitutes the ordering source. In the literature on the similarity approach we often see authors trying to pull these two types of information apart again, by distinguish singular facts and laws and take them to be of different importance for the similarity order. We also have evidence that this distinction has some cognitive reality to it, as one can distinguish an age in the development of children where they are able to reason counterfactually with one (laws, or a standard of normalcy), but not yet with the other (singular facts of the evaluation world) (Perner et al. 2015). So, maybe it would be better to keep relevant singular facts and a standard of normalcy apart. However, this cannot be directly modelled using Kratzer’s formal model. If we put all the relevant singular facts in the modal base, we end up in trouble in case the antecedent contradicts one or more of these facts.

There is an easy way out of this problem. We could simply say that the antecedent is not just added to the modal base, but it actually revises the modal base. Then the standard of normalcy is applied to select the most normal worlds out of those that are in the revised modal base. This gives us an alternative approach to that of Kratzer (2012). Facing the question of how to deal with counterfactuals, she chooses to move everything into the ordering source in case of a counterfactual, because an ordering source can be naturally used to model revision. But then you lose the conceptual difference between the modal base and ordering source. We propose here to leave singular facts in the modal base, but change the way the modal base is affected by the antecedent. This move allows us to keep the original conceptual difference between the two variables affecting the interpretation of modals. As we will see later, it gives us a angle at how to solve Mackay (2015)’s problem with the arsenic cases. To spell this proposal out we only have to change the basic rule B for the interpretation of if-clauses by adapting the way the antecedent affects the contextual variable of the modal base.

\[
(G) \quad \text{IF } \alpha \beta \|_{f,g}^{f^+,g} = \|\beta\|_{f^+,g}^{f^+,g}, \text{ where } \forall w \in W : f^+(w) = \text{Rev}(\|\alpha\|_{f,g}^{f,g}, f(w))
\]

21 See, for instance, Lewis (1973b,a), Veltman (2005).
\[ \text{Rev}(\llbracket \alpha \rrbracket_{f,g}, f(w)) \] denotes the revision of \( f(w) \) with the meaning of the antecedent \( \llbracket \alpha \rrbracket_{w,f,g} \). In order to make Rule G applicable, the revision function will have to be defined.

4 The proposal

4.1 The general idea.

Main assumptions. In this section we will develop a new approach to fake tense. The goal is to avoid the problem Mackay (2015) pointed out for Iatridou (2000) and Schulz (2014), but without running into the difficulties discussed in Section 3.1. We start here with a summary of the central ideas of the proposal. First of all, we adopt Kratzer (2012)’s restrictor approach. That means we embrace the following two assumptions.

i. In the main clause of a conditional there is an overt or covert modal. This modal is interpreted following Kratzer (2012)’s approach to modals. In particular it takes a modal base and an ordering source as argument. The modal base defines the body of information that is relevant for the interpretation of the modal in the conditional. The ordering source sets a standard of normalcy.

ii. The function of the \( \text{If} \)-clause in conditional sentences is to modify the modal base of the modal in the main clause.

We modify or extend this proposal with the following claims.

i. The antecedent is not simply added to the modal base, but the modal base is revised with the content of the \( \text{If} \)-clause (see Rule G).

ii. The modal base is a subset of what is believed or expected to hold for the actual world. It is the part of the common beliefs/expectations in the discourse context that is relevant to issue under discussion. We will refer to this contextually relevant body of information as \( \text{MB}_0 \). We can follow Mackay (2018) and restrict \( \text{MB}_0 \) to veridical beliefs or expectations.

iii. The standard of normalcy we work with here is normal according to the laws of nature. We make this restriction for reasons of convenience: for the examples we discuss here this is the standard of normalcy that matters. We will refer to this ordering source as \( \text{OS}_0 \).

But see footnote 20 for a possible adaption that does without the assumption of a modal in the main clause.
With this proposal for the semantics of conditionals in the background we can now propose our account of fake tense.

**Fake Past**

The function of fake past is to signal that during update with the antecedent some facts of the modal base had to be given up.

This treatment of fake past is very similar to that of MacKay (2018). It still holds that fake past is about the modal base and also that it is about giving up information. But in our proposal the information is given up because of the antecedent. In the rest of this section we will work this idea out.

**The logical form of SPCs.** The core of the proposal is the claim that past tense morphology can, next to variables for times, also introduce variables for modal bases and add information in form of a presupposition about possible referents for the variable. But this interpretation is only available in a context where such a variable occurs in the semantics of the expression, i.e. when the morphology sits on a modal. Sometimes the past tense introduces a free variable that refers to some contextually given hypothetical context. This is what happens in case of modal subordination. But in conditionals the variable introduced by the tense morphology is bound by the *If*-clause. In other words, the antecedent expresses a generalised quantifier over properties of modal bases. More precisely, we assume the LF given below, where all variables range over modal bases. In the second row, we make the semantic type of the parts of the construction explicit, taking $\alpha$ as shortcut for the type of sets of sets of propositions.

\[
\begin{aligned}
(H) && & \text{[IF}_{1}\text{[antecedent]] } & 1\text{[pro}_{1}^{\text{Past}}\text{WOLL[consequent]]} \\
&& & \text{[IF [antecedent]]}_{1}(\langle \alpha, t \rangle, t) & \lambda x.\alpha.\text{Past}(x).\text{WOLL}(x, \text{consequent})
\end{aligned}
\]

This analysis is similar to the logical form assumed by many PaP approaches to fake tense and also to what was proposed by MacKay (2018) in that it assumes the past tense operator in SPCs to scope over the modal in the main clause of the conditional. However, there is also an important difference. We stay closer to the original proposal of Kratzer and don’t take the *If*-clause to be a direct argument of the modal in the main clause. Instead, it scopes over the modal expression and provides an argument for the modal in the main clause: the modal base. This difference in logical form has a substantial impact on the meaning assigned to SPCs. The past tense is still restricting the modal base, just as proposed by MacKay (2018). But

---

23 We follow in our notation of the LF Romero (2014).
now it restricts the modal base at a point when the information of the antecedent has already been added. This change allows us to implement our idea that the past checks whether the antecedent forced us to give up information in the modal base.

The proposed LF is also for a couple of independent reasons a very attractive analysis for conditionals. First of all, according to this analysis if-clauses denote semantic objects (the hypothetical context the sentence is talking about) that serve as argument for the main clause. This fits nicely with Schlenker 2004, who argues that If-clauses behave very similar to definite descriptions and should also be treated as such. This analysis also links nicely with the results of the syntactic study on conditionals done in Bhatt & Pancheva 2005. In this cross-linguistic study of conditionals the authors conclude that If-clauses of conditionals should be analysed as free relative constructions.24

4.2 The lexical entries

The future modal WOLL. Following Abusch (1997), we analyse the modal would in the main clause of X-marked conditionals as the past form of a modal stem WOLL. WOLL expresses that in the most normal worlds in the modal base the sentence in the scope of the modal is true. The meaning of WOLL is spelled out using standard order semantics. x is the variable for the modal base and y the variable for the ordering source. Both are placeholders for sets of propositions.25 For our approach x needs to be visible at the level of LF, y doesn’t. a is the assignment function with respect to which an expression is interpreted.

(I) \[ [\text{WOLL } \phi]^a = \lambda x \lambda y. \forall w \in \bigcap x (\forall w' \in \bigcap x (w' \not< y w) \to (w \models \phi)) \]

The If-clause. As said before, the If-clause is interpreted as quantifier over modal bases. It introduces the hypothetical scenario with respect to which the modal in the main clause of a conditional is interpreted. In very general terms the modal base is calculated by revising a given modal base x (MB0 in non-embedded cases) with the If-clause of the conditional. We define a revision function Rev using premise semantics:

24 As a side remark, we could have gone even further and let the If-clause modify the world argument of the modal. This way we could have done without any modal base in the analysis. The If-clause would then have been analysed as a modifier of the main clause. The advantage would have been that we could have done without an obligatory modal element in the main clause. We decided, however, to stay here closer to the original restrictor approach and let the antecedent modify the modal base of the modal in the main clause.

25 More specifically, they are functions from worlds to sets of propositions, but we suppress world-dependence here, because it’s not relevant for our discussion. \( \prec_y \) is defined using the ordering source in the standard way of premise semantics.
**X-marked conditionals**

\(Rev\) returns the maximal subsets of \(x\) that are consistent with the antecedent plus the antecedent proposition. This function can return multiple values, because there might be more than one maximal subset of the premises consistent with the antecedent. We deal with this by letting \(\text{If}\) quantify over all maximal consistent subsets, see Rule J.\(^{26}\)

In this definition \(P\) be ranges over properties of modal bases and \(x\) over modal bases.

\[
(J) \quad \boxed{[\text{If} \; \phi]^a} = \lambda P \lambda x. \forall x' \in Rev_\phi(x) : P(x')
\]

This interpretation rule fits the revised interpretation schema for \(\text{If}\)-clauses defined in Rule G. It is a very general definition of the revision function. We are free to adopt any more specific revision function we want. In a number of recent papers it has been argued that the semantics of conditionals should take causal information into account (Schulz 2011, Santorio, Ciardelli et al. 2018). Building on this work we propose here that the revision function selects maximal subsets of the premises that are logical consistent with the antecedent (thus, laws of nature are ignored for check of consistence) and don’t contain any facts that causally depend on either the antecedent or facts that had to be removed to warrant consistency with the antecedent. We will not formally spell this premise function out here. We can apply this concept of revision without the formal details and introducing them would take us too far away from the central issues at hand. See Schulz (2011) and Ciardelli et al. (2018) for formalisations.

**Fake Past** As said before, we propose that past tense morphology can not only be interpreted as a temporal pronoun, but also as a pronoun for a modal base. The modal base variable introduced by the past tense morphology is bound by the \(\text{If}\)-clause, which expresses a generalised quantifier over modal bases. The function of this generalised quantifier is to provide the hypothetical context that the modal in the main clause takes as modal base. The past tense checks whether this hypothetical context fulfils a certain modal remoteness condition. More concretely, it checks whether during revision with the antecedent some facts of the original modal base, the contextually relevant body of information, had to be given up.

We build on Iatridou (2000) and Schulz (2014) and propose that the past morpheme is semantically underspecified. It operates on structures \(\langle I, <, i^*\rangle\), where \(I\) is a set that is ordered by \(<\) and \(i^*\) some reference point in \(I\). We propose that the structure relevant for the modal interpretation of past tense is the same as the one the

\(^{26}\) In a recent paper Ciardelli et al. (2018) argue that we have to adopt a more cautious variant of premise semantics, where instead of all maximal subset of the modal base consistent with the antecedent, we only keep the intersection of these subsets. In this case we have only one modal base as output of the revision function and wouldn’t have to involve the universal quantifier.
revision function in the If-clause relies on. Thus, I is the set of all possible modal bases, a set of sets of propositions. The standard of comparison $i^*$ is the relevant body of information $MB_0$ and the order $<$ is the order of premise semantics taking $MB_0$ as the set of premises.\footnote{We cannot take as order set-inclusion. Because in our approach the modal base is restricted by fake tense after revision with the antecedent, it contains the proposition expressed by the antecedent. But the antecedent is generally not part of what is believed or expected in the utterance context of a conditional, certainly not a X-marked conditional. Thus, the revised modal base won’t in general be a subset of $MB_0$.}

$$(K) \quad x_1 < x_2 \text{ iff } (x_2 \cap MB_0) \subset (x_1 \cap MB_0).$$

Based on this definition of the structure $\langle I, <, i^* \rangle$ we can now provide the modal interpretation rule for fake past. The first row provides the definition we will use here. The second row restates the same meaning Kratzer (2012) style.

$$(L) \quad \begin{align*}
\text{[pro}^\text{PAST}_i]a &= a(i) \text{ if } a(i) < MB_0 \text{ and undefined otherwise.} \\
\text{[PAST}, \phi]\text{c,w,g} &= \text{[\phi]}\text{c,w,g, if } g(i) < MB_0 \text{ and undefined otherwise.}
\end{align*}$$

Compare this to Mackay (2018)’s proposal (see Rule E). According to both approaches the past tense expresses a restriction on the modal base. This restriction is about giving up information. But, using our terminology, Mackay (2018) proposes that the restriction is that $MB_0$ is a subset of the factive common ground, while we propose that the modal base revised with the antecedent is a subset (modulo $MB_0$) of the relevant body of information $MB_0$. So yes, fake tense is about giving up information, but it is relevant information and it is the antecedent that forces us to give it up. This is where our proposal differs with Mackay (2018).

**An example**  Let’s discuss a small example to see the apparatus in action. The point of this example is also to draw attention to an important feature of our approach: the distinction between revision – done by the If-clause – and prediction – done by the modal in the main clause. The account of fake tense proposed here relies on the fact that revision and prediction are separated. This will be particularly crucial in how our proposal handles the arsenic cases.

The example we use is a standard example from the literature on causal approaches to counterfactuals. Consider the counterfactual in (6-a) in the context described below.

Suppose there is a circuit such that the light is on ($L$) exactly when both switches are in the same position (up or down). At the moment
X-marked conditionals

switch one is down (¬S1), switch two is up (S2) and the lamp is off (¬L).

(6) a. If switch one were up, the lamp would be on.
   
b. \[ IF S_1 \] ⟨⟨ α, t ⟩, t ⟩ λxα.x < MB₀. WOLLₓ, g(L) \]

The modal base for this example consists arguably of all the facts given in this scenario: \( MB₀ = \{ ¬S₁, S₂, ¬L \} \). The interpretation works basically in two steps. First the \( I f \)-clause revises \( MB₀ \) with the information of the antecedent. Then the modal takes this revised modal base and predicts that the consequent holds with respect to it.

First, revision. To calculate the revised modal base we have to look for maximal subsets of \( MB₀ \) logically consistent with \( S₁ \) that don’t contain facts causally dependent on either \( S₁ \) or the facts that have to be removed to warrant consistency with \( S₁ \). In order to get consistency with the antecedent, we have to remove \( ¬S₁ \). But because the state of the lamp causally depends on the position of the switches, \( ¬L \) has to be removed as well. So, \( \text{Rev}_{S₁}(MB₀) = \{ S₁, S₂ \} \). This is the modal base fed to the main clause \( λxα.x < MB₀. WOLLₓ,g(L) \).

In the main clause we have to check whether the condition of that past tense, \( \text{Rev}_{S₁}(MB₀) < MB₀ \) is satisfied. That is the case: we had to remove \( ¬S₁ \) and \( ¬L \) from \( MB₀ \). Finally, we come to the step of prediction. We have to check whether in the most normal worlds for \( \text{Rev}_{S₁}(MB₀) \) the light is on. The ordering source is given by the causal law governing the switches and the lamp: \( OC₀ = \{ (S₁ ↔ S₂) ↔ L \} \). The optimal worlds among those satisfying \( \{ S₁, S₂ \} \) will be those where the light is on. Thus, we correctly predict that the conditional is true.

4.3 Fake Perfect

So far we only discussed fake tense in SPCs. Of course, the proposal can be applied to the first layer of past tense morphology in PPCs as well. But what about the second layer, the Perfect occurring in examples like (1-e)? Mackay (2018) proposes that the second layer of past tense morphology in PPCs does not receive a modal interpretation, but keeps its temporal meaning. Mackay (2018) additionally claims that at the level of LF also the past operator expressed by the second layer of past tense morphology can scope over the modal in the matrix clause. However, Mackay (2018) does not explain how this wide scope reading of the second layer of past tense should be interpreted.

Furthermore, Mackay (2018) puts forward an explanation for Ippolito (2006)’s observations concerning the projection of presuppositions in X-marked conditionals. She observes that an SPC like (7-a) is infelicitous in a context where the presupposition of the antecedent (that John is alive) is not satisfied, while the corresponding
PPC (7-b) is fine. Thus, it seems that PPCs can locally accommodate counterfactual presuppositions of the antecedent, while for SPCs the presuppositions project and have to be satisfied in the utterance context.

(7) a. If John ran the Boston marathon next spring, he would win.
    b. If John had run the Boston marathon next spring, he would have won.

As Ippolito (2006) points out, any approach to fake tense should strive to also explain the projection behaviour of presuppositions in X-marked conditionals. Given that it is the tense morphology that distinguishes X-marked conditionals from indicative conditionals and the examples (7-a) and (7-b) from each other, the interpretation of this morphology has to be a crucial factor. Mackay (2018)’s explanation of the difference between (7-a) and (7-b) relies on the stipulation that presuppositions project out of the antecedent of X-marked conditionals – which is part of what we need to explain here.

We will quickly sketch an account for the second layer of past tense morphology in PPCs that can explain Ippolito (2003)’s observation concerning (7-a) and (7-b). I agree with Mackay (2018) that the second layer of past tense morphology in PPCs does not receive a modal interpretation, but keeps its temporal meaning. Furthermore, I agree that there is a reading of PPCs where also this second layer of past tense morphology scopes over the modal in the matrix clause, see (8). This is the reading we will use to account for examples like (1-e).

(8) \[ IF \varphi\] \[PASTPAST WOLL(\psi)\]

The important question is: what is the semantic contribution of the second past tense operator in this LF? I propose that just as the first layer of past tense marks a change in the context of the modal base, the second layer marks a past shift in the evaluation time of the modal. Also this shift of the evaluation time is a result of revising the modal base with the antecedent. So, the quantifier expressed by If-clause binds the evaluation time of modal together with its modal base. In M the LF for (8) is given, using again the two different notations introduced earlier. We see that the If-clause binds two variables. One is the variable for the modal base, introduced but the Simple Past, the other is the variable of the evaluation time of the modal, introduced but the perfect morphology. To mark the type distinction between the two pronouns, we use \( mpro \) for a variable over modal bases and \( tpro \) for a variable over times.

\[
(IF\varphi)\lambda x \lambda t. Past(x) Past(t) WOLL(x, t, \psi)
\]

Without the second layer of past tense morphology scoping over the modal, the evaluation time of the modal in conditionals is set to the utterance time. As with the contribution of the indicative form of conditionals, this can either be modelled assuming a silent present tense operator scoping over the modal or by applying the
principle *Maximise Presupposition*. We leave the decision of which of these options should be adopted to future research.

To be able to interpret the new LF in M, we need time-sensitive versions of the entries for the *If*-clause (Rule J) and the modal *WOLL* (Rule I), see N.\(^{28}\)\(^{28}\) \(\text{Rev}\) is now a function from modal bases \(x\) and times \(t\) to modified modal bases \(x'\) and times \(t'\). The interpretation rule of the temporal pronoun \(t\text{pro}\) is simply the temporal version of Rule L introduced earlier \((t_0\) is the utterance time).

\[
\begin{align*}
\llbracket \text{WOLL } \phi \rrbracket^a &= \lambda x \lambda y \lambda t. \forall w \in \bigcap x (\forall w' \in \bigcap x (w' \not< w) \rightarrow w, t \models \phi)), \\
\llbracket \text{IF } \phi \rrbracket^a &= \lambda P \lambda x \lambda t. \forall (x', t') \in \text{Rev}(x, t) : P(x, t), \\
\llbracket t\text{pro}^{\text{Past}} \rrbracket^a &= a(i) \text{ if } a(i) < t_0 \text{ and undefined otherwise.}
\end{align*}
\]

This leaves us with the task to define the revision function appropriately. Let us first think about how presuppositions fit our semantic framework. Which presuppositions our words come with is governed by laws. But the relevant laws are not laws of nature. They are laws concerning the correct use of language. If you say that John is running even though John died a couple of years ago, you do not understand the concept of *running* correctly. Such conceptual laws, in contrast to laws of nature, cannot be violated. They have to be obeyed in order to make sense of our talk about the world. That means that these laws also constrain proper modal bases. A body of information that is inconsistent with our conceptual laws just doesn’t make sense. So, we need to change the definition of revision given earlier and exchange logical consistency with logical and conceptual consistency.

We also need to say something about the temporal argument of the revision function. The revision function operates on modal bases. A modal base represents our common beliefs about the actual world at the utterance time. It represents a partial picture of the world as it is *now*. Thus, a modal base comes with a temporal perspective, which is also fed to the revision function. We propose here that if the revision function has to change facts that lie in the past relative to the temporal perspective of the modal base, then this temporal perspective is shifted back in time to the moment when the change occurs. This is an idea we are familiar with from the historical accessibility relation introduced in Thomason & Gupta 1981. The difference is that in our context "possible" means conceptually or logically possible. This is a less restrictive notion of possible than normally assumed when the historical

\(^{28}\) In the new interpretation rule for *WOLL* we could have let the modal shift the evaluation time of the consequent forward. However, we refrain from doing so here. The complex issue of the temporal location of antecedent and consequent in X-marked conditionals is left for another paper.
accessibility relation is applied. 29 We sum up the discussion in the following revised definition of the revision function \( \text{Rev} \).

The revision function \( \text{Rev}_\phi \) takes a modal base \( f \) and its temporal perspective \( t \) as arguments and returns pairs \( \langle f', t' \rangle \), where

i. \( f' \) contains \( \phi \) plus a maximal subset of \( f \) that is logical and conceptually consistent with \( \phi \) and does not contain any facts that causally depend on either the antecedent or facts that had to be removed to warrant consistency with the antecedent, and

ii. \( t' \) is the (first) time at which facts in the modal base \( f \) that concern the past of \( t \) needed to be change in order to gain logical and conceptual consistency with \( \phi \). If no such past changes of the modal base are necessary, then \( t' = t \).

According to this proposal, there are only two situations in which the revision forces a backshift of the evaluation time of the modal and, hence, a second layer of past morphology on the modal is required. Either the antecedent talks about the past and is false according to \( MB_0 \), or a change of past facts of the modal base is needed to make the antecedent conceptually consistent with the modal base. This allows us to account for the difference observed concerning (7-a) and (7-b). Suppose that the modal base contains the fact that John died a couple of years ago. If you want to add to this modal base the information that John will run the Boston marathon next year, you will need to give up the fact that he died, because adding the assumption that John will run the marathon next year is conceptually inconsistent with the fact that he is dead. But because the fact that needs to be given up concerns the past, the temporal perspective of the modal base is shifted back to the moment when John died. This is the evaluation time fed to the modal in the main clause of (7-a) and (7-b). However, (7-a) presupposes or implies that the evaluation time of the modal is the utterance time. Hence, the sentence is out and the PPC (7-b) needs to be used.

In general, this proposal predicts correctly that any presupposition about the past the \( If \)-clause of an SPC carries needs to be satisfied by the the utterance context of the SPC. In other words, these presuppositions project. If the presupposition is not satisfied, a PPC needs to be used. Perhaps this is not yet a complete picture of the projection behaviour of presuppositions in X-marked conditionals, but it is a substantial step in that direction.

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29 One might wonder why we don’t work with historical alternatives directly when this is what we want to capture. The reason is that we need the format of a modal base as a set of propositions to make sense of the first layer of fake tense morphology.
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Notice that this proposal also allows us to account for (1-e), the example we used in the introduction to illustrate the second layer of fake tense morphology in X-marked conditionals. Such a conditional is used in case it is part of the common ground that something happened that will prevent the antecedent from becoming true. That means that in order to add the antecedent to the modal base, this past eventuality that excludes the truth of the antecedent needs to be removed. Thus, even though the antecedent of this conditional talks about the future, revising the modal base with this antecedent will shift the evaluation time of the modal back in time. Hence, the PPC form needs to be used. Notice, furthermore, that we can also explain why the counterfactuality of a PPC talking about the future cannot be cancelled. 30 The use of the second layer of past tense morphology clearly signals that the revision shifted the evaluation time of the modal to the past. Thus, to make room for the antecedent some past fact of the modal base had to be given up. That can only mean that the antecedent contradicts the modal base: at the utterance time the antecedent was no longer possible. We see that the counterfactuality of PPCs talking about the future follows from their semantics.

5 Discussion

5.1 Comparison

We have proposed here another PaM approach to fake tense in SPCs. 31 The tense morphology is claimed to have a modal meaning in the context of these conditionals. The proposal made comes very close to those made by Iatridou (2000) and Schulz (2014). We take the past tense morphology to be underspecified and in general applicable to structures \( \langle I, <, i^* \rangle \), where \( I \) is some semantic domain, \( < \) and order on this domain and \( i^* \) a reference element of \( I \) provided by the utterance context. The past tense is then taken to introduce a variable and expresses, in the form of a presupposition, that the referent of this variable stands in the relation \( < \) to the reference element \( i^* \) of \( I \). But the interpretation of this structure is different in the present proposal. Most importantly, here we model hypothetical contexts or belief states not as sets of possible worlds, but as sets of propositions. Thus, we work with a different set \( I \). This change allows us to define the order in a way that works for the arsenic example (9-a).

(9) a. If Jones had taken arsenic, he would show the symptoms he is actually showing.
   b. \([IF \phi]_{\langle (\alpha, t), t \rangle} \lambda x_\alpha. x < MB_0. WOLL(x, \psi)\)

31 Just as Mackay (2018), the current proposal deviates from the general description of PaM approaches given in the introduction in that it doesn’t interpret all tense morphology locally.
Let $\phi$ stand for \textit{John took arsenic} and $\psi$ for \textit{John shows the symptoms he is actually showing}. This means we have to interpret the LF given in (9-b). First, we interpret the \textit{If}-clause and revise $MB_0$ with the antecedent. $MB_0$ is the body of relevant information in this context. So, it will probably contain the information about the symptoms than John shows. These symptoms are consistent with $\phi$ even taking the laws of nature into account. But they are effects of the antecedent and, therefore, erased by $Rev$ from the modal base. Hence, $Rev_{\phi}(MB_0)$ contains the antecedent itself, $\phi$, maybe additional facts from $MB_0$, but no longer the observed symptoms. This modal base is now fed into the modal claim made in the main clause. We have to check whether the presupposition of the past tense morphology is satisfied. Yes, it is: the revised modal base doesn’t contain the symptoms anymore. Hence, using past tense morphology on the modal is warranted. Now, we have to check whether the revised modal base, together with the laws of nature allows us to predict the consequent. But that is the case: the symptoms John shows are the ones you would expect in case he took arsenic. Thus, the conditional (9-a) is predicted to be true in the given context.

This explanation extends to the problematic examples (2-a) and (2-b) from Mackay (2015), as well as the dialog discussed in Section 2.3. Even in case the antecedent of a conditional forces us to give up facts of the relevant body of information ($MB_0$), it is still possible that the actual world is among the worlds on which the consequent is checked. The reason is that the revision function defined here sometimes gives up facts that are not contradicted by the antecedent. We conclude that the Mackay puzzle is not a problem for our proposal.

Still, the solution proposed here differs from (Mackay 2018). We agree with Mackay (2018) that the past tense morphology in SPCs should be understood as applying to the modal base of the modal statement made in the main clause. We also agree that the feature the past tense checks is loss of information from the modal base. But Mackay (2018) claims that the past tense checks whether $MB_0$ is a proper subset of the factive common ground (using our terminology). According to our proposal, the past tense checks whether the revision of $MB_0$ with the antecedent, $Rev_{A}(MB_0)$, is a proper subset (relative to $MB_0$) of $MB_0$. In other words, yes, we agree that the past tense in X-marked conditionals expresses that certain information is missing from the relevant modal base. But the information is missing because the information had to be given up in order to make room for the antecedent. As we just saw, this proposal still allows us to account for the observations that were fatal for (Iatridou 2000) and (Schulz 2014). But, as we argued in Section 3.1, Mackay (2018)’s solution goes too far and predicts far too many acceptable X-marked conditionals. The present account doesn’t run into this problem, as we will discuss in the next section.
5.2 Indicative conditionals

Just as in Mackay (2018), we propose that indicative conditionals complement X-marked conditionals. While X-marked conditionals presuppose that the revision of the modal base $MB_0$ with the antecedent is a subset (relative to $MB_0$) of the revised modal base, indicative conditionals convey that revision didn’t remove anything from the relevant modal base: $Rev_\phi(MB_0) \cap MB_0 = MB_0$. As in Mackay (2018), we basically have two options for how to implement this. We could either specify an entry for a modal present tense or explain the condition of indicative conditionals as an implication of the principle of Maximise presupposition from Heim (1991). An important consequence of our treatment of indicative conditionals is that they can still be uttered using a modal base that is a subset of the factual common ground. That means that we still have the flexibility of Kratzer’s modal approach for non-past modals. Because the X-marked conditionals are now restricted to cases where the antecedent forces us to give up relevant information, we also overcome the problem of overgeneration of X-marked conditionals that Mackay (2018)’s approach has to face. Finally, we can explain why the indicative form cannot be used in the arsenic cases. Because the antecedent forces us to suspend our belief in the symptoms that we observed, $Rev_\phi(MB_0) \cap MB_0 \subset MB_0$ and, hence, the condition of the indicative form is violated. A X-marked conditional has to be used.

To illustrate the potential of the approach, in particular in explaining the difference between indicative and X-marked conditionals, we will quickly discuss how it can be applied to the famous Kennedy example, introduced in (Adams 1975).

(10) a. If Oswald hadn’t shot Kennedy, someone else would have.
    b. If Oswald didn’t shoot Kennedy, someone else did.

Both conditionals are built from the same propositions. Let $O$ shorten Oswald shot Kennedy and $K'$ stand for Someone other than Oswald shot Kennedy. Thus, both conditionals, (10-a) and (10-b) appear to state the same conditional thought if $O$, then $K'$. The only difference is the extra layer of tense morphology present in (10-a). We can explain the difference in meaning between the two conditionals just relying on our proposal for the semantics of past tense in X-marked conditionals. The difference is basically just an effect of believing or not believing that Oswald was, in fact, the shooter.

Assume, first, that we believe that it actually was Oswald who shot Kennedy ($O$). We know that Kennedy is dead and he died because somebody shot him ($K$). In this context we can utter the first, but not the second conditional. The modal base $MB_0$ would arguably contain $K$ and $O$. Revision with the antecedent $\neg O$ would mean that not only $O$ is replaced by $\neg O$, but also the causally dependent fact $K$ is given up. Because the revised modal base is relative to $MB_0$ a subset of $MB_0$, the
conditional needs to be X-marked. But whether the counterfactual (10-a) comes out as true depends on whether there are some laws of nature or other facts that allow us to predict $K$ independent of $O$. This gives us a conspiracy reading of (10-a).

Assume now that we have no idea whether Oswald was the shooter or not. In this case, we need to use the indicative form to express the conditional. We still have $K$ in the modal base $MB_0$, but no longer $O$. Revision with the antecedent will add the fact $\neg O$ to the modal base. The fact $K$ stays, because neither does it depend causally on some fact we had to remove, nor does it causally depend on the antecedent we just added. The new modal base is $\{K, \neg O\}$. From this set $K'$ follows by basic logic. We don’t need to refer to any laws of nature or additional facts.

Not only does this shows that our proposal can in a natural way account for these examples, the calculations also make the more general point that in order to account for the contrast between (10-a) and (10-b) we don’t need to postulate two different conditional connectives for both types of conditionals, at least not to account for this famous example, contra do what many authors still believe.

5.3 Non counterfactual X-marked conditionals.

Finally, some quick words on conditionals like (11-a) or (11-b). This is, next to the arsenic cases, another group of X-marked conditionals without a counterfactual antecedent. In these cases, the speaker generally doesn’t know whether the antecedent is true. It is very hard to pinpoint why in these cases an X-marked conditional is used instead of an indicative conditional. The basic intuition seems to be, also voiced in Iatridou (2000), that the X-marked form is used in case the speaker considers the antecedent less likely to be true than false.

(11) a. If he took this syrup, he would get better.
   b. I don’t think the gardener was the murderer, but I don’t know for certain. However, if the gardener had done it, he would have used a knife. Let’s see whether we can find a knife.

Our proposal can account for this intuition. We predict that X-marking in a conditional is fine as long as in the process of revising the relevant body of information ($MB_0$) with the antecedent some facts in $MB_0$ have to be given up. Because we defined $MB_0$ as the set of relevant beliefs or expectations, beliefs and expectations about how the future will turn out are part of $MB_0$ as well. As soon as the antecedent contradicts some of these facts, the use of the X-marked form is warranted.

6 Conclusion

The basic intuition you find in the majority of the literature on X-marked conditionals is that the X-marking says something about the antecedent of the conditional - it’s
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considered remote by the speaker or the discourse participants. Iatridou (2000) and Schulz (2014) wanted to capture this by saying that the worlds the antecedent talks about are remote from the actual world. Mackay (2018) showed that this doesn’t work, because the actual world can be among the worlds the antecedent selects. His solution was to say that instead fake tense is about information the discourse participants have: some of this information is given up when the conditional is interpreted. We argued here that while this idea is on the right track, it’s still not entirely there. Mackay (2018)’s condition is too weak, because it is nearly completely independent of the conditional itself. What we added here is the idea that information is given up because or by the antecedent. This is what the fake tense morphology conveys.

On a first look this idea seems to be a non-starter, because it seems to only work for counterfactuals. But not all X-marked conditionals have counterfactual antecedents. We have the arsenic examples to prove this and the examples discussed in Section 5.3. We account for this here by (i) taking as reference point of the tense morphology not the factive common ground, but the relevant body of beliefs and expectations, and (ii) working with a revision function that takes information about causal dependencies into account. The first change allows us to explain FLV conditionals: even though no knowledge about the world is given up, we predict that in the case of FLV the antecedent goes against certain beliefs and expectations you have about the future an X-marked conditional should be used. The second move allows us to account for examples like the famous arsenic cases. Even though the antecedent is consistent with the (true) beliefs and expectations in this scenario, the revision forces you to give up some of the available information (the observed symptoms), because it causally depends on the antecedent.

There are two more rather technical innovations that make this approach possible. First of all, there is the change in the restrictor approach that we proposed at the beginning. Now, the modal base is revised by the antecedent, instead of just adding the antecedent to it. Due to this change we can now distinguish also for counterfactuals a modal base that provides a relevant body of information and an ordering source that sets a standard of normality. We argued that there is independent evidence showing that we need such a distinction. A second important change is the separation of revision and prediction. In papers on conditionals written from a philosophical or logical perspective revision and prediction are generally fused together and cramped into the meaning of the conditional connective. From a linguistic perspective there is more structure to work with. In our proposal the If-clause is responsible for the revision and the construction of a hypothetical scenario – which can include giving up relevant information. The modal in the consequent is responsible for making predictions concerning this hypothetical scenario – which will include adding information based on some standard of normality. Kratzer (2012)’s original
approach was already very clear in separating these two functions, but without that it played a substantial role in the many applications the theory has seen since it was developed in the 70ies of the last century. The present proposal, however, would not have been possible without separating revision and prediction. In order to account for the arsenic cases, we have to be able to say that at the point where the fake tense checks its condition, certain information about the symptoms of the patient has been given up (by revision), while when the consequent is checked this information is available again (by prediction).

**Future work** There is still a lot of work be done on fake tense. First of all, a full compositional account of the ideas proposed here needs to be developed that, in particular, involves a general treatment of tense in both, its modal and its temporal meaning. This theory needs to be accompanied by a theory about feature transmission that allows us to explain why the morphological material occurs where it occurs in English sentences and how the temporal location of the involved eventualities emerges. Given that there is a lot of literature one can built on here, like Romero (2014), in general, this looks quite feasible. But there is one aspect that can be challenging: we need to explain why there is also fake tense morphology in the antecedent.

In the framework presented here, it is not possible to give a modal interpretation to the past tense morphology in the *If*-clause. The reason is that from the perspective of syntax the only possible scoping of the conditional operator *If* and the past tense seems to be that *If* scopes over past tense. In our framework, *If* is responsible for constructing the hypothetical antecedent scenario. The past tense would apply to the proposition expressed by the antecedent and, thereby, part of the information that the modal base is revised with. As long as there is no modal in the antecedent the past tense morphology could hatch onto, it could only get its temporal interpretation and localise the eventuality described in the antecedent in the past relative to the utterance time. That is not the interpretation we are looking for.

I see two solutions for this problem at the moment, both of them not perfect. First, there might still be a way to interpret the past tense morphology in the antecedent as applying to the generalised quantifier introduced by *If*. Analysing *If*-clauses as definite description of modal bases would then give us an object of the right type for the interpretation of fake tense proposed here. Just as in the main clause of the conditional, the past tense in the *If*-clause would check that the revised modal base is a true subset of the modal base of the utterance context. This LF would lead to the same predictions as the one assumed here. However, right now I don’t see a way to make syntactically sense of this scoping order.

Alternatively, one could explain the tense morphology in the antecedent of X-marked conditionals as SOT phenomenon. But it is not obvious, given the LF
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proposed here, that we can analyse the tense markings in the *If*-clause as an SOT effect. The reason is that strictly speaking the evaluation time of the antecedent proposition is at the level of LF not directly bound by the modal anymore. That doesn’t mean that this option is out, but it would involve at least more work (on SOT in general).

Another open question is that of the applicability of our approach to fake tense in other languages than English. But the most exciting challenge that still needs to be answered is fake aspect. In her seminal work on this topic Iatridou (2000) showed that it is not only past tense morphology that in some languages appears not to be interpreted in X-marked conditionals. The same applies to imperfective morphology as well. I know of no approach that can explain this observation. Sabine Iatridou thinks (p.c.) that it doesn’t make sense to write another paper on fake tense without dealing with fake aspect at the same time – no solution for one part of the puzzle can work without a solution for the other part as well. I do agree. Still, I couldn’t help myself. I hope that the framework developed here provides a good basis for dealing with fake aspect.

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