THE TIME OF POSSIBILITIES
Truth and Felicity of Subjunctive Conditionals

by

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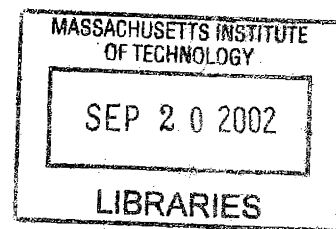MASSACHUSETTS INSTITUTE OF TECHNOLOGY

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ABSTRACT

This dissertation is a study of modality and, in particular, of conditional statements within the framework of possible world semantics. I argue that in order to understand what the meaning of a modal sentence is we need to look closely at the internal composition of accessibility relations. Accessibility relations are shown to be complex relations involving both a world and a time of evaluation, and it is shown that temporal and aspectual operators can be interpreted in the modal domain, and may not occur inside the scope of the modal operator. When interpreted in this position, temporal and aspectual operators contribute to the selection of the possible worlds by defining the relevant notion of accessibility. Capitalizing on work by Irene Heim, David Lewis and Robert Stalnaker, I show that this proposal allows us to develop a semantic analysis of those conditionals that are traditionally called *subjunctive conditionals*, and to provide an answer to how to select the worlds that the modal operator quantifies over. Finally, I argue that the semantic analyses of counterfactuals discussed by Lewis (1979) – Analysis 1 and Analysis 2 – cannot be maintained in that neither of them accounts for the contrast between the felicity conditions of different types of subjunctive conditionals. Instead, I will argue that our theory based on a time-dependent notion of accessibility can.

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INTRODUCTION

I. Modality and the selection of possible worlds

What is the meaning of a modal sentence? In possible world semantics, modal sentences are quantified structures: a modal operator quantifies over possible worlds, its restriction being provided either linguistics or contextually, and its nuclear scope being the proposition expressed by the sentence below the modal operator. For example, the modal sentence *Charlie must play tomorrow* will have the structure below where the modal operator *must* is a universal quantifier over possible worlds.

(1) $\forall w'$ [R(w',w) $\rightarrow$ Charlie plays tomorrow in w']

The nuclear scope of the operator will be the proposition expressed by the sentence (without the modal), i.e. the proposition that Charlie plays tomorrow. Because *must* allows both an epistemic and a deontic readings, the restriction of the modal operator will depend on the value of the variable R, which is assigned an accessibility relation by the context of utterance. Here, assume (simplistically) that an accessibility relation is a binary relation between possible worlds. The second argument of R, w, is the evaluation world, whose default value is the actual world. To go back to our example, if R is assigned a deontic accessibility relation, the sentence in (1) will assert that in all the possible worlds

where the current (contextually salient) laws hold, it is true that Charlie plays tomorrow. If R is assigned an epistemic accessibility relation, then the sentence means that in all the worlds where all that the speaker actually knows is true, it is true that Charlie plays tomorrow.

Conditional statements are modal sentences too. A possibly covert modal operator quantifies over possible worlds: the antecedent of the conditional is interpreted in its restriction, the consequent is its nuclear scope (Kratzer 1981b). A great deal of research both in philosophy and in linguistics has highlighted the complexities of giving the correct truth-conditions for conditional sentences. Consider the case of counterfactuals: viewed as material implications, all counterfactuals are true, because their antecedents are false. It follows that not only does *If Charlie had played yesterday, his team would have won* come out true, but the opposite conditional *If Charlie had played yesterday, his team would have lost* would come out true too. Something else must be intended. To put it with Nelson Goodman, the problem of counterfactual is *"to define the circumstances under which a given counterfactual holds while the opposing conditional with the contradictory consequent fails to hold"* (Goodman 1983: 4). But when you try to list these circumstances, i.e. a set of true sentences such that the antecedent together with this set entails the consequent, you run into insurmountable problems (see also Kratzer 1981a).

This is the selection problem: how to select the worlds that will be quantified over by the modal operators. Stalnaker's and Lewis theories provide a way to approach the problem that avoids the difficulties that caused Goodman to abandon the enterprise of solving the problem of counterfactuals. Stalnaker appeals to the *selection function* which is crucially left undefined: it is a function that takes a proposition (the antecedent) and a

world (the actual world) into a possible world (the world as it would be if the antecedent were true). This world is maximally similar to the actual world, but not much more can be said about the selection function: conditionals are affected with vagueness, and their vagueness is the vagueness of the selection function. What counts as most similar is a matter of context and different contexts will impose different requirements on the function. Lewis talks about a *similarity function* and, again, only some general indications of what counts as most similar are given. One aspect of the similarity that Lewis is explicit about, though, is that the relevant similarity among worlds is *overall similarity*, i.e. what is compared when evaluating whether two worlds w and w' are more similar to each other than w' and w'' are, is the whole history of these worlds.

This dissertation is an investigation of these concepts. More specifically, it is a study of what it means to be an accessible world, that is to say, of how we define accessibility relations. I will make a proposal and show that Lewis' overall similarity cannot be maintained. So, what does it mean to be an accessible world?

Inspired by Iatridou (2000), I will answer this question by looking at the *form* of subjunctive conditionals. In particular, I will focus on some odd property of modal sentences: the occurrence of past tense morphology in sentences about hypothetical future situations. The hypothesis that this thesis develops is that the once we explain what the role of this temporal (and aspectual) elements is we will have a better understanding of what it means to be an accessible world.

To phenomenon of unaccounted temporal morphology is found in conditionals as well as main clauses. (2) illustrates this fact for conditionals.

(2) If Charlie played baseball tomorrow, his team would lose.

As Iatridou (2000) already observed, the occurrence of the past tense *played* when talking about the hypothetical situation of Charlie playing tomorrow is puzzling because it would not be felicitous to utter the sentence in (3) if both the past tense and the future adverb are locating the event of playing baseball in time.

(3) Charlie played baseball tomorrow.

However, there is an interpretation of the sentence in (3) which makes the sentence felicitous and meaningful (Dudman 1983). And in this interpretation, the sentence means that Charlie *was supposed to* play baseball tomorrow. In (2) the mismatch between the tense and the temporal adverb occurs in a modal sentence and does not give rise to infelicity; in (3), the temporal mismatch occurs in a regular main clause and, as a result, the modal interpretation is forced. As the paraphrase of the example in (3) shows, the past is not interpreted in the proposition that-Charlie plays tomorrow, but in the modal domain. This dissertation offers a semantic analysis of what it means for a temporal element to be interpreted in the modal domain.

To sum up, the questions we will ask are the following:

(i) What is the definition of "accessible worlds"?

(ii) What can temporal mismatches tell us about the internal composition of the accessibility relation?

(iii) How does the temporal dimension of modality affect the truth-conditions of modal sentences?

II. Subjunctive conditionals

Traditionally, conditionals are classified in two types: indicative and subjunctive. This dissertation is about the nature and form of subjunctive conditionals and, in the end, about the essential difference between the two types. Iatridou (2000) has shown that, despite the labels that we will be using, the mood difference between these two types of conditionals in some languages is not an essential aspect of this distinction and that the occurrence of the subjunctive mood is entirely due to language-specific morphological rules. However, I have decided to be conservative and keep the traditional terminology because, although subjunctive conditionals are not subjunctive, they do share a common property: the ultimate objective of this dissertation is to understand what this common element is and what the nature of the indicative/subjunctive partition is.

Consider the following pair of conditionals. The difference between the indicative conditional in (4) and the subjunctive conditional in (5) is that the latter is infelicitous if uttered in a context where the situation described by the antecedent is known to be likely to happen (cf. (6)).

INDICATIVE CONDITIONAL

(4) If Charlie plays tomorrow, his team will lose.

(5) If Charlie played tomorrow, his team would lose.

(6) Charlie will probably play tomorrow.

    a. #If he played tomorrow, they would certainly lose.

    b. If he plays tomorrow, they will certainly lose.

For a subjunctive conditional to be felicitous, the speaker must not assume that the antecedent is true; if he does, then he should use the indicative conditional. Stalnaker (1968, 1975) argues that indicative and subjunctive conditionals should be given the same semantic analysis as possible-world conditionals and that the difference between these two types has to be explained in terms of different pragmatic constraints on the selection function, which may result in the two types of conditionals having different truth-conditions. In this dissertation, I maintain with Stalnaker that the same semantic analysis should be given to all conditionals, and that the difference is elsewhere. Where? Recall what we have observed in the previous section: as pointed out in Iatridou (2000), what is special about subjunctive conditionals like (5) is the unaccounted occurrence of a past tense.

The central question of this dissertation is the following: What is the role of the temporal and aspectual morphology that we see in subjunctive conditionals and that is interpreted neither temporally nor aspectually? Once we answer this question, we will be in a position to offer a systematic account of the truth and felicity of subjunctive

conditionals and we will have an answer to the question about the essential difference between indicative and subjunctive conditionals.

We will begin with a kind of subjunctive conditionals that I have called *mismatched past subjunctive conditionals*. In order to present the puzzle, though, let me give the reader a brief survey of the possible kinds of subjunctive conditionals. Subjunctive conditionals may talk about future, present or past hypothetical situations.

SUBJUNCTIVE CONDITIONALS

(7) If Charlie were sick now, he would be at home.

(8) If Charlie played baseball tomorrow, they would lose.

(9) If Charlie had played baseball yesterday, they would have lost.

All these conditionals, regardless of when the hypothetical eventuality is supposed to take place, have a past tense morpheme in both the antecedent clause and the consequent clause (morphologically, *would* is analyzed as the modal verb *woll* plus past tense morphology). If the supposition is about a past time, two layers of past are required to occur (*had played* in (9)), as shown by the unacceptability of the following sentence.

(10) #If Charlie played yesterday, they would lose.

However, although one layer of past cannot occur with a past adverb (see the example above), two layers of past can unexpectedly occur with a future adverb. Thus, the label *mismatched* past subjunctive conditionals.

(11) If Charlie had played tomorrow, they would have lost.

Even assuming with Iatridou (2000) that in subjunctive conditionals one layer of past is never interpreted temporally, how are we going to explain the occurrence of *two* layers of pasts in (11)? In a regular past subjunctive conditional like (9), it seemed natural to say that – whatever the one layer of past necessary in subjunctive conditionals is doing – the reason why a second layer of past occurs is because the supposition that Charlie plays baseball is about a past time. But, if so, shouldn't (11) be nonsense? To sum up, we will ask the following question: What is the role of the second layer of past that occurs in mismatched past subjunctive conditionals?

Conditionals like (11) are interesting for another reason as well. They are *future counterfactuals*. After Anderson (1951), the counterfactuality of a regular past subjunctive conditional is viewed as an implicature. Mismatched past subjunctive conditionals are counterfactual as well: however, if we try to cancel the counterfactuality using Anderson's kind of examples, the result is infelicitous, thus suggesting that the counterfactuality of a mismatched past subjunctive conditional is of a different nature.

The objective of the proposal that I develop in this dissertation is to explain both these aspects of mismatched past subjunctive conditionals (i.e. their temporal mismatches and their counterfactuality) and show that they are two sides of the same phenomenon.

Once we have a theory about mismatched past subjunctive conditionals, we will be in a position to ask the question of why the past tense morphology is the hallmark of subjunctive conditionals in general. My proposal is inspired by Heim (1992)'s discussion

of counterfactual conditionals in a framework of context change semantics, in turn inspired by Stalnaker's work on presuppositions (Stalnaker 1973, 1974).

My main thesis is that the temporal and aspectual information we see in subjunctive conditionals plays a crucial role in the construction of the modal interpretation by contributing to the internal composition of the accessibility relation and, consequently, to the definition of what it is to be an accessible world. I will claim that we cannot maintain Lewis' notion of overall similarity and that we need the notion of a time-dependent similarity among worlds.

III. Overview of the dissertation

Leaving aside the Introduction, the dissertation consists of five chapters.

In Chapter 2 I introduce the puzzle of mismatched past subjunctive conditionals. I discuss previous accounts of these conditionals in the literature, their valuable insights and their problems.

In order to solve the puzzle of mismatched past subjunctive conditionals, I will first develop a semantic analysis of subjunctive conditionals, looking at simpler cases. This is the content of chapter 3. I analyze the puzzle of presupposition projection in subjunctive conditionals in light of new data and argue that the solution to this puzzle comes from the proper analysis of the temporal elements in subjunctive conditionals. The proposal is that the structure of a subjunctive conditional is that of an existential perfect (cf. von Fintel and Iatridou 2002).

In Chapter 4, we will go back to the mismatched cases and I offer a solution. I build my proposal of the role of past in constructing the modal interpretation and show how the special felicity conditions for these conditionals follows from my analysis of the past together with a principle about maximizing presupposition, independently argued for in Heim (1991). Moreover, I discuss Lewis' theory of counterfactuals and show that it cannot account for the facts presented here.

In Chapter 5 I address the question of the mapping between the semantic and the morphological structures, more specifically, how the arrangement of temporal and modal heads in the syntax is reflected in the morphology.

Finally, in chapter 6 I present some remarks about so-called inverted conditionals, and briefly discuss the question of the mapping between syntax and semantics, and the question of which clause (antecedent or consequent) is semantically interpreted.

CHAPTER 2

TEMPORAL MISMATCHES IN SUBJUNCTIVE CONDITIONALS:

THE PUZZLE

I. Future Counterfactuals

Past subjunctive conditionals do not always talk about the past. Sometimes they may talk about the future, despite the overt past verbal morphology. This chapter is a study of these cases, which have been left unaccounted for by most theories of conditionals or have been given what I will argue, is the wrong analysis. Before I give the background for the discussion and clarify the terminology that I will be using, let me introduce the relevant examples. Both the conditionals in (1) and (2) talk about a future hypothetical event, that is to say the event of them playing tomorrow. However a number of differences set these two examples apart.

> (1) If they played the last game tomorrow, Charlie's team would win.
>
> (2) If they had played the last game tomorrow, Charlie's team would have won.

The first difference is morphological. The subjunctive conditional in (1) has one morpheme expressing past (the –*ed* on the main verb *play*), whereas the subjunctive conditional in (2) has two morphemes expressing past (the –*ed* on the auxiliary *have* and the auxiliary itself). The second difference between (1) and (2) has to do with their conditions of use. In order to illustrate this difference, imagine the following scenario. The last game of the baseball season had been scheduled for yesterday, but, having heard about a furious storm that was approaching, it was decided to postpone it to a sunny day. It is now raining and I have heard that it will stop later today. In these circumstances, I can utter (1) but I cannot utter (2). Now consider a modification of this scenario. Suppose that Charlie's team did in fact play the last game last night and, because of the rain, lost. In these circumstances, I can felicitously utter (2) but not (1). The situation is thus reversed. The first conclusion that these facts suggest is that morphologically complex subjunctive conditionals such as (2) are felicitous just in case the eventuality described in the antecedent is impossible.

There are two questions that pairs like (1) and (2) raise. The first question is why the morphologically simpler conditional in (1) cannot always be used to talk about future hypothetical events. The second question is why the morphologically more complex conditional in (2) must be understood as a future counterfactual. The objective of this chapter is threefold: (i) to develop a general theory of subjunctive conditionals; (ii) to argue that one essential piece of the modal interpretation is contributed by the tense; (iii) to map morphology to meaning. In order to answer the questions we have laid down above, we need to provide the terminological background for our discussion. Conditionals are traditionally divided into two categories: *subjunctive conditionals* and

indicative conditionals. The sentences in (3a) and (3b) are examples of indicative conditionals.

(3) **Indicative conditionals**

    a. If Charlie plays tomorrow, they will win.

    b. If Charlie played yesterday, they won.

Subjunctive conditionals are morphologically marked. They owe their name to the fact that in several languages with rich verbal morphology, they are marked by the subjunctive mood. In English, however, where subjunctive conditionals only show past tense morphology. Here, I will call subjunctive conditionals that talk about future (or present) hypothetical situations like (4a) *one-past subjunctive conditionals,* and subjunctive conditionals that talk about past hypothetical situations like (4b) non-mismatched *two-pasts subjunctive conditionals*.

(4) **Subjunctive conditionals**

    a. If Charlie played tomorrow, they would win.

    b. If they had played yesterday, they would have won.

In this dissertation, I have nothing to say about why the subjunctive mood occurs in some languages to mark the distinction shown above. Following Iatridou (2000), I will assume that mood is not a necessary ingredient of counterfactuality and that language-specific morphological rules are responsible for its occurrence.

II. Temporal mismatches

The sentence in (5) sounds unacceptable, and the reason seems at first obvious.[1] An event cannot be said to be both past relative to the utterance time and to be occurring tomorrow.

(5) #Charlie flew his kite tomorrow.

Things are not so simple, though. In fact, there are cases where the temporal mismatches do not give rise to non-sensical interpretation like the one generated by the sentence in (5). Consider the conditional sentence in (6). Here the past tense is allowed to co-occur with the future adverb *tomorrow*, without making the sentence non-sensical. Clearly, the past tense is not locating the event in the past, because of that event we are saying without contradiction that it will take place tomorrow. What is the role of past?

(6) If Charlie flew his kite tomorrow, Lucy would not call him wishy-washy.

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[1] What I mean when I say that these simple sentences sound unacceptable is that it is the case that when we are locating an event in time the tense and the temporal adverb must agree in their temporal content. However, as I pointed out in chapter 1, when a temporal mismatch occurs, the sentence becomes acceptable if it is interpreted modally. The sentences below illustrate this phenomenon (examples (i) and (ii) are taken from Dudman 1983):

    (i)   The conference began next Monday.
    (ii)   She returned the ticket tomorrow.
    (iii)   Didn't they play tomorrow?

Sentence (i) is not an English sentence in the interpretation in which it is just temporally locating the time of the conference. However, the sentence does have a modal meaning, according to which the conference was scheduled for next Monday, but the speaker has some reason to believe that it will not actually happen. Sentence (iii) is similar: there existed some plan of playing tomorrow, but the speaker has reason to believe that the plan will not be realized (this meaning component does not come form the question, however, as shown by the fact that the question "Are we playing tomorrow" does not suggest that the speaker has reason to doubt that they will play tomorrow). See Ippolito (2002) for more discussion of these examples. Let me mention here that not every English dialect accepts these sentences; most dialects seem to prefer the

As the examples in (4) show, when the hypothetical eventuality is located in the future (or in the present, in the case of states), one layer of past occurs. When the eventuality described in the antecedent is located in the past, then two layers of past occur but the tense is not interpreted as a past perfect (pluperfect). The following example is from Iatridou (2000). *Tall* is not a stage-level predicate, because being tall is a property that an individual gains at some point during puberty and has throughout his adult life. Keeping this sense of being tall, the sentence in (a) is deviant.[2] However, when this very sentence is part of a past subjunctive conditional like (c), it is acceptable. In both non-past subjunctive conditionals and past subjunctive conditionals there is one layer of past that does not seem to be interpreted temporally, i.e. it does not seem to locate the eventuality described in the antecedent in the past.

(7) a. #Napoleon had been tall.

b. Napoleon was tall.

c. If Napoleon had been tall, he would have defeated at Wellington.

Not only do we find an unaccounted past in any kind of subjunctive conditional in English, but, even more surprisingly, the past tense seems to mark "subjunctive conditionals" in several, completely unrelated languages: Indo-European languages (English, Italian, Greek, etc.), Papago (Hale 1969), Japanese, Korean (Han 1996, Cho

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past progressive version of the sentences given above (cf. Dowty 1977, Copley 2000). However, this is not problematic because the past progressive has a past component too.

[2] The sentence would become acceptable if we were to start thinking of being tall as a temporary property of human being in such a way that somebody could grow and shrink several times (thanks to Bob Stalnaker for bringing this point up). However, this interpretation of the predicate tall is irrelevant for the present discussion.

1997), Hebrew, Turkish, Basque, etc. (James 1982, Fleischman 1989). Based on these facts, Iatridou argues that the hallmark of subjunctive conditionals is not the subjunctive mood but the past tense. This idea had already been suggested in informal analyses of subjunctive conditionals. For example, according to Palmer (1986, 2001), the past tense in the antecedent of (4a) (and, presumably, the past on the modal *would* in the consequent) is a *modal past*, the intuition being that the past tense does not locate the event of Charlie's playing in the past but removes the speaker from the actual situation and places her into an unreal one. Consequently, in a past subjunctive conditional like (4b), past is marked once for 'unreality' and once for past time since we are talking about yesterday's hypothetical playing. Iatridou exploits this intuition as well but her objective is to account for *why* the past can be employed in modal context with this distancing effect. In her proposal, the past tense morphology instantiates what she calls the *exclusion feature*. This feature can either be interpreted in the domain of time or in the domain of worlds. In the former case, a sentence with past will be interpreted as talking about a time different from the time of the utterance; in the latter case, a sentence with past will be interpreted as talking about worlds different from the actual world. In a simple sentence such as *John left*, the past is interpreted temporally and the sentence talks about a past time at which an event of John's leaving took place. The possibility of interpreting past modally (i.e. as excluding the actual world) is exploited in conditionals like (4a) or (4b). The difference between (4a) and (4b) is that, in the latter, two layers of past occur, the one instantiated by the auxiliary *have* and the one instantiated by the past *-ed*. Iatridou's proposal is fundamentally similar to Palmer's: one layer of past is interpreted modally, thus contributing to the modal interpretation of the structure; the other layer of past is

interpreted temporally, i.e. as expressing a relation of anteriority between the hypothetical

event and the utterance time.

Notice that this has an important consequence. The layer of past that is interpreted

temporally locates the hypothetical event in time and, as such, must be interpreted *inside*

the proposition expressed by the antecedent. This is exactly parallel to what happens in a

simple sentence with the past tense: in (8), the past tense locates the event of playing in

the past, which is the reason why it is compatible with the past adverb *yesterday* but not

with *tomorrow*.

(8) Charlie played with Lucy (yesterday/#tomorrow).

As we saw at the beginning of the chapter, though, morphologically past subjunctive

conditionals do not always talk about the way the past could have been. Sometimes they

talk about the future, despite their two layers of past morphology. I will call this kind of

two-pasts subjunctive conditionals *mismatched past subjunctive conditionals* (MPSC).

(9) If they had played the last game tomorrow, Charlie's team would have won.

Examples like (9) are problematic for theories about the morpho-semantics of subjunctive

conditionals, as Iatridou acknowledges in her paper.[3] If the reason why there is a

pluperfect in (9) is that one past is locating the hypothetical event of playing baseball in

the past, we are left with no understanding of why two pasts occur in a MPSC, where the

hypothetical event is located in the future by some future adverb. In this chapter, I will

abstract away from the question of what the one layer of past in a one-past subjunctive conditional like (6) does and whether Iatridou's proposal is correct. This will be the content of chapter 3. What I will concentrate on in this chapter is the role of the second layer of past in MPSCs. The second layer of past raises two puzzles. The first puzzle should by now be familiar and I will call it the *past puzzle*: given that the hypothetical eventuality is said to occur in the future, what is the role of the second layer of past? How is the mismatch between the past and the future adverb resolved? The second puzzle is the *felicity puzzle* and has two parts. We are already familiar with the first part or this puzzle, which concerns the difference between the felicity conditions of one-past subjunctive conditional and those of MPSCs: differently from one-past subjunctive conditional, in MPSCs the hypothetical eventuality described in the antecedent is understood as impossible (cf. (1) and (2)). The second part is about the difference between the conditions of use of MPSCs and those of non-mismatched two-pasts subjunctive conditionals: more precisely, differently from non-mismatched two-pasts subjunctive conditionals, MPSCs seem to resist the *cancelability test*. Consider the non-mismatched two-pasts subjunctive conditional below.

(10) If it had rained yesterday, Charlie would not have flown his kite.

Out of the blue, the antecedent would be understood as false. But, as shown by Anderson (1951), the falsity of the antecedent is not entailed since it is possible to construe contexts where it cannot be assumed that the antecedent is false. Thus, it is argued that the counterfactuality of a past subjunctive conditional is an implicature.

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[3] Iatridou (2000: 252), footnote 26.

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

The reasoning above is valid and plausible. Because no argument can be valid if it assumes the negation of the thesis that it is supposed to show, the speaker of our example cannot be assuming that the antecedent is false. When applied to MPSCs, though, Anderson's test does not result in a felicitous piece of reasoning. Consider the following incoherent example.

(12) #If Charlie had gone to Boston by train tomorrow, Lucy would have found in his pocket the ticket that she in fact found. So, he must be going to Boston by train tomorrow.

The deviance of this example shows that non-mismatched two-pasts subjunctive conditionals and MPSCs have different conditions of use. It may be suggested that the reason why the sentence above is infelicitous is that the time of the consequent precedes the time of the antecedent, and that as other cases of backwards causation, this is disallowed.[4] If this were the case, the sentence above would be odd for the same reason why Lewis' sentence *If Jim asked Jack for help today, there would have been no quarrel yesterday* is (Lewis 1979). However, I don't think this is the case. First of all, there are conditionals where the time of the consequent precedes the time of the antecedent and that are good. For example, I can say *If Charlie had gotten married with Sally tomorrow, he would have had his bachelor party last night*, meaning that Charlie will not get

married tomorrow and he did not have his bachelor party last night. So, what makes the example above infelicitous is the attempt to cancel its counterfactuality.

How are the PSCs and the MPSCs different and where does this difference come from? This is the second part of the felicity puzzle.

To sum up, MPSCs like (2) raise two puzzles, the *past puzzle* and the *felicity puzzle*. We have two goals: one goal is to solve both puzzles, the other goal is to show that these two puzzles are intimately connected and that, in fact, they have a common explanation. As we just saw, the felicity puzzle has to do with the conditions of use of MPSCs, which were shown to be different from the conditions of use of both one-past subjunctive conditionals and non-mismatched two-pasts subjunctive conditionals. The past puzzle has to do with the co-occurrence of the pluperfect with a future adverb, and the resolution of the temporal mismatch. We showed above that theories about the morpho-semantics of subjunctive conditionals discussed above cannot in principle account for the occurrence of a pluperfect in a MPSC. In the next section, I will discuss the proposal in Ogihara (2000), which explicitly addresses the puzzle of MPSCs.

III. A theory of mismatched past subjunctive conditionals: Ogihara (2000)

Suppose Mary's birthday is tomorrow but John, who was her boyfriend, mistakenly gave her flowers yesterday. She became very upset and left him. In this scenario, a MPSC is felicitous, but a one-past subjunctive conditional is not. That John could give flowers to Mary tomorrow does not rescue the one-past subjunctive conditional. I use capital letters to indicate what has been focused.

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[4] Thanks to Bob Stalnaker and an anonymous reviewer for raising this point.

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(13) If John had given flowers to Mary TOMORROW, she would not have left

　　 him.

(14) If John gave flowers to Mary TOMORROW, she would not leave him.

In this section, I present Ogihara's proposal and show why it cannot be maintained: it does not account for the data he considers, and it is refuted by new facts that I will consider.

　　 In Ogihara's proposal, focus is essential to the interpretation of mismatched past subjunctive conditionals. Assuming Rooth (1985) and subsequent work, focus is associated with a focus operator and a variable that gets introduced as a sister node to an expression that contains a focused constituent in the syntactic representation. Thus, the antecedent of the MPSC above will have the structure below.

(15)

```
                        S
                      /   \
                   S        instead (C)
                 /   \
              S        ~C
          /         \
John give flowers to Mary TOMORROW_F
```
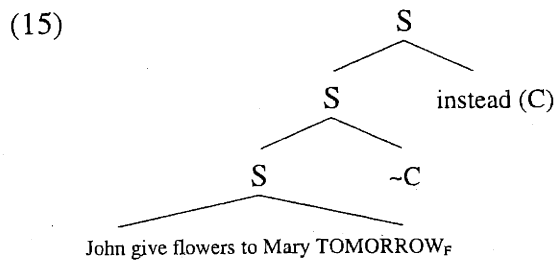
The focus semantic value of *John gives flowers to Mary TOMORROW* is the set of temporally indeterminate propositions of the form that-John give flowers to Mary at x, where x is a variable ranging over times. The relevant propositions are temporally indeterminate, that is to say they are tenseless. This is because the tense in the antecedent (and the consequent) of the conditional is employed to constrain the focus variable C by making a past time contextually salient. As a result, only past alternatives are relevant,

i.e. only propositions where x is assigned a past time as its value (e.g. that-John give flowers to Mary yesterday, that-John give flowers to Mary two days ago, etc.). According to Ogihara, the second layer of past in a MPSC does not locate the hypothetical event in the past, but indicates the time at which some similar event took place in the actual world. The proposition that is contrasted with the hypothetical one is obtained by focus. Note that Ogihara maintains that some proposition in the set of alternatives must be true. His proposal does solve both the past puzzle because the second layer of past is not interpreted in the proposition expressed by the antecedent but as the restriction of the focus variable. Unfortunately, as we will see in a moment, Ogihara's proposal does not solve the felicity puzzle.

Ogihara's proposal claims that in MPSCs the past restricts the focus variable C and, consequently, makes some relevant (past) proposition salient. Moreover, he claims that for a MPSC to be true one proposition in the set of alternatives must be true. However, in the case of MPSCs (as well as in the case of any other subjunctive conditionals), there needs to be no true past proposition contrasted with the antecedent. Suppose Charlie died a month ago before ever going to Boston and both Lucy and Sally know it. Lucy and Sally are now talking about Charlie and Lucy says that she believes that if Charlie had gone to Boston tomorrow, he would have seen the Red Sox play. Sally, who knows that the Red Sox are not playing tomorrow but the day after, disagrees and can felicitously utter the following MPSC.

(16) No. If Charlie had gone to Boston THE DAY AFTER TOMORROW,

he would have seen the Red Sox play.

By hypothesis, no proposition of the form that-Charlie goes to Boston at x is true because he never went to Boston. *A fortiori*, there is no past proposition of the form that-Charlie goes to Boston at x, where x ranges over past times. The alternatives that are considered are themselves hypothetical and they do not have to hold in the actual world.

The requirement that there be a true proposition in the set of past alternatives made salient by the focus on the temporal adverb does not seem to follow from any other part of Ogihara's proposal. In general, focus on one element of a conditional does not force any alternative to be true, so we do not expect focus to force a proposition to be true in the case of MPSCs either. For example, suppose that Lucy and Sally know that Charlie suffers from some food allergy, and that he did not eat anything at the party because he did not want to fall sick. They are now arguing about what would have made Charlie sick, had he eaten it. Lucy has just said that she thinks that Charlie would have gotten sick if he had eaten strawberries. Sally disagrees and says *If Charlie had eaten CHOCOLATE, he would have gotten sick*. Here, it is by hypothesis not true that something made Charlie sick, i.e. there is no true proposition of the form *that*-Charlie ate x, where x ranges over kinds of food. Yet, the sentence is felicitous.

However, if in light of examples such as (16) above and what we know in general about focus in conditionals, we drop that requirement that some past proposition among the relevant alternatives is true, we run into problems too. In particular, we cannot account for the difference we began with, i.e. the difference between a MPSC and a one-past subjunctive conditional. Without that requirement, Ogihara's theory predicts that the MPSC and the one-past subjunctive conditional below should both be felicitous in the situation imagined above, i.e. a situation in which John mistakenly thought that May's

birthday was yesterday instead of tomorrow, and gave her flowers yesterday. However, we know this is not true.

> (17) If John had given flowers to Mary TOMORROW, she would not have left him.
>
> (18) If John gave flowers to Mary TOMORROW, she would not leave him.

The variable C introduced by the focus on the temporal adverb will be the set of alternative proposition of the form that-John give flowers to Mary at x, where x ranges over times. Now, because there is not second layer of past in the NPSC, the set of alternatives will contain both proposition where x is replaced by a past time, as well as propositions where x is replaced by non-past (future or present) times. Still, this set will contain past alternatives and one of them – that-John give flowers to Mary yesterday – is true. The NPSC should be felicitous, but it is not. Why? The difference between (17) and (18) would seem to be that the MPSC in (17) requires a past alternative to be true, but we saw above that this is not true (cf. (16) and also (19) below). Furthermore, we still would not have any explanation for why (18) is infelicitous if a past alternative is true, unless we stipulated that if a past alternative is true, then you must have a second layer of past. But this would just be a mere stipulation.

A further argument against Ogihara's proposal is that a MPSC is felicitous even when no relevant alternative is *past*. This is an argument that focus should not play an essential role in the theory of MPSCs. Imagine that Lucy has just told me that Charlie is going to Rome to meet my sister, who actually lives in Milan. He has already bought a

ticket and there is no way to reach him to make him change his plans. There is nothing I can do: Charlie will go to Rome.

(19) If he had gone to MILAN tomorrow, he would have met my sister.

Suppose I utter the conditional in (19). All the alternatives are propositions of the form that-Charlie goes to x tomorrow, that is to say, propositions that will only vary depending on the value assigned to the variable x, which ranges over *places* and not over times. Therefore, it cannot be true that the perfect tense is interpreted as constraining the set of alternatives, because the alternative propositions all talk about tomorrow.

To conclude, Ogihara's proposal cannot be maintained for the following reasons. First, it claims that some proposition in the set of the relevant alternatives has to be true in the actual world. We saw that this is incorrect for MPSCs. Without the claim that a past proposition in the set of relevant alternatives must be true, though, his theory cannot account for why MPSCs are counterfactuals. Second, since the focus story does not seem to be correct, the role of the (second layer of) past in a MPSC is also left unaccounted for: it cannot be interpreted within the proposition but there is no variable C to constrain.

Nonetheless, it is important to realize that Ogihara's insight was correct. I take the idea that the (second layer of) past in a MPSC is not interpreted inside the proposition expressed by the antecedent but is constraining something else, to be fundamentally correct. In this respect, Ogihara's proposal and mine are similar in spirit. In chapter 3, I will argue for a different answer to the question about what the past constrains in a MPSC: what we see in MPSCs is a temporal mismatch, but what we understand is the

impossibility of the antecedent. What is the mapping between the morphological pieces (what we see) and the semantic structure (what we understand)? My objective is broader, though: it is to develop a theory of MPSCs that sheds light on the nature of subjunctive conditionals in general, their truth conditions and felicity conditions, a topic that has interested and puzzled linguists and philosophers for decades. In order to make the exposition easier and clearer, I will begin with a semantic analysis of NPSCs, i.e. subjunctive conditionals with one layer of past only. Once we have a theory for these simpler cases, we will be in a position to solve the puzzle of MPSCs and, at the same time, we will have a general theory of subjunctive conditionals.

CHAPTER 3

A SEMANTIC ANALYSIS OF SUBJUNCTIVE CONDITIONALS

PART I: SUBJUNCTIVE CONDITIONALS

I. Theories of conditionals

In this dissertation, I have adopted the traditional terminology for conditionals and I have called conditionals like *if ϕ, ψ* "subjunctive conditionals" if they displayed language-specific morpho-syntactic features which distinguish them from their indicative counterparts. In English, the characteristic feature of a subjunctive conditional is the presence of past morphology in both the antecedent and the consequent clauses, together with an overt modal verb in the consequent. To illustrate the contrast between indicative and subjunctive conditionals, consider the examples in (1) and (2).

(1) INDICATIVE CONDITIONAL

If Charlie plays tomorrow, we will lose the baseball game.

(2) SUBJUNCTIVE CONDITIONAL

If Charlie played tomorrow, we would lose the baseball game.

Because *subjunctive* and *indicative* are the terms used in the philosophical literature on conditionals and because we have referred and will refer to that literature throughout this dissertation, I have decided to keep these terms in the current discussion. The original source of these labels is the observation that languages that marked the distinction between indicative and subjunctive mood, employed the subjunctive for the conditional in (2) but the indicative for (1). Italian is a relevant example: only the subjunctive conditional is marked by the subjunctive mood.

(3) INDICATIVE CONDITIONAL

Se Carlo giocherà domani, perderemo la partita di calcio.

If Carlo play-fut,ind tomorrow, (we) lose-fut,ind the soccer game

'If Carlo plays tomorrow, we will lose the soccer game'

(4) SUBJUNCTIVE CONDITIONAL

Se Carlo giocasse domani, perderemmo la partita di calcio.

If Carlo play-imp,subj tomorrow, (we) lose-pres,cond the soccer game

'If Carlo played tomorrow, we would lose the soccer game'

However it turns out that there is not much substance behind these labels. Iatridou (2000) has shown that it is cross-linguistically false that the essential mark of "subjunctive conditionals" is the subjunctive mood: some languages that have a true subjunctive mood (e.g. French) do not use it in "subjunctive" conditionals. Iatridou argues that what is cross-linguistically always present instead is the past morphology. Consider the case of

English (2): as for the antecedent, we see a clear past tense (*played*); as for the consequent, the past component is embedded in the modal verb *would*, which is analyzed as WOLL + past. As for the Italian example in (4), it is possible to show that the conditional mood does in fact incorporate a past component (Iatridou 2000: 266, for this argument applied to French). I believe the same can be shown for the imperfect subjunctive that occurs in the antecedent.[5] The generalization that emerges form Iatridou's work is that it is *past morphology* and not subjunctive morphology that cross-linguistically marks conditionals like (2). This generalization is our starting point.

Despite this classification of conditionals into subjunctive and indicative, often theories about the semantic analysis of conditionals have not directly addressed the question about what the differences and similarities between these two types of conditionals are. Often, theories have focused on one kind of conditional or the other, and have not approached the difference between these two types in a systematic way. Lewis (1973) analyzes *counterfactual conditionals*, a subset of the subjunctive conditionals, and develops a theory according to which counterfactuals are possible-worlds conditionals. However, little is said about indicative conditionals. In Lewis (1976), he claims that indicative conditionals are not possible-worlds conditionals and should be given the same truth-functional account as material implications. Certainly, counterfactuals and indicative conditionals are different, but giving them a completely different semantics seems unpalatable: we would like to understand what the similarities are, and where the differences come from. Moreover, subjunctive conditionals are not necessarily

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[5] The tense that occurs in subjunctive conditionals is the imperfect subjunctive. On most analyses of the imperfect in Romance, whether indicative or subjunctive, the imperfect is analyzed as an imperfective past (Giorgi and Pianesi 1997, Bonomi 1997, among others). Hence, one component (feature) of the imperfect subjunctive we see in subjunctive conditionals is past.

counterfactuals, but in Lewis' theory there is no room for a general account of the contrast between indicative and subjunctive. Kratzer (1981, 1991) analyzes all conditionals as having the same structure, one in which the *if*-clause is the restriction of a (possibly covert) modal operator: thus, for any world *w*, the *if*-clause has the function of restricting the set of worlds accessible from that world *w*. However, like Lewis, Kratzer too distinguishes between *indicative conditionals* on one hand and *counterfactuals* on the other, where counterfactuals are a special kind of conditionals characterized by an empty modal base and a totally realistic ordering source (see references cited above). Again, where does this difference come from and what is the place of *subjunctive conditionals* in general? Other scholars simply do not raise the issue of what the truth-conditions of these two types are: for example, Karttunen and Peters (1979) propose that different presuppositions are associated with indicative and subjunctive conditionals but remain agnostic as to what their truth-conditions are. To conclude, the theories that address the issue of what the semantic analysis for conditionals should be seem to regard the distinction between *indicative conditionals* and *counterfactuals* as the relevant distinction, rather than the distinction between indicative and subjunctive conditionals. Nevertheless, there exist differences between indicative and subjunctive conditionals regardless of the latter being counterfactuals: if I say *If Charlie played tomorrow, we would lose the game*, I suggest that Charlie is likely not to play (regardless of whether Charlie will play or not), but if I say *If Charlie plays tomorrow*, I do not. If I say *If the butler had done it, the police would have found a knife* I may still believe that the butler did it and it may be true. Still, if I utter that sentence, I am suggesting something different

from what I would suggest were I to utter *If the butler did it, the police found a knife*. The distinction subjunctive /indicative is real, regardless of counterfactuality.

In this scenario, Stalnaker (1975)'s proposal points precisely in the direction of a systematic account of the difference between *indicative* and *subjunctive* conditionals. According to Stalnaker, both kinds of conditional statements have the same semantics but different pragmatic constraints, and these different pragmatic constraints affect the truth-conditions, so that subjunctive and indicative conditionals may actually express different propositions. This difference is said to be reflected in the different mood (indicative versus subjunctive). Examples of indicative and subjunctive conditionals are given below.

(5) **Indicative conditional**

If Charlie plays tomorrow, his team will win.

(6) **Subjunctive conditional**

If Charlie played tomorrow, his team would win.

The semantic analysis of conditionals as possible-worlds conditionals is developed and defended in Stalnaker (1968) and Stalnaker and Thomason (1970), and Lewis (1973) (not for indicative conditionals). For the purpose of this discussion, the differences between Stalnaker's and Lewis' theories do not matter, and – as we shall see below – my formulation of the truth-conditions for conditionals will be closer to Lewis.

The central idea of Stalnaker's analysis is that a conditional statement of the form *If ϕ, ψ* "is an assertion that the consequent is true, not necessarily in the world as it is, but

in the world as it would be if the antecedent were true" (Stalnaker 1999: 68). Formally, this is accomplished by means of a function f that takes a proposition (the antecedent) and a world (the actual world) into a possible world (the world as it would if the antecedent were true). The possible world that is the value of the function is the world where the antecedent is true and which is maximally similar to the actual world (one of the arguments of the function). The semantic rule is given below.

(7) **Semantic Rule for Conditionals** (Stalnaker 1975)

A conditional *if* ϕ, ψ is true in a possible world w just in case ψ is true in

$f(\phi,w)$.

The rule above gives the form of the truth-conditions of conditional statements but says nothing about how the possible worlds are selected. In this respect is simply avoids Goodman's problem of how antecedents select counterfactual worlds. The only property of the selection function above is that it will select the world most *similar* to the actual world, but not much more can be said to specify what the criteria for similarity are without running into all those problems that Goodman ran into and that made him conclude that there is no non-circular way to define the selection function. In this theory, the vagueness of conditionals is the vagueness of the selection function. And if the specification of the selection function cannot be part of the semantics of conditional statements, it will part of their pragmatics. What we can say is what the domain of the function is, but in order to explain his proposal, it is necessary to introduce a few related notions.

The *context set C* is the context as defined in the possible worlds framework. The *context set* is the set of possible worlds not ruled out by the presupposed background information, i.e. the set of possible worlds where all the presupposed information is true. This presupposed information is the common knowledge or presumed common knowledge and assumption of the participants in the conversation. The presupposed information is what the speaker believes it is the case in the actual world.[6] It is not even necessary that the speaker believes what she is presupposing. More important is that she believes that the presuppositions are shared by her and her audience.

Stalnaker appeals to the notion of context set in order to specify how the selection function works in conditionals. The idea is that if the conditional is evaluated at a world that is a member of the context set, then the world that is selected (the value of the function) must be a member of the context set too. The intuition behind this constraint is that when a speaker utters a conditional statement, everything that she is presupposing in the actual world is presupposed to hold in the hypothetical situation in which ϕ is true. The selection function can also reach outside the context set to select a counterfactual world. With respect to this latter point, Stalnaker views the subjunctive mood in English as well as other languages as a conventional device "for indicating that the presuppositions are being suspended, which means in the case of subjunctive *conditional* statements that the selection function is one that may reach outside of the context set" (Stalnaker 1999: 70). Indicative conditional statements are only appropriate if the antecedent is compatible with the context. Thus, counterfactual conditionals must be subjunctive conditionals, but it does not follow that all subjunctive conditionals are

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[6] This presumed common ground is the *speaker*'s presuppositions, which do not have to be shared by all the participants in the conversation: what is necessary is that the speaker believes that these presuppositions

counterfactual. The examples below show the contrast between indicative and subjunctive conditional statements.

      (8) # Charlie will not play tomorrow, but if he plays tomorrow, he will win.

      (9) Charlie will not play tomorrow, but if he played, he would win.

In this dissertation I will make use of the notion of accessibility relation instead of Stalnaker's similarity function. Hence, it may be useful if I couch Stalnaker's proposal presented above in the same terms that I will be using in the rest of the discussion. Consider the indicative conditional *If Charlie plays tomorrow, his team will win*. This conditional will be true if all the worlds accessible from the actual world and such that it is true that Charlie plays tomorrow, are worlds where his team wins. The constraint at work in indicative conditional is that the set of accessible worlds is restricted to epistemically accessible worlds, i.e. worlds in the context set. However, this is not true for the subjunctive conditional *If Charlie played tomorrow, his team would win*: here the set of accessible worlds is not restricted to worlds epistemically accessible from the actual world but can include worlds inconsistent with the speaker's presuppositions, i.e. worlds outside the context set. Thus, the subjunctive conditional above is true if all the accessible worlds in which Charlie plays tomorrow are worlds where his team wins. And among these worlds, there may be worlds outside of the context set. We will see later that the notion of similarity among worlds will still play a role in addition to the notion of accessibility relation.

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are common to her and her audience.

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I will adopt the core of Stalnaker's analysis of conditional in terms of possible worlds, the division of labor between semantics and pragmatics and the role played by the context set. However, the bipartition of the realm of conditional statements in indicative and subjunctive conditionals, central in the literature on conditionals, is the first claim that I would like to challenge. Although correct, this simple bipartition into subjunctive and indicative conditionals is insufficient: subjunctive conditionals are not a homogeneous category.

The question that we want to answer in this nad the next chapter is the question that any semantic theory of conditionals must address: What is the set of worlds that the modal operator quantifies over? For indicative conditionals it seems correct to say that the worlds that the modal operator quantifies over must be epistemically accessible worlds, that is to say, worlds compatible with the speaker's epistemic state (Stalnaker 1975). My proposal in this chapter, and chapter 4, is heavily inspired by the discussion and insights in Heim (1992). However, her claim that for any subjunctive conditional, the *context at the utterance time* may be incompatible with the antecedent, but it must entail the presuppositions of the antecedent, will be argued to be incorrect in light of some facts that we will observe. In fact, once we show that not all subjunctive conditionals obey Heim's generalization, we will also have shown that the bipartition into indicative and subjunctive conditionals is not sufficient because different subjunctive conditionals satisfy different constraints.

Presuppositions play a crucial part in the definition of the felicity conditions for conditional statements in both Stalnaker's and Heim's theories, as we will see below. My proposal is in the same spirit as my two predecessors. It is precisely about the correct

definition of the felicity conditions for conditional statements and about what is the set of possible worlds that modal operator quantify over.

II. Presuppositions and context sets

The claim that I will defend is that the felicity conditions of subjunctive conditionals depend on the *tense* of the conditional itself, in particular on whether a second layer of past occurs or not, independently of whether the hypothetical eventuality is located in the past or in the future. What we must recognize is the contribution of tense to modality. More specifically, I argue that the felicity condition for subjunctive conditionals requires that the antecedent be compatible with the context but that what counts as the context depends on the tense of the conditional itself. We will discuss this in more detail later in the chapter, but to facilitate exposition, let me roughly state what my proposal is.

(10) **Felicity conditions for subjunctive conditionals**

The antecedent of a subjunctive conditional must be consistent with the *context of evaluation*. The context of evaluation is determined by the tense of the antecedent (past/non-past).[7]

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[7] Recall that in this chapter when we talk about there being a past or not in the antecedent of a subjunctive conditional we refer to the second layer of past that occurs in a MPSC. In this chapter, we are no concerned with the one layer of past that occurs in a NPSC like *If Charlie played tomorrow, his team would win.* Why we have a past in a NPSC co-occurring with a future adverb (e.g. *tomorrow*) and what is role is will be discussed in chapter 3.

If we show that (10) is correct, we will have shown the inadequacy of the traditional theory of subjunctive conditionals, and we will be in a position to provide a theory for mismatched past subjunctive conditionals.

II.1 The puzzle of subjunctive conditionals revisited

Heim (1992) develops her ideas about conditionals within the context change semantics framework, an elaboration of Stalnaker's theory of what it is to make an assertion. The central idea of context change semantics is that the meaning of a sentence is its *context change potential* (CCP), a CCP being a function from contexts to contexts. Both matrix and embedded clauses have context change potentials. The second idea is that the presuppositions of a sentence are requirements on the context, that is to say, they determine which contexts its CCP can be applied to. Third, the phenomenon of presupposition projection follows from the way the CCP of complex sentences is composed from the CCPs of its parts.

In Heim's framework, Stalnaker's insight that in an indicative conditional the selection function will reach inside the context set becomes the requirement that the CCP of the antecedent be applied to the main context, which in turns requires that all the presuppositions in the antecedent hold in the main context. This is intended to capture the fact that if I utter the indicative conditional below and it is part of the common ground that Mary is in the phone booth, then the hypothetical situation that I am considering is one in which *both* John and Mary are in the phone booth, and not a situation in which John but not Mary is in phone booth. The example is modified from Heim (1992).

(11) If John is in the phone booth, the door will not close.

As Heim points out this is not a property of the similarity relation because the worlds in which both John and Mary are in a phone booth together may be more far-fetched than the worlds where John is in the phone booth alone. It follows from the fact that the similarity function applies to a proposition that contains all the information in the context plus the information contributed by the antecedent. To see how this works, consider the CCP definition of an indicative conditional. *Sim* is the similarity function from propositions to propositions that maps each proposition into the set of worlds maximally similar to w in which the proposition is true.

(12) $c + if\phi, \psi = \{w \in c: Sim_w(c + \phi) + \psi = Sim_w(c + \phi)\}$

(13) $Sim_w(p): = \{w' \in W: w' \in p$ and w' resembles w no less than any other world in $p\}$

As (12) shows, the similarity function *Sim* applies to the proposition $c+\phi$, which is the intersection of the c worlds and the ϕ worlds, i.e. the set of worlds where the propositions in c and ϕ are true.

Clearly, the definition in (12) works for indicative conditionals, as we illustrated with the phone booth example: all the propositions in c (e.g. that Mary is in the phone booth) are true in the worlds selected by the selection function *Sim* (in which that John is in the phone booth is true too). But now, let us ask the question of whether the definition above can be applied to subjunctive conditionals. The antecedents of subjunctive conditionals can be known to be inconsistent with the common ground. If we apply the

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CCP of ϕ to c when c is inconsistent with ϕ's presuppositions, the whole conditional will come out undefined, contrary to fact. Therefore, the question we need to ask is the following: what is the argument to which the CCP of the antecedent of a subjunctive conditional applies? Heim argues that it cannot be W, the set of all possible worlds, because counterfactuals whose antecedents have presuppositions would never be felicitous since the modal base (W) would never entail the presuppositions in the antecedent. However – Heim argues – this is not desirable because subjunctive conditionals whose antecedents are known to be false but have presuppositions in their antecedents are felicitous, which means that the context to which the antecedent is added does entail the antecedent's presuppositions. Consider again two examples adapted from Heim (1992).

(14) If John attended too, there would be too many people.

(15) If John had attended too, there would have been too many people.

The presupposition triggered by the particle *too* is that somebody other than John will or did attend the contextually salient event, and this presupposition has to hold in the context even though it is known that John will or did not attend the relevant event. In Heim's terminology, the modal base must have the right entailment (i.e. it must entail that somebody other than John will or did attend), and consequently cannot be W.

Heim's proposal is to add the antecedent neither to the empty context (W) not to the main (utterance) context but to a *revised context*, i.e. a context where some

assumptions have been suspended (in order to apply the CCP of the antecedent to it) but where the presuppositions in the antecedent have remained.

(16) For any context c, LF ϕ:

rev$_\phi$(c), the revision of c for ϕ, is $\bigcup\{X \subseteq W: c \subseteq X$ and $\underline{X + \phi \text{ is defined}}\}$

The set that is obtained after the operation above is the largest set such that the presuppositions in the antecedent are entailed. Thus, the CCP of a subjunctive conditional will be as follows.

(17) $c + \textit{if } \phi, \textit{ would} \psi = \{w \in c: \text{Sim}_w(\text{rev}_\phi(c) + \phi) + \psi = \text{Sim}_w(\text{rev}_\phi(c) + \phi)\}$

This time, the similarity function applies to $\textit{rev}_\phi(c) + \phi$, i.e. the set of worlds where the propositions in the revised context (which include the presuppositions of ϕ and does not include $\neg\phi$) and ϕ are true. This solves the puzzle of presupposition projection in subjunctive conditionals. However, it does so by stipulating the right constraint on the revision process, i.e. by stipulating that the presuppositions of the antecedent stay despite the revision. The stipulation that Heim made seemed inescapable because once you move outside the context set, nothing guarantees that the modal base will have the right entailments.

In the discussion that follows, I will argue that the generalization that the presuppositions in the antecedents of subjunctive conditionals have to hold in the main context (the context at the utterance time) is incorrect. If we replace the context of

utterance with the *context of evaluation*, and once we have a theory of what the context of evaluation is in each case, we come to realize that there is no conflict between the fact that the antecedent may be counterfactual and the requirement that its presuppositions be true. Let us then consider some relevant examples.

Suppose that Charlie quit smoking three years ago, and never started smoking again. The non-past subjunctive counterfactual in (a) below is infelicitous, as we would expect given the generalization above.

(18) *Charlie quit smoking three years ago.*

    a. #If Charlie quit smoking tomorrow, he could participate in the experiment.

    b. If Charlie had quit smoking tomorrow, he could have participated in the experiment.

The proposition that Charlie smokes is presupposed by the antecedent of the conditional, and, according to the definition of the revision process above, this proposition will be entailed by the revision set. Because the revision of c can entail the presuppositions required by ϕ only if c entails them, it follows that the actual context set c must entail the proposition that Charlie smokes: since it is not true in the actual context that Charlie smokes, the sentence is correctly predicted to be infelicitous. What does not follow from Heim's theory of the revision of the context set is the felicity of the conditional in (b): the proposition that Charlie smokes is *incorrectly* predicted to be entailed by the main context.

One question that needs to be addressed is what exactly this relevant presupposition is. Consider (a) above. The simpler presupposition could be that Jack smokes immediately before the time of the quitting: in our example, the presupposition would have to be that Jack smokes until some time tomorrow when he quits. Now, this presupposition does not have to include the utterance time, i.e. it is not the case that what (a)'s antecedent requires is that Jack smokes now and until tomorrow. For example, suppose today is Monday and, as of today, Jack has never smoked. However, I know that he will start smoking next Monday as part of an experiment about the effects of smoking. I can still say *If Jack quit smoking in two months, he would receive $1000*. Hence, the presupposition seems to be that Jack smokes immediately before the time of the quitting. Now consider the following scenario. Jack is one of the subjects of the experiment and his reward will depend on when he decides to quit smoking. He could think to himself: *If I quit smoking in two months, I would receive 1000; however, if I quit smoking in six month, I would receive, $4000*. Clearly, when Jack considers the possibility that he might quit smoking after six month, he is not presupposing that he will be smoking until then: he does not know until when he will be smoking, and this is precisely the reason why he is entertaining all these suppositions.[8] However, there seems to be something that he must be presupposing, i.e. that there is a future time (precisely, a time after next Monday) at which Jack smokes. Although this presupposition is weaker than smoking in two months or smoking in six months, it is sufficient to trigger accommodation each time a supposition is made. I will go back to this important issue later in this chapter.

To strengthen this point, consider another conditional statement with a presupposition-triggering item. Suppose that Charlie died last year. Again as in the case

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[8] Thanks to Irene Heim for bringing this point to my attention.

of the verb *quit*, the MPSC in (b) is felicitous, contrary to the generalization that for any subjunctive conditional, the presuppositions of the antecedent have to hold in the main context c.

(19) *Charlie died last year.*

    a. #If he came to the ceremony tomorrow, he would be proud of Sally.

    b. If he had come to the ceremony tomorrow, he would have been proud of Sally.

Let us assume with Musan (1997) that most predicates trigger a presupposition that their subject be in existence or alive at the time at which the predicate is said to hold of it.[9] Both the antecedent in (a) and the antecedent in (b) presuppose that Charlie is alive (tomorrow), which is inconsistent with the common ground. Unexpectedly, though, only the conditional statement in (a) is infelicitous. Both the subjunctive conditional in (a) and the subjunctive conditional in (b) are future counterfactuals. Both antecedents express the same proposition, i.e. that Charlie comes to the ceremony tomorrow. Hence, the difference between (a) and (b) must lie in the number of morphemes expressing past in both antecedents and consequent clauses: in (a) only one layer of past morphology occurs (the *–ed* on the main verb *come* in the antecedent and the past on *would* (woll+past) in the consuquent); in (b) two layers of past (the *–ed* on the auxiliary and the auxiliary itself in the antecedent and the past on *would* and the auxiliary *have* in the consequent). The generalization that examples like (18) and (19) require is the following.

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[9] Exception to this generalization are the "existence independence" predicates like *be famous*, which do not contain a lifetime presupposition (Musan 1997: 283).

(20) **New Generalization**

The restriction that the presuppositions in the antecedent of a subjunctive conditional must be consistent with the main context <u>only</u> holds for non-past subjunctive conditionals.

Our working hypothesis is that whether the presuppositions in the antecedent have to be entailed by the context depends on whether a second layer of past occurs or not.[10]

The examples discussed above showed that it is not true that all subjunctive conditionals are subject to the same appropriateness conditions and, consequently, that it is not true that subjunctive conditionals form a homogeneous class. Above I have the new generalization. In what follows, I will propose a theory that accounts for it.

III. Felicity Conditions for subjunctive conditionals

I will follow the ideas proposed by Stalnaker (1973, 1974), Karttunen (1974), and Heim (1988, 1992), according to which for a sentence ϕ to be felicitous in the context c, c must entail the presuppositions required by ϕ. In the common ground theory of presuppositions developed by Stalnaker, the common ground is the set of the speaker's presuppositions, i.e. the set of propositions that the speaker's believes are assumptions shared by her and her audience. Assertions are meant to update the common ground. If an assertion is made and accepted, the common ground expands and the context set shrinks. Thus, if a

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[10] Heim's generalization, though, was based on examples where the presupposition triggering item was the particle *too*, and for those examples it was in fact correct that no difference arises between non-past subjunctive conditionals and mismatched past subjunctive conditionals. My proposal is based on the

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sentence ϕ presupposes p, then asserting ϕ requires that the common ground entails p, that is to say, it requires that the speaker assume that it is true in the common ground that p (modulo accommodation).[11] It is explicit in Heim's context change semantics, and implicit in Stalnaker's idea of a *derived context*, that a clause (precisely, the structural description of a clause at the level of Logical Form) is not always evaluated with respect to the utterance context. The context with respect to which a structure is evaluated depends on the level of embedding of the clause, the most unembedded clause being interpreted with respect to the main (utterance) context. The principle above can then be reformulated as follows: what is responsible for the felicity of a sentence ϕ is not whether its presuppositions are entailed by the main context but whether they are entailed by the *evaluation context* (which may be identical to the utterance time in some cases). Let us call this principle PREP.

(21) **Presupposition Principle (PREP)**

> For a sentence ϕ to be uttered felicitously, the presuppositions of ϕ have to be entailed by the context of evaluation.

Let p be the set of worlds where ϕ's presuppositions are true, and c_n the context set at time t_n; then PREP requires that $c_n \subseteq p$. Because PREP is true of any sentence ϕ, it will be true of the antecedent of a conditional too. Once we have a theory of how to derive the context of evaluation in each case, we come to realize that there is no conflict between

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examples with lexical presuppositional items such as *quit*, and I will argue later that examples such as Heim's *seem* to be counterexamples to my generalization for independent reasons.

the fact that the antecedent of subjunctive conditional can be counterfactual and the fact that the presuppositions of the antecedents have to hold.

Let ϕ be the antecedent of a conditional and suppose that the felicity conditions for the two types of subjunctive conditionals that we are studying have the following structure.

(22) **Felicity Conditions**

    A. <u>Non-past subjunctive conditionals</u>

      $\phi \cap c_? \neq \emptyset$

    B. <u>Mismatched past subjunctive conditionals</u>

      $\phi \cap c_? \neq \emptyset$

What are the contexts relevant for these felicity conditions? Given that one-past subjunctive conditional and MPSCs are felicitous in very different circumstances (in fact, in the opposite circumstances), the contexts in A and B above must be different. Answering this question is the objective of chapter 3 and chapter 4. I will start with the one-past subjunctive conditional because they are a simpler case: once we have an analysis of truth- and felicity- conditions on one-past subjunctive conditional, we will be able to propose a semantic analysis for MPSCs.

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[11] Stalnaker (1972, 1973, 1974, 1978, 1998, Stalnaker 2000). Karttunen (1974), Lewis (1979), Heim (1982,

PART II: WHAT LOOKS LIKE PAST IS PERFECT

I. Subjunctive Conditionals

The objective of this section is to understand what the past is the morphological realization of in subjunctive conditionals and what it contributes to the composition of the meaning of a subjunctive conditional. As Iatridou observes and as we discussed earlier in this chapter, the past morphology is not interpreted temporally, as the event of playing baseball in (2) is supposed to take place in the future (tomorrow). What follows in this chapter is inspired by her work and by the intuition behind it, i.e. that the temporal morphology we see in modal constructions actively contributes to the construction of the modal meaning. However, I depart from her idea that tense morphology has a "core meaning" that can apply to different kinds of entities (i.e. her idea that if it applies to times, we have the temporal meaning of the piece of tense morphology; if it applies to worlds, then we have the modal meaning of that very piece of morphology). My claim is that tense (or aspectual) morphology has a single, definite interpretation: the temporal one. The way tense morphology contributes to the composition of modal meaning is by being interpreted in *different positions* in the structure of a modal sentence, i.e. either in the restriction or in the nuclear scope of the modal operator.

Here, I argue that the past we see in the conditional above *If Charlie played tomorrow, we would loose the baseball game* is the morphological realization of a *perfect operator* interpreted in the modal domain. I will develop an analysis of the meaning of

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1983, 1992), Thomason (1990) and von Fintel (2000) also contributed important worl in the tradition of the

subjunctive conditionals and show how it solves the puzzle of the presupposition projection for subjunctive conditionals (Heim 1992).

II. The puzzle of subjunctive conditionals revisited

I have already presented the puzzle and the new presupposition data that called for a new formulation of the puzzle in the preceding chapter, but for sake of clarity I will briefly summarize it here. What is the set of worlds that the modal operator quantifies over? For indicative conditionals it seems correct to say that the worlds that the modal operator quantifies over must be epistemically accessible worlds, that is to say, worlds compatible with the speaker's epistemic state (Stalnaker 1975). Restricting the quantification to epistemically accessible worlds accounts for why the presuppositions of the antecedent have to hold in the worlds quantified over and why the antecedent itself has to be consistent with what the speaker knows. However, subjunctive conditionals turn out to be more complicated. On one hand, we do not want the modal operator to quantify over epistemically accessible worlds because typically the antecedent of a subjunctive conditional is known to be inconsistent with the speaker's epistemic state. This is shown below where that Charlie is alive is inconsistent with what is being assumed (that Charlie is dead).

    (23)   Charlie is dead. If he were alive, he would come to the ceremony.

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common ground theory of presuppositions.

On the other hand, if we do not restrict the modal base to those worlds that are epistemically accessible, i.e. if the modal base is empty (W), it is a mystery why conditionals whose antecedents have presuppositions are felicitous at all, since W does not have the right entailments. The following example shows that subjunctive conditionals whose antecedents have presuppositions are indeed felicitous.

(24) Charlie smokes. If he quit smoking tomorrow, which he won't, he would run the marathon.

In fact, not only *can* the presuppositions be entailed by the set of worlds we want to quantify over, but they *must* be entailed. In the following example, the presupposition of the antecedent – that Charlie smokes – is inconsistent with the background assumption (that Charlie no longer smokes), and as a result the subjunctive conditional is infelicitous.

(25) Charlie quit smoking last year. #If he quit smoking tomorrow, he would not run the marathon.

Heim (1992) discussed this puzzle and concluded that the only way to reconcile these two requirements of subjunctive conditionals is to stipulate that the modal base is neither the set of epistemically accessible worlds (the main context) nor the totally empty modal base W, but the largest set of worlds obtained by suspending all the speaker's assumptions except the presuppositions of the antecedent, which remain entailed. The dilemma is the following. The set of worlds we need seems to have two irreconcilable

properties: (a) it must be a set of worlds such that the (epistemically inaccessible) antecedent can be consistent with it and (b) it must be a set of worlds such that the presuppositions of the antecedent must be entailed by it.

Above, however, we discovered that the generalization that the presuppositions of the antecedent must be entailed by the context holds for non-past subjunctive conditionals but not for mismatched past subjunctive conditionals: in the latter ones, the presuppositions of the antecedent can be inconsistent with the context. Thus, we have three cases: first, the case of indicative conditionals, where the antecedent must be consistent and its presuppositions must be entailed by the context; second, the case of non-past subjunctive conditionals (one layer of past) where the antecedent can be inconsistent but its presuppositions must be entailed by the context; third, the case of past subjunctive conditionals (two layers of past) where neither the antecedent nor its presuppositions must be compatible with the context. The objective of this chapter is to account for all three cases.

III. Felicity Conditions for Conditionals

As we already explained, it seems correct to hold that for a sentence ϕ to be felicitously uttered in the context c, c must entail the presuppositions of ϕ. In the common ground theory of presuppositions developed by Stalnaker (1973, 1974, 1975), the common ground is the set of all the propositions known or assumed to be true by all the participants in the conversation, and the context set is the set of worlds where all the propositions in the common ground are true. Assertions are meant to update the common

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ground. If the assertion is made and accepted, the common ground expands and the context set shrinks. Thus, if a sentence ϕ presupposes p, then asserting ϕ requires that the common ground entail p, i.e. it requires that the speaker assume that it is true in the common ground that p, modulo accommodation.[12] It is explicit in Heim's context change semantics (and implicit in Stalnaker's idea of a *derived context*) that a clause (that is to say, the structural description of a clause at the level of Logical Form) is not always evaluated with respect to the context of utterance: the context with respect to which a structure is evaluated depends on the level of embedding of the clause, the most unembedded clause being interpreted with respect to the main (utterance) context. We can then reformulate the principle above: what is responsible for the felicity of a sentence ϕ is not whether its presuppositions are entailed by the utterance context but whether they are entailed by the *evaluation context* (which may be identical to the utterance time in some cases). This is the principle that in chapter 2 we called 'Prep'.

(26) **Presupposition Principle (PREP)**

> For a sentence ϕ to be uttered felicitously, the presuppositions of ϕ have to be entailed by the context of evaluation.

Because Prep is true of any sentence ϕ, it will be true of the antecedent of a conditional too.[13] Because this will be true of the antecedent of *any* conditional, the difference

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[12] Stalnaker (1972, 1973, 1974, 1978, 1988, 1998). Kartunnen (1974), Lewis (1979), Heim (1982, 1983, 1992), Thomason (1990) and von Fintel (2000) also contributed important work in the tradition of the common ground theory of presuppositions.

[13] The claim that the presuppositions of the antecedent of a conditional have to be entailed by the context is a standard claim of a dynamic approach to meaning (Heim 1992). However, we will see later that the issue is more intricate and I will have more to say on this topic later in this chapter.

between the felicity of an indicative conditional and that of a subjunctive conditional must be accounted for in some other way. In chapter 2 we already discussed Stalnaker (1975)'s proposal: in indicative conditionals, the value of the selection function is required to be an antecedent-world *inside* the context set, i.e. the value of the selection function when applied to the actual world is required to be an epistemically accessible world. As for subjunctive conditionals, the selection function may reach outside the context set, i.e. the antecedent-world chosen by the selection function *may* be epistemically inaccessible. Karttunen and Peters (1979) proposed a stronger constraint, that is to say, that subjunctive conditionals are felicitous just in case the worlds in which the antecedent is false are epistemically possible. However, this seems to strong, as argued by von Fintel (1998). He considers sequences of conditionals like the following, where it is not true that it is epistemically accessible that the antecedent is false because it is not epistemically accessible that Uli did not make the amount of food that he made.

(27) If Polly had come to dinner tonight, we would have had a good time.

If Uli had made the same amount of food that he in fact made , she would have eaten most of it.

Von Fintel proposal accounts for this sequence by requiring that a subjunctive conditional is felicitous just in case the domain of quantification (and not the antecedent worlds) is partly outside the context set. Others have suggested different constraints on the felicity of subjunctive conditionals: Portner (1992) for example argues that a subjunctive

conditional is felicitous only if there are no antecedent-worlds in the current context set, allowing there to be multiple context sets to accommodate counterexamples.

My proposal is that the skeleton of the felicity conditions for the three kinds of conditionals we are considering is the same, but what changes is the context set. In all the three cases, the antecedent ϕ is required to be compatible with *some* set of worlds. The felicity condition for indicative conditionals is the easiest: it requires that the antecedent ϕ be compatible with the main context (i.e. the context at the utterance time). The felicity condition for non-past subjunctive conditionals (which from now on I will call one-past subjunctive conditionals) requires that the antecedent be compatible with *some* context, call it c_3. Finally, the felicity condition for mismatched past subjunctive conditionals (which from now on I will call two-pasts subjunctive conditionals) requires that the antecedent be compatible with *some other* context c_4. Both c_3 and c_4 are different from c_u.

(28) Felicity Conditions

    (A) <u>Indicative conditionals</u>

        $\phi \cap c_u \neq \varnothing$

    (B) <u>1-past-subjunctive conditionals</u>

        $\phi \cap c_3 \neq \varnothing$

    (C) <u>2-past-subjunctive conditionals</u>

        $\phi \cap c_4 \neq \varnothing$

In this picture, the context of evaluation of a subjunctive conditional is never the main context. Furthermore, whether a subjunctive conditional has one layer of past morphology or two layers of past morphology correlates with the selection of the context of evaluation. It is therefore a pressing question what exactly these contexts are, and in

order to answer this question, I will propose a compositional analysis of the meaning of subjunctive conditionals. The point of the following discussion is to show that once we replace the context of utterance with the context of evaluation, and once we have a theory of what the context of evaluation is in each case, we come to realize that there is no conflict between the fact that the antecedent can be counterfactual and the fact that the presuppositions of the antecedents have to hold.

IV. What looks like past is perfect

I propose that the past morphology that we see in both the antecedent and the consequent clause of a one-past subjunctive conditional is the morphological realization of a *perfect operator*. The English perfect, especially the present perfect, has received a lot of attention in the linguistic literature because of the properties that distinguish it from both the present and the simple past tense. McCoard (1978) offers a survey of possible theories of the perfect: the current relevance theory, the indefinite past theory, the embedded past theory and, finally, the theory that he argues to be the best, the Extended Now theory. Very briefly, the extended now theory is an analysis of the perfect as the marker of prior events which are nevertheless included within the overall period of the present, the "extended now".

The analysis of the perfect that I will assume here is a version of the Extended Now theory (McCoard 1978, Dowty 1979, among others) suggested in Iatridou, Anagnostopoulou and Izvorski (2001) and implemented and extended in von Fintel and Iatridou (2002), and Iatridou (2002). According to this theory, the perfect sets up a time

span (their version of the extended now), whose left boundary (LB) is determined by the adverbial, and whose right boundary (RB) is determined by the tense of the perfect (present for the present perfect, past for the past perfect, future for the future perfect). Consider the two examples below, Existential and Universal perfect respectively.

(29) Since 1997, Lucy has been to NY once.   (E)

(30) Lucy has been happy since Charlie gave her flowers.   (U)

The universal interpretation of the perfect requires a predicate of which the subinterval property holds (these could be stative predicates, or predicates that have been turned into predicates with the subinterval property by operators like the progressive). The LF for the universal sentence above will look as follows.

(31)   LF for U-perfect
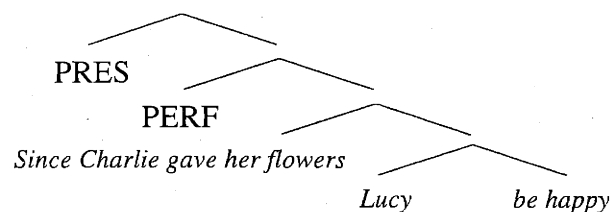
The universal sentence will be true just in case there is an interval whose right boundary is the utterance time and whose left boundary is the time at which Charlie gave Lucy flowers, and Lucy is happy throughout that interval. This requires the perfect operator, the left boundary and the right boundary to be defined as follows. The *o* symbol in the entry of the present tense means 'overlap'.

(32) $[[\textbf{PERF}]]^{g,c} = \lambda P_{<i,t>}. \lambda t.\exists t': RB(t, t') \ \& \ P(t')=1$

(33) $LB(t,t')$ iff $t \cap t' \neq \emptyset \ \& \ \neg \exists t'': t'' < (t \cap t') \ \& \ t'' \in t'$

(34) $RB(t,t')$ iff $t \cap t' \neq \emptyset \ \& \ \neg \exists t'': (t \cap t') > t'' \ \& \ t'' \in t'$

(35) $[[\textbf{PRES}_2]]^{g,c} = g(2)$, defined only if $g(2) \ o \ t_c$

In the existential perfect, the right boundary of the time span will be the utterance time, since the tense is present. The *since*-adverbial, on the other hand, determines the left boundary of this interval. Informally, the sentence is true if there is a time during this interval at which Lucy was in NY. The LF for *Since 1997, Lucy has been in NY once* will be the following.

(36) LF for E-perfect
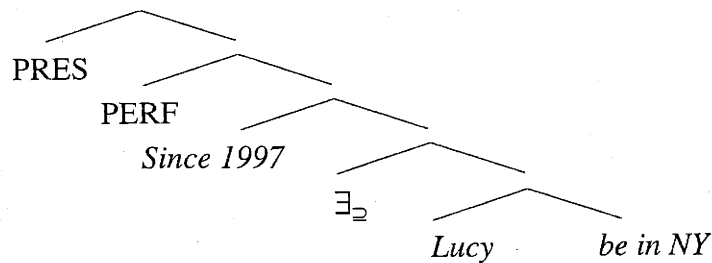
The $\exists_\supseteq$ operator will have the entry below.

(37) $[[\exists_\supseteq]]^t = \lambda p_{<st>}.\exists t': t \supseteq t' \ \& \ p(t')=1$

As I mentioned at the beginning of this section, I suggest that the past morphology that we see in both the antecedent and the consequent clause of a subjunctive conditional is the morphological realization of the perfect operator introduced above. As I said earlier in

this dissertation, temporal elements can be interpreted *below* a modal operator (in the proposition expressed by the sentence without the modal) or *in the modal domain*. My claim is that the perfect that occurs in subjunctive conditionals is interpreted in the modal domain. The next sections will address the question of what it means for a perfect to be interpreted in the modal domain.

IV.1 The semantic analysis of Subjunctive Conditionals

I shall assume the structure of a conditional sentence argued for in Kratzer (1981), (1986) and (1991). In the same vein as Lewis (1975)'s treatment of adverbs of quantification, Kratzer does not analyze the connective *if* as a two-place operator taking the antecedent and the consequent as its arguments. Instead, a conditional sentence is analyzed as a tripartite structure: the *if*-clause is interpreted as the restriction of a possibly covert modal operator, whereas the consequent is interpreted in the nuclear scope. Thus, the structure determined by a modal operator is similar to any other quantificational structure. This applies to conditionals sentences as well as any other modal structure. To illustrate this proposal, consider the following modal sentence.

(38) Charlie must be here

As the semantic structure of this sentence shows, the accessibility relation R restricts the quantification over worlds: R is a relation between worlds that determines which worlds are the relevant worlds.[14, 15]

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[14] Here I am assuming a structure where world variables are syntactically present at the level of logical form (LF). See von Fintel and Heim's lecture notes.

(39)

```
                    t
                  /   \
                γ       δ <st>
              <st,t>
              /    \
          must      β
      <<s,t>,<st,t>>   <s,t>
          /    \
         R      w
      <s,<s,t>>>
```
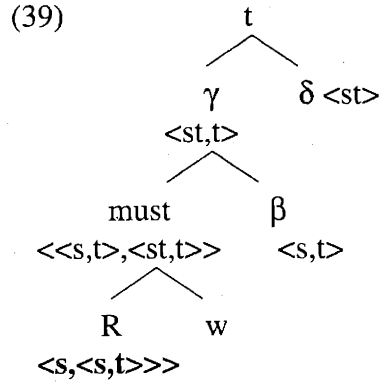
According to the most conservative view of the inner structure of the accessibility relation, R is just a binary relation between worlds. For example, assuming that the modal *must* is interpreted epistemically, the accessibility relation will have the entry in (39). If w stays free, it will be interpreted as referring to the actual world.

(40) $R = \lambda w.\lambda w'$. w' is compatible with that the speaker knows in w.

The modal *must* has the lexical entry in (41). At the end of the semantic composition, the modal sentence will have the truth-conditions in (42).

(41) $[[\textbf{must}]] = \lambda p \in D_{<s,t>}.\lambda q \in D_{<s,t>}.\forall w \in W[p(w){=}1 \rightarrow q(w){=}1]$

(42) $[[\textbf{Charlie must be here}]]^{W} = 1$ iff for all the worlds w' compatible with what the speaker knows in w, Charlie is here in w'.

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[15] *s* is the type of a world; $<s,t>$ is the type of a proposition (a function from possible worlds to truth-values); *t* is the type of a truth-value.

However, for reasons that will become clearer as the discussion proceeds, we have to assume that accessibility relations are not binary relations between worlds but ternary relations between worlds and time, so that the lexical entry for the accessibility relation R is as follows.

(43) $R = \lambda w.\lambda t.\lambda w'$. w' is relevantly accessible from w at t.

The internal composition of any modal sentence will be as shown in below:

(44)

$$
\begin{array}{c}
t \\
\diagup \quad \diagdown \\
\gamma \qquad \delta \text{ <st>} \\
\text{<st,t>} \\
\diagup \quad \diagdown \\
\text{Modal} \qquad \beta \\
\text{<<s,t>,<st,t>>} \quad \text{<s,t>} \\
\diagup \quad \diagdown \\
\alpha \qquad t \\
\text{<i,<s,t>>} \\
\diagup \quad \diagdown \\
R \qquad w \\
\text{<s,<i,<s,t>>>}
\end{array}
$$
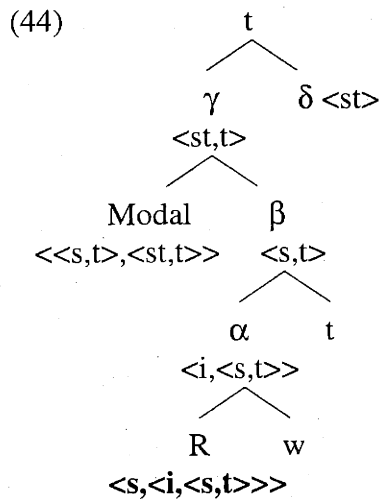
The structure below shows the compositional analysis of a conditional structure where a past tense has been interpreted inside the accessibility relation. The node labeled σ is the antecedent, which combines with the (already saturated) accessibility relation by Predicate Modification (Heim and Kratzer 1998). The node labeled δ is the consequent.

(45)

$$
\begin{array}{c}
\text{S t} \\
\diagup\diagdown \\
\gamma \qquad \delta \text{ <st>} \\
\text{<st,t>} \\
\diagup\diagdown \\
\text{Modal} \qquad \varepsilon \text{ <s,t>} \\
\text{<<s,t>,<st,t>>} \quad \diagup\diagdown \\
\beta \qquad \sigma \\
\text{<s,t>} \quad \text{<s,t>} \\
\diagup\diagdown \\
\alpha \quad\cdot\quad \text{t} \\
\text{<i,<s,t>>} \\
\diagup\diagdown \\
\text{R} \qquad \text{w} \\
\text{<s,<i,<s,t>>>}
\end{array}
$$
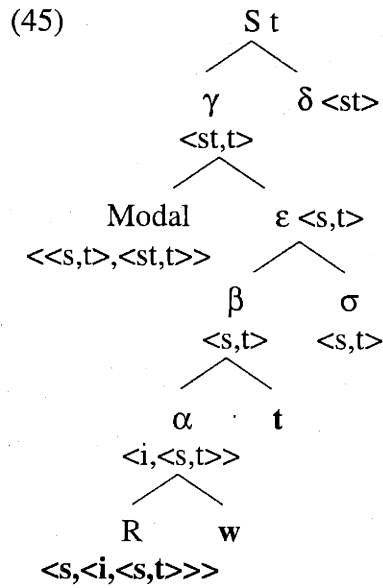
Now, my proposal is that the perfect operator is not interpreted within the proposition expressed by the consequent clause but it provides the time argument of the accessibility relation. We could implement this proposal by generating the perfect operator inside the accessibility relation (where x occurs in the structure above), and then adjoining it to the top of the structure for reason of interpretation (the perfect operator being a quantifier cannot saturate the time argument of R). Therefore, the after-movement structure will look as follows.

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(46)

```
              CP
             /\
        [perf]  /\
          ↑    1    TP
          |        /\
          |    /\    ψ
          |  Modal  /\
          |       β    φ
          |      /\
          |   /\   x₁
          |  R   w
          |_____|
```

$$
\begin{array}{c}
\text{CP}\\
[\text{perf}]\quad\;\; 1 \quad \text{TP}\\
\text{Modal}\quad \psi\\
\beta \quad \phi\\
R \quad w \quad x_1
\end{array}
$$
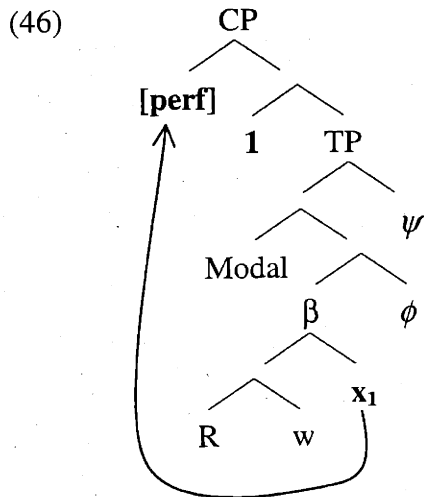
However, this does not seem a very attractive operation, as the nature of this movement is syntactically obscure. Instead, I will choose a second option in which the perfect operator is base-generated at the top of the structure, while still being interpreted as the argument of the accessibility relation. The structure and the semantic computation is shown in the tree below. I will explain the structure in greater detail below. Here, I would like to draw the reader's attention to the close parallelism between the structure of a subjunctive conditional below and the structure of the Existential-perfect we gave above. In both structures, a perfect operator occurs below tense, and the existential quantifier $\exists_\supseteq$ occurs lower in the structure and takes the relevant proposition as it argument (in the case of the E-perfect, the proposition was that one expressed by the tenseless sentence; in the case of the subjunctive conditional, the proposition is more complex as it includes accessible worlds where ϕ is true). The variable x argument of the accessibility relation R ranges over times. The world argument of R is the actual world w_c by default.

(47)

$\exists t_3: RB(t_c,t_3)$ & $\forall w[\exists t_1: t_3 \supseteq t_1$ & w is accessible from w_c at t_1 and ϕ is true in w
and w resembles w_c no less than any other world $\rightarrow \psi$ is true in w]

t_c $\lambda t_6.\exists t_3: RB(t_6,t_3)$ & $\forall w[\exists t_1:t_3 \supseteq t_1$ & w is accessible from w_c at t_1 and ϕ is true in
       w and w resembles w_c no less than any other world $\rightarrow \psi$ is true in w]

$[[\textbf{Perf}]]^{g,c} =$
$\lambda P.\lambda t_6.\exists t_3: RB(t_6,t_3)$ & $P(t_3)=1$

      $\lambda t_2. \forall w[\exists t_1: t_2 \supseteq t_1$ & w is accessible from w_c at t_1 and ϕ is true in w
       and w resembles w_c no less than any other world $\rightarrow \psi$ is true in w]

    $\lambda t_2. [...]$ $\forall w[\exists t_1:t_2 \supseteq t_1$ & w is accessible from w_c at t_1 and ϕ is
         true in w and w resembles w_c no less than any other
         world $\rightarrow \psi$ is true in w]

$\lambda q.\forall w[\exists t_1:t_2 \supseteq t_1$ & w is accessible from w_c at t_1 $[[\psi]]^{g,c} = \lambda w_6. w_6 \in \psi$
and ϕ is true in w and w resembles w_c no less
than any other world $\rightarrow q(w)]$

     $[[\textbf{Modal}]]^{g,c} =$
     $\lambda p.\lambda q.\forall w[p(w) \rightarrow q(w)]$

       $\lambda w_5. \exists t_1:t_2 \supseteq t_1$ & w_5 is accessible from w_c at t_1 and ϕ is true in w_5
       and w_5 resembles w_c no less than any other world accessible
       from w_c at some subinterval of t_2 and in which ϕ is true.

    $[[\textbf{Sim}]]^{g,c} =$
$\lambda p.\lambda w_5. w_5 \in p$ and w_5 resembles w_c no
   less than any other world in p $\lambda w_4.\exists t_1: t_2 \supseteq t_1$ & $[\lambda t_5.\lambda w_2. w_2$ is
              accessible from w_c at t_5 and ϕ is true
              in $w_2](t_1)(w_4) =$
              $=\lambda w_4.\exists t_1:t_2 \supseteq t_1$ & w_4 is accessible
              from w_c at t_1 and ϕ is true in w_4

$[[\exists_\supseteq]]^{g,c} = \lambda P_{<i<st>>}.\lambda w_4.\exists t_1: t_2 \supseteq t_1$ & $P(t_1)(w_4)$ $\lambda t_5.\lambda w_2. w_2$ is accessible from
                  w_c at t_5 and ϕ is true in w_2.

       $\lambda t_5.[...]$ $\lambda w_2.w_2$ is acc. from w_c at x_5
               and ϕ is true in w_2

     $\lambda w_2. w_2$ is accessible from w_c at x_5 $[[\phi]]^{g,c} = \lambda w_3. w_3 \in \phi$

   $\lambda t_4.\lambda w_2. w_2$ is accessible from w_c at t_4 x_5

   $[[\textbf{R}]]^{g,c} =$ w_c

$\lambda w_1.\lambda t_4.\lambda w_2. w_2$ is accessible from w_1 at t_4

Given an evaluation world w and time t, the relevantly accessible worlds are those worlds that are compatible with what is still possible in w at t: as time goes by and as the set of propositions true in the actual world expands, possibilities get foreclosed which means that the set of worlds compatible with the actual world shrinks over time. Thus, the kind of notion of accessibility that we are interested in is time-dependent. I shall go back to a discussion of this notion in chapter 4. Let us go over the structure above in more detail. Now, as the reader can see from the structure above, since the variable which saturates the time argument of the accessibility relation gets bound by the $\exists_{\supseteq}$ operator and because of the definition of the $\exists_{\supseteq}$, which worlds are accessible is evaluated not with respect to the whole interval (introduced by the perfect operator) but with respect to each subinterval of this interval. Moreover, the antecedent ϕ is added not to the set of all worlds accessible from the interval, but is added to each set of worlds accessible at subintervals of this interval. Thus, whatever requirements need to be satisfied when adding the antecedent to the set of accessible worlds, they will need to be satisfied at the subinterval level. This point will be important later in the discussion. As for the perfect operator, it builds an interval whose right boundary is determined by the c-commanding tense. In the structure above, it was the utterance time.

(48)
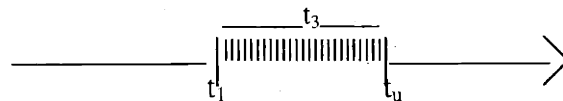
Informally, the truth-conditions of a one-past subjunctive conditional will require that it be true just in case there is an interval t_3 whose right boundary is the utterance time and

such that in all the possible worlds w such that there is a subinterval of this interval at which w is accessible and such that the antecedent ϕ is true in w and w is maximally similar to the actual world, the consequent ψ is true in w.

(49) $[[\textit{If } \phi \textit{ would } \psi]]^c = 1$ iff $\exists t_3$: $RB(t_c, t_3)$ & $\forall w[\exists t_1$: $t_3 \supseteq t_1$ & w is accessible from w_c at t_1 and ϕ is true in w and w resembles w_c no less than any other world $\rightarrow \psi$ is true in w]

I will go back to what it means for a world to be accessible in chapter 4: briefly, a world is accessible if it is compatible with what is possible in the actual world at some particular time.

Before turning to the issue of the felicity conditions of subjunctive conditionals and before showing that this proposal accounts for the facts without stipulations, let me give an analysis of two-pasts subjunctive conditionals, i.e. the mismatched kind we began with in chapter 2.

We can put the present proposal as follows: *the perfect operator is the hallmark of subjunctive conditionals*. Thus, two-pasts subjunctive conditionals will have to have the perfect operator too. But what is the role of the second layer of past morphology? Is the past real or fake?

(50) If Charlie had quit smoking tomorrow, he would not have run the marathon.

My proposal is that the past tense is real and it modifies a time, but, as we just saw, this time cannot be the time at which some eventuality took place (since it is possible to have a future adverb locating that eventuality in the future). Hence, the past must modify some other time. Which time? The conditional above will have the structure here below.

(51) <u>Structure of a two-pasts subjunctive conditional</u>:

```
                    S
                  /   \
           PAST2     /   \
             PERF       α
                      /   \
                   /   \    ψ
                /   \    φ
             Modal    R
```
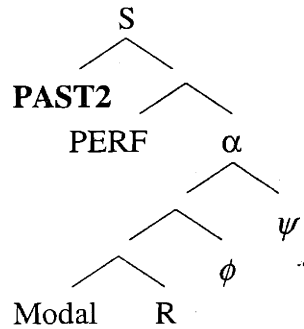
The perfect operator – the hallmark of subjunctive conditional – occurs in usual position but this time the right boundary of the interval built by the operator will be a past time since the tense above the operator is past. Hence, we have the answer to the question we asked above: the role of past is to set up the right boundary of the interval.

I adopt a variant of the referential analysis of tense developed by Partee (1973), Enç (1987) and Kratzer (1998). Heim (1994) suggested that tense be interpreted as a *presupposition*, in a way analogous to the interpretation of gender features for pronouns (Heim and Kratzer 1998). For example, a sentence in the past tense will be defined only if there is a contextually salient past time.

(52) $[[\textbf{PERF}]]^{g,c} = \lambda P. \lambda t. \exists t_4: RB(t,t_4) \ \& \ t \subset t_4 \ \& \ P(t_4)=1$

$[[\textbf{PAST2}]]^{g,c} =$ defined only if $g(2)<t_c$; if defined, $[[\textbf{PAST}]]^{g,c} = g(2)$

(53)
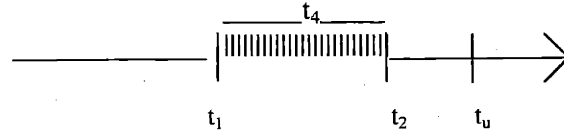
Thus, what we have in the modal domain of a two-pasts subjunctive conditional is a real *past perfect*. The truth-conditions for a two-pasts subjunctive conditional are shown below.

(54) $[[$ ***If** ϕ **would have** $\psi]]^c = 1$ iff $\exists t_4$: $RB(t_c,t_4)$ & $\forall w[\exists t_1$: $t_4 \supseteq t_1$ & w is accessible from w_c at t_1 and ϕ is true in w and w resembles w_c no less than any other world $\rightarrow \psi$ is true in w]

To sum up my proposal, I have proposed that the essential component of subjunctive conditionals is a perfect operator interpreted at the top of the modal structure and contributing to the interpretation of the accessibility relation. In one-past subjunctive conditional, where the only past you see is in fact the perfect in disguise, the right boundary of the interval is set to the utterance time by default. However, in two-pasts subjunctive conditionals, what you see is in fact a past perfect, where the past sets the right boundary to a time before the utterance time.

We know that the past tense can be interpreted as part of the proposition expressed. If I utter the sentence *Charlie flew his kite*, I am saying that what is past is the flying of the kite. However, it does not follow that the past tense must be interpreted that way. Consider the modal sentence below. This sentence is ambiguous. In one reading, the sentence means that it is possible *now* that Charlie left or has left. This is the epistemic

reading.[16] In the other reading, the sentence means that it was possible at *some past time* that Charlie would leave. This is the metaphysical reading.

(55) Charlie could have left.

    (i) It is possible now that Charlie (has) left.   (EPI)

    (ii) It would have been possible for Charlie to leave   (META)

As the paraphrases are meant to show, the difference between the epistemic and the metaphysical readings that we want to focus on lies in the scope relation between the modal and the past tense (I take the auxiliary *have* to be the realization of the past tense).[17] In the epistemic reading, the modal takes scope over the past. In the metaphysical reading, it is the past to take scope over the modal. Because in the epistemic reading the past is interpreted in the proposition, a future adverb like *tomorrow* is only compatible with the metaphysical reading of the sentence.

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[16] Actually, the epistemic reading should not be paraphrased as we did above ("It is possible now that Charlie left") and it does not talk about what is possible *now*: as the presence of two payers of past indicates, even when one layer of past is interpreted below the modal, one is still the realization of the perfect above the modal, exactly like a one-past indicative conditionals. Thus, the correct epistemic paraphrase for the modal sentence above would be "It could be that Charlie left".

[17] We will go back to this point in chapter 3, but for the time being notice that the auxiliary *have* generally instantiates the perfect. However, there are many cases where the perfect morphology is actually interpreted as past. For example, consider the following sequence-of-tense example:

    (i)   Yesterday, Charlie told me that Sally has left last Monday.
                Charlie: "Sally left last Monday"
                Charlie: # "Sally has left last Monday"

The pluperfect (past perfect) in the indirect speech can only correspond to a use of the simple past tense in the direct speech, as shown by the incompatibility of the present perfect with the adverb *last Monday*. See chapter 5 for more on past and perfect and their morphological realization.

(56) Charlie could have left tomorrow.   (META; *EPI)

It would have been possible for Charlie to leave tomorrow.

In other languages, the two readings of the sentence above are actually expressed by different forms, which transparently show where the past is interpreted with respect to the modal. Consider the case of Italian:

(57) a. Carlo <u>sarebbe</u> potuto partire.   (META)

        Carlo be-cond can-past part leave-inf

        'Carlo could have left'

      b. Carlo potrebbe <u>essere</u> partito.   (EPI)

        Carlo can-cond be-inf leave-past part

        'Carlo could have left'

In the (a) sentence, only the main verb in its infinitival form *partire* 'to leave' occurs in the scope of the modal. Both the auxiliary 'to be' and the past (realized by the conditional mood) occur above the modal, which – being a main verb in Italian – is realized as past participle (as happens to main verbs in English when they occur in the scope of *have*).[18] Thus, we have the metaphysical reading. On the other hand, in the (b) sentence, the past (realized, as in English, by an auxiliary) occurs in the scope of the modal, and no auxiliary occurs above it. Thus, we only have the epistemic reading. Interestingly, if we now add a future adverb to the Italian epistemic sentence in (b), we get nonsense. This is

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shown in (a) below. However, the future adverb is perfectly compatible with the metaphysical sentence in (b).

(58) a. #Carlo potrebbe essere partito domani.

#It's possible now that Carlo left tomorrow

b. Carlo sarebbe potuto partire domani.

It would have been possible for Carlo to leave tomorrow.

The paraphrase and the compatibility with the future adverb *tomorrow* clearly show that in the metaphysical reading, the past is not interpreted in the complement of the modal verb (as in the epistemic reading, where the future adverb cannot in fact occur).

IV.2 Context sets and felicity conditions

I am now in a position to spell out the felicity conditions for the three types of conditionals, which I repeat here for convenience. For all conditionals, it is required that the antecedent ϕ be compatible with the context set. The difference among the three cases we are considering lies in what counts as the relevant context set in each case.

(59)   Felicity Conditions

    (A) Indicative conditionals

       $\phi \cap c_u \neq \varnothing$

    (B) 1-past-subjunctive conditionals

       $\phi \cap c_3 \neq \varnothing$

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[18] This will become much clearer in chapter 3. For the present discussion, it is enough to say that the past is realized in (a) above by the auxiliary in the conditional mood. In chapter 3 we will see that things are more

(C) <u>2-past-subjunctive conditionals</u>

$$\phi \cap c_4 \neq \varnothing$$

The context sets c_u, c_3 and c_4 are sets of worlds w such that there is a time during a certain interval such that w is epistemically accessible at that time and such that the antecedent ϕ is true in w. In other words, context sets c (whether it is c_u, c_3, or c_4) are sets of all the worlds accessible at any time during a certain interval. The piece of structure that corresponds to these sets is the following.

(60)

$\lambda w_4.\exists t_1:t_2 \supseteq t_1$ & w_4 is accessible
from w_c at t_1 and ϕ is true in w_4

$[[\exists_\supseteq]]^{g,c} =$ $\lambda t_5.\lambda w_2.$ w_2 is accessible from
$\lambda P_{<i<st>>}.\lambda w_4.\exists t_1: t_2 \supseteq t_1$ & $P(t_1)(w_4)$ w_c at t_5 and ϕ is true in w_2.

$\lambda t_5.[...]$ $\lambda w_2.w_2$ is acc. from w_c at x_5
and ϕ is true in w_2

$\lambda w_2.$ w_2 is accessible from w_c at x_5 $[[\phi]]^{g,c} = \lambda w_3.$ $w_3 \in \phi$

$\lambda t_4.\lambda w_2.$ w_2 is accessible from w_c at t_4 x_5

$[[\mathbf{R}]]^{g,c} =$ w_c
$\lambda w_1.\lambda t_4.\lambda w_2.$ w_2 is accessible from w_1 at t_4
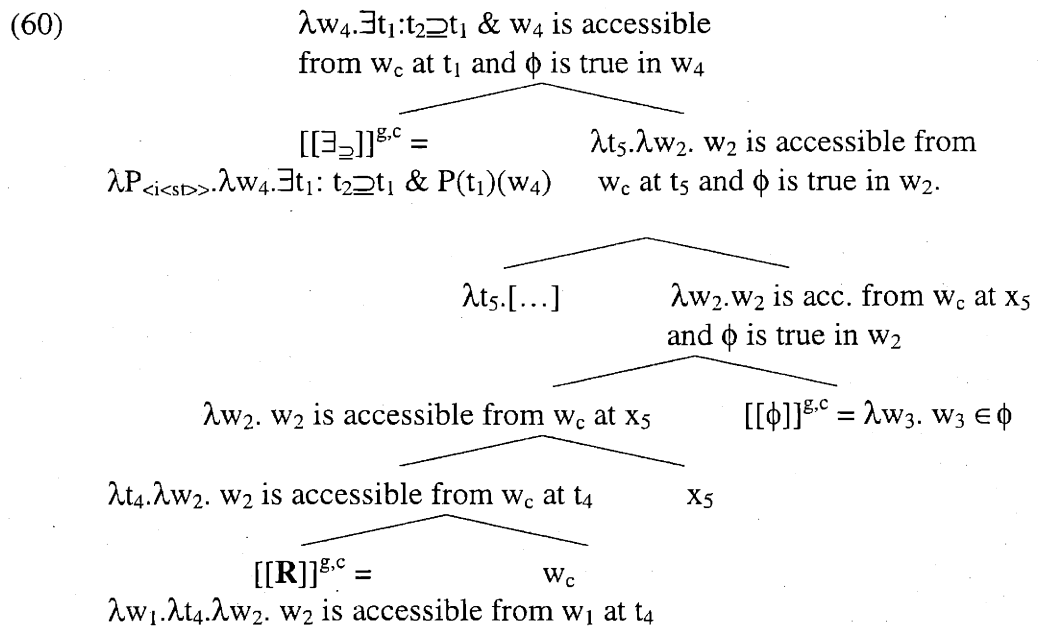
When no perfect and $\exists_\supseteq$ operators occur, the time argument of the accessibility relation is the utterance time by default. In this case, the context set is c_u (*current* context), i.e. the set of all the world compatible with what the speaker knows at the utterance time. This is what happens in indicative conditionals since there is no perfect or past that contributes to

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complicated .

the interpretation of the accessibility relation. As for one-past subjunctive conditionals, the perfect and the $\exists_\supseteq$ operators are interpreted as part of the accessibility relation: hence, c_3 must be the set of worlds compatible with what the speaker knows during the interval t_3 built by the perfect, whose right boundary is the utterance time. Finally, in two-pasts subjunctive conditionals, a perfect operator and a past occur, both contributing to the definition of an accessible world: thus, c_4 must be the set of worlds compatible with what the speaker knew during the interval t_4 whose right boundary is a time earlier than now. This is summarized below.

(61) Context of evaluation

$c_u = \{w \in W: w$ is compatible with the speaker's knowledge at $t_u\}$

$c_3 = \{w \in W: \exists t_1 : t_1 \subset t_3$ & w is compatible with the speaker's knowledge at $t_1\}$

$c_4 = \{w \in W: \exists t_1 : t_1 \subset t_4$ & w is compatible with the speaker's knowledge at $t_1\}$

Given the structure of a conditional, the felicity requirement that the antecedent be compatible with the relevant context set is basically the requirement that the restriction of the modal operator not be empty, which we may view as a particular case of the more general restriction that quantifiers not have an empty domain.[19]

During our discussion in the previous and current chapters, it has become clear that any good theory of subjunctive conditionals must be able to account for two facts: (i) the puzzle of subjunctive conditionals and (ii) the felicity difference between one-past subjunctive conditionals and two-pasts subjunctive conditionals. Let us start with the first fact.

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[19] Thanks to Irene Heim for pointing this out.

V. The puzzle of subjunctive conditionals solved

Whereas the antecedent of a subjunctive conditional can be inconsistent with the speaker's epistemic state, the presuppositions of the antecedent cannot. This was the dilemma we described at the beginning of this chapter. The set of worlds we need seems to have two irreconcilable properties: (a) it must be a set of worlds such that the possibly epistemically inaccessible antecedents can be consistent with it and (b) it must be a set of worlds such that the presuppositions of the antecedent must be entailed by it. The pair below exemplified this puzzle: in the first conditional, that Charlie is alive is known to be false, but the subjunctive conditional is felicitous; however, the fact that it is known that Charlie does not smoke (and will not smoke tomorrow) causes the infelicity of the second subjunctive conditional.

> (62) Charlie is dead. If he were alive, he would come to the ceremony.

> (63) Charlie quit smoking last year. #If he quit smoking tomorrow, he would not
>   run the marathon.

The proposal presented above solves this dilemma. Consider again the piece of the structure corresponding to the context set.

(64) $\lambda w_4.\exists t_1:t_2\supseteq t_1$ & w_4 is accessible
from w_c at t_1 and ϕ is true in w_4

$[[\exists_\supseteq]]^{g,c} =$ $\lambda t_5.\lambda w_2.$ w_2 is accessible from
$\lambda P_{<i<st>>}.\lambda w_4.\exists t_1: t_2\supseteq t_1$ & $P(t_1)(w_4)$ w_c at t_5 and ϕ is true in w_2.

$\lambda t_5.[\ldots]$ $\lambda w_2.w_2$ is acc. from w_c at x_5
and ϕ is true in w_2

$\lambda w_2.$ w_2 is accessible from w_c at x_5 $[[\phi]]^{g,c} = \lambda w_3.$ $w_3 \in \phi$

$\lambda t_4.\lambda w_2.$ w_2 is accessible from w_c at t_4 x_5

$[[R]]^{g,c} =$ w_c
$\lambda w_1.\lambda t_4.\lambda w_2.$ w_2 is accessible from w_1 at t_4

The time argument of the accessibility relation is not the interval itself but a variable that will range over subintervals of the interval and will be existentially closed by the $\exists_\supseteq$ operator. In the end, the outcome will still be the set of worlds accessible at any time during the interval, but merging the antecedent before merging the $\exists_\supseteq$ operator means that the antecedent is added to the set of worlds accessible at each subinterval of the interval and, consequently, it requires that for this operation to be well-defined the presuppositions of the antecedent must be entailed by each set of accessible worlds.[20] It follows that the presuppositions of the antecedent must be entailed *throughout* the interval.[21] Hence, the left boundary of the interval cannot precede the time at which the presuppositions of the antecedent became true.

Now we have the tools to account for one of the examples in the pair we gave above.

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[20] Later we will see that something needs to be said about the entailment requirement. See section VII.

(65) Charlie quit smoking last year. #If he quit smoking tomorrow, he would not

run the marathon.

The presupposition of the antecedent – that Charlie smokes tomorrow – must be entailed

by each set of worlds epistemically accessible at some time during the interval. Because

in one-past subjunctive conditionals the right boundary of the interval is the utterance

time, the set of worlds accessible at the utterance time will be one of them. Thus, it is

required that what the speaker knows at the utterance time entails the presupposition that

Charlie smokes tomorrow. But in our example below, it does not. Hence, the sentence is

infelicitous.

The felicity of the example below also follows from our account. The antecedent

does not carry presuppositions, so PREP, the principle that requires that the

presuppositions of the antecedent be entailed by c_3, is vacuously met ($c_3 \subseteq W$). In this case,

the left boundary will be some time immediately before Charlie's death.

(66) Charlie is dead. If he were alive tomorrow, he would come to the ceremony.

These observations about the presuppositions and the interval created by the perfect help

us strengthen the comparison between the standard interpretation of the perfect and the

modal one. This is why. We said above that the right boundary of the interval is set by the

tense of the perfect construction (the utterance time in the present perfect, some past time

in the past perfect). We did not say much about the left boundary. In the perfect sentence

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[21] This point (that the presuppositions must be entailed throughout the interval) needs some clarification.
See below for more.

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Since 1997, Lucy has been to NY once the left boundary is determined by the *since* adverbial, i.e. it is going to be some time within the year 1997, so that the interval will be the time span between this time and the utterance time. However, there may be no overt adverbial setting the left boundary of the interval, as in the following sentence.

(67) Lucy has visited Boston once.

As observed by IAI (2000), this sentence means that during *her lifetime*, Lucy was once in Boston. Thus, the left boundary of the interval is Lucy's birth. Because the right boundary of the interval is set by the present tense, the sentence requires that Lucy's lifetime include the utterance time, i.e. that Lucy be still alive now. We can put this differently. Recall that, following Musan (1997), I assume that most predicates carry the presupposition that their subject is alive or in existence at the time at which they are said to satisfy the predicate. Hence, we may think of the interval created by the perfect operator as the interval throughout which the presupposition of the sentence in question holds, and whose left boundary cannot precede the time at which the presupposition held for the first time. In *Lucy has visited Boston*, this gives us an interval such that it is true throughout it that Lucy is alive (Lucy's existence). In a sentence like *The meteor has hit the earth once*, the interval will be determined by the meteor's existence. The contrast below (Chomsky 1970) also follows.

(68) #Einstein has visited Princeton.

(69) Princeton has been visited by Einstein.

Consider the infelicitous sentence first. The presupposition of this sentence is that Einstein is alive and this presupposition must be true throughout the interval created by the perfect. Because the interval includes the utterance time (its right boundary is the utterance time), it follows that the presupposition has to be true now too, which is inconsistent with what we know, i.e. that Einstein is dead now. As in the case of subjunctive conditionals the presuppositions of the antecedent must hold throughout the interval whose left boundary is the time at which they were first entailed by the context, in standard perfect sentences the presuppositions of the sentence have to hold throughout the interval introduced by the perfect operator whose left boundary is the time at which these presuppositions first held.

Notice that the requirement that the presuppositions hold throughout the interval raise one issue having to do with the presence of the existential quantifier. We expect the presuppositions of the proposition under an existential quantifier not to be universal: so in the sentence *A woman was talking to her sister*, the presupposition is only that *a* woman has a sister (and not that every woman has a sister). However, in the conditional cases that we are considering, the presuppositions have a universal force. I do not know why this is so, but notice that this is true of *all* the uses of the perfect, that is to say, it is true not only of the modal (high) uses that I have suggested but also of the normal (low) interpretation of the perfect in *Lucy has been to Boston*: this sentence requires that Lucy be alive throughout the interval, and not just at some time, differently from the sentence *In 1990 Lucy went to Boston*, where the only requirement is that she was alive at some point in 1990. Therefore, although it is somewhat mysterious why such a requirement holds of the perfect, that fact that it holds in subjunctive conditionals and in *perfect*

sentences is further support for the claim that a perfect operator occurs in the structure of subjunctive conditionals.

To conclude, I have proposed a theory that accounts for the puzzle of one-past subjunctive conditionals. The set of worlds we needed seemed to be epistemically accessible worlds since the presuppositions of the antecedent of a subjunctive conditional had to be entailed by it. However, the set of worlds we needed could not possibly be the set of epistemically accessible worlds since often the antecedent itself is known to be false. The theory that I have argued for here solves this dilemma by appealing to the work of a perfect operator interpreted as part of the definition of an accessible world. The perfect operator builds an interval of time whose right boundary is the utterance time. Thus, quantification will be restricted to ϕ-worlds accessible from the actual world at any time during the interval. Crucially, ϕ's presuppositions must be entailed by each set of worlds epistemically accessible at some time during the interval: because the set of worlds accessible at the utterance time is one of them, it follows that ϕ's presuppositions must hold at the utterance time as well. On the other hand, ϕ itself only has to be compatible with this big set of worlds: it is sufficient that there be some world accessible at some time during the interval, for the conditional to be felicitous; it is not required that that time be the utterance time, though, which accounts for the fact that ϕ could be known to be false by the speaker, while the subjunctive conditional is still felicitous.

Let us now turn to the second fact we need to explain, i.e. the difference between one-past and two-pasts subjunctive conditionals.

VI. The felicity difference: one versus two layers of past

The question that we are now urged to answer is the following: given the infelicity of the one-past subjunctive conditional we discussed above, why is the two-pasts subjunctive conditional appropriate in the very same circumstances?

> (70) Charlie quit smoking last year. #If he quit smoking tomorrow, he would not run the marathon.
>
> (71) Charlie quit smoking last year. If he had quit smoking tomorrow, he would not have run the marathon.

As it should be by now familiar given the discussion above, the presuppositions of the antecedent have to be checked at each time during the interval, i.e. they are required to be entailed by each set of worlds epistemically accessible at some time during the interval. If a second layer of past occurs, we have the structure of a past perfect, where the past is higher than the perfect operator and provides the value for the right boundary of the interval. More precisely, the right boundary will be the contextually salient past time, i.e. the time immediately before which Charlie quit smoking last year. Because the right boundary is a past time, the whole interval lies in the past. It follows that the presuppositions of the antecedent do not have to be entailed by the set of worlds accessible at the utterance time, since the utterance time is not a subinterval of c_4: in our example, what is required is that the presupposition that Charlie will smoke tomorrow is entailed by the set of worlds accessible throughout the interval whose right boundary

precedes the time when he quit smoking; it is not required that it be entailed by the set of worlds accessible now.[22] This explains why the mismatched past subjunctive conditional is appropriate even if the speaker knows that the presupposition in the antecedent is false. As for why it is appropriate *only* if the speaker knows that the presupposition is false (modulo cancellation), we will explain it in the next chapter.

VII. Entailment and Accommodation: what you can and cannot accommodate

Let us go back to our familiar two-pasts subjunctive conditional, repeated below. As we said before, the presuppositions need to be checked at each point during the interval, i.e. they are required to be entailed by each set of worlds accessible at some time during the interval. The right boundary of this interval is the time immediately before the time at which Charlie quit smoking last year. Thus, at each time during the interval, Charlie smokes.

> (72) Charlie quit smoking last year. If he had quit smoking tomorrow, he would have not run the marathon.

---

[22] There is an issue here about this entailment requirement that I am assuming, which will be resolved below when I will talk about accommodation. Properly speaking the set of worlds accessible at some time t will include the set of worlds accessible at any time later than that. Thus, if some proposition is not entailed by the set of worlds accessible now, then it could not have been entailed by the set worlds accessible at some time earlier than now, contrary to what I have said above. What is crucial here is that at each time what we consider is not really the totality of the worlds accessible then, but a subset of those worlds, precisely the subset of worlds that entails the proposition in question. Because at time t we are considering a subset of the accessible worlds then, if a proposition is entailed by this subset it may not be entailed by the set of worlds accessible at any time later, because these worlds may not have been members of that subset .

However, there is problem. Although at each point in the interval Charlie smokes, it is still not entailed by the set of epistemically accessible worlds at each time during the interval that Charlie will be smoking tomorrow: in fact, at each subinterval of that past interval, it was epistemically possible that Charlie would quit smoking last month or maybe tonight. In other words, at each time during this past interval there are epistemically accessible worlds where Charlie does not smoke tomorrow. Does this force us to abandon the entailment requirement? Are we going to replace it with the weaker compatibility requirement? I will first give an argument that we *may* keep the entailment requirement. Then, I will give an argument that we *must*.

Let us begin with the 'may' argument. What can help us is accommodation. Remember that each time during the interval is an evaluation point: the presuppositions of the antecedent must be checked then. However, as we pointed out above, each set of epistemically accessible worlds will include worlds where Charlie quits smoking after the evaluation time (the subinterval) but before tomorrow. These are the worlds that need to be eliminated if we want to keep the entailment requirement. Once we eliminate them, what we are left with are worlds where Charlie smokes at the evaluation time and still smokes tomorrow. If accommodation takes place, the set of accessible worlds will shrink in the desired way. Indeed, we know that precisely this kind of accommodation must take place in other more familiar subjunctive conditionals: suppose Charlie smokes now (August), but it is not entailed by the context that Charlie will smoke this Christmas because it is epistemically possible that Charlie will quit smoking in September. It is nevertheless appropriate to utter the following subjunctive conditional.

(73) If Charlie quit smoking this Christmas, he would please his grandmother.

All those worlds where he quits smoking between now and Christmas are *de facto* eliminated, something that we can account for by assuming that accommodation has taken place.

I believe that accommodation is in fact what goes on and that we should not give up the entailment requirement in favor of the weaker compatibility requirement. The reason is the following. Suppose that Charlie does not smoke now, and that I do not know enough about him to have an opinion about whether he will or will not start smoking at some point in the future. Even though it is compatible with what I know that there is future time between now and Christmas when he will start smoking, if I do not *know* that he *will* start smoking, I cannot appropriately say *If he quit smoking this Christmas, he would please his grandmother*. Hence, a mere compatibility relation is not enough.

Furthermore, notice that it is important that accommodation is performed at each point during the interval and not over the whole set of accessible worlds. As pointed out to me by Irene Heim, if accommodation where allowed to be performed globally over the whole set of worlds *w* such that there is a time during the interval at which *w* is accessible, so as to eliminate all the unwanted worlds in the set, then the same kind of global accommodation should be allowed to take place in one-past subjunctive conditionals, and they should be felicitous. Here is why. Let us go back to our familiar example repeated below.

(74) Charlie quit smoking last year. #If he quit smoking tomorrow, he would not

   run the marathon.

We argued that the problem with it is that the worlds epistemically accessible now are worlds in which Charlie does not smoke tomorrow, even though c_3 can contain (epistemically inaccessible) worlds where ϕ and its presuppositions are true. Now, if the global accommodation we referred to above were possible, it would apply here, thus eliminating all the epistemically accessible worlds where Charlie does not smoke tomorrow, and only leaving in the context set worlds where he does smoke tomorrow. So, if global accommodation occurred, the one-past subjunctive conditional would be felicitous. But it is not. Hence, global accommodation cannot apply.

By merging the antecedent lower than the $\exists_\supseteq$ operator, the structure proposed in (47) allows accommodation to be performed precisely where we need it to be performed, i.e. over each set of worlds accessible at some time during the interval and not over the whole set of accessible worlds. This requires that at each time during the interval (which in the example above includes the utterance time), there are *some* worlds where the presuppositions of the antecedent are true.

VIII. A classification of conditionals

The proposal defended above is that the *past* and the *perfect* may contribute to the truth and felicity conditions of conditional statements. Assuming that the absence of past is interpreted as present, this picture allows for four combinations: (1) *perfect* but no *past*;

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(2) *perfect* and *past*; (3) no *perfect* and no *past*; (4) *past* but no *perfect*. My claim is that all four possibilities are instantiated, as shown in Table 1.

TABLE 1

	1PastSC	2PastSC	IndC	?
PERF	*YES*	*YES*	*NO*	*NO*
PAST	*NO*	*YES*	*NO*	*YES*

When the perfect operator is present but there is no past we have the structure of a one-past subjunctive conditional, which I repeat below. When no past occurs the value of the time argument of R will be the time of the context by default.

(75)   ONE-PAST SUBJUNCTIVE CONDITIONALS

```
              CP
             /  \
        [perf]   TP
                /  \
              /  \   ψ
            /  \   φ
         Modal   R
```
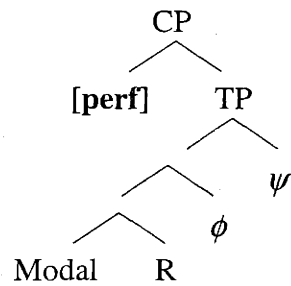
When both the perfect operator and the past are present, we have the structure of a two-pasts subjunctive conditional, repeated below.

(76)   TWO-PASTS SUBJUNCTIVE CONDITIONALS

```
              CP
             /\
        [past]  /\
            [perf]  TP
                   /\
                  /\   ψ
                 /\  φ
            Modal  R
```
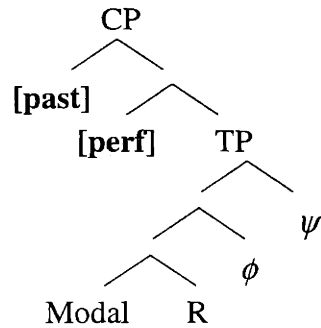
When neither the perfect nor the past occurs, we have the structure of an indicative conditional. As shown in the structure below, the time argument of the accessibility relation will be t_c by default, and nothing else is needed. Thus, what distinguishes indicative conditionals from subjunctive conditionals is that in indicative conditionals, whatever time occurs in the antecedent (or consequent) is *never* interpreted outside the proposition expressed by the clause; that is to say, it is never interpreted in the accessibility relation. As a result, the value of the time argument of R is always t_c, and both the truth and felicity conditions are computed with respect to t_c.

(77)   INDICATIVE CONDITIONALS

```
            /\
        t_c   CP
             /\
            /\   ψ
           /\  φ
      Modal  R
```
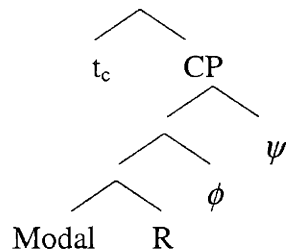
When the past but no perfect operator occurs, then we have the structure in (78). The value of the accessibility relation is a (contextually salient) past time, thus, both the truth

and the felicity conditions of this mysterious type of conditional will make reference to this past time, and consequently, they will actually resemble the truth and felicity conditions of two-pasts subjunctive conditionals. The question is whether there exists any conditional whose structure looks like (78). I suggested elsewhere that the answer is yes and that (78) is the structure of what I have elsewhere called *imperfect conditionals*, i.e. a type of Italian conditionals where the imperfect tense occurs in both the antecedent and the consequent. For an analysis of Imperfect conditionals, I refer the reader to Ippolito (2002b).

(78)   IMPERFECT CONDITIONALS

$$
\begin{array}{c}
\text{CP} \\
[\text{past}] \quad \text{TP} \\
\quad\quad\quad\quad \psi \\
\quad\quad\quad \phi \\
\text{Modal} \quad \text{R}
\end{array}
$$
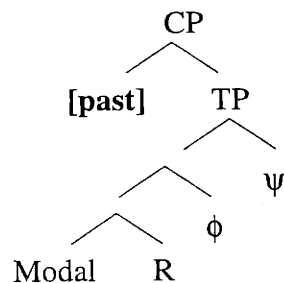
IX. Conclusion

Iatridou (2000) suggested that the presence of the past morphology in subjunctive conditionals is not accidental and that past is the essential ingredient of counterfactuality. Her idea is that the past that we see in a normal sentence such as *Charlie played the game yesterday* and the past that we see in a subjunctive conditional such as *If Charlie played the game tomorrow, he would lose* share some feature which is realized in the

morphology by the past morpheme. This feature is abstract and is neither temporal nor modal, even though it will be interpreted in either way.

My work is inspired by Iatridou's view. Like her, I take the past that occurs in subjunctive conditionals to play an essential role by being what distinguishes a subjunctive from an indicative conditional. However, my proposal is different from Iatridou's in the following respects: temporal and aspectual morphemes used in modal sentences are interpreted in the only way they could be interpreted, i.e. temporally or aspectually. What is the difference between standard and modal uses of the temporal/aspectual morphology? My proposal was that when tense, as well as aspectual operators, can either be interpreted inside the proposition that is expressed by a sentence as locating some eventuality in time or it can be interpreted as the time argument of the accessibility relation, thus contributing to the restriction of the modal operator. This analysis offered a way to solve the puzzle of presupposition projection on subjunctive conditionals. Let us now move to mismatched past subjunctive conditionals and offer a solution to the felicity puzzle we began with.

TEMPORAL MISMATCHES IN SUBJUNCTIVE CONDITIONALS:

THE SOLUTION

I. Mismatched past subjunctive counterfactuals

Suppose that the future can semantically be analyzed as a modal and not as a tense. Thus, tense can only be past or present. We can further simplify this picture by assuming that the only real tense is past, present being the (default) interpretation given to a T node marked as non-past. Given the quantificational structure that we are assuming for modal sentences, the past can either be interpreted above the modal and its restriction or below it. When it is interpreted below it, the past tense will refer to the time at which some event took place: drawing an analogy between quantified DPs and modal operators, this will be the interpretation of tense in *Every kid flew his kite yesterday* ([$_Q$ Every [$_{RESTR}$ kid]][$_{NS}$ fly-PAST his kite yesterday]) or the epistemic reading of the modal sentence in (1).

(1) Charlie could have left.

As we said before, the past can be interpreted above the modal. When it does, it contributes to the composition of the accessibility relation. By adding the adverb

tomorrow to the sentence above, we force the metaphysical reading (as the epistemic one becomes impossible): *Charlie could have left tomorrow* says that it was possible at some past time for Charlie to leave tomorrow (although it may not be possible now for Charlie to leave tomorrow). As we already observed above, in the case of the metaphysical reading of (1) the past cannot be interpreted in the nuclear scope of the modal operator, since it would clash with the future adverb *tomorrow*. Thus, it must be interpreted in the restriction.

The proposal that I made in the previous chapter is that in subjunctive conditionals the past is interpreted as contributing to the internal composition of the accessibility relation by providing a value for the right boundary of the perfect operator realized by the obligatory layer of past morphology occurring in subjunctive conditionals.

(2)

$$
\begin{array}{c}
S \\
\diagup \diagdown \\
\text{PAST2} \quad \diagup \diagdown \\
\text{PERF} \quad \alpha \\
\diagup \diagdown \\
\diagup \diagdown \quad \psi \\
\diagup \diagdown \quad \phi \\
\text{Modal} \quad R
\end{array}
$$
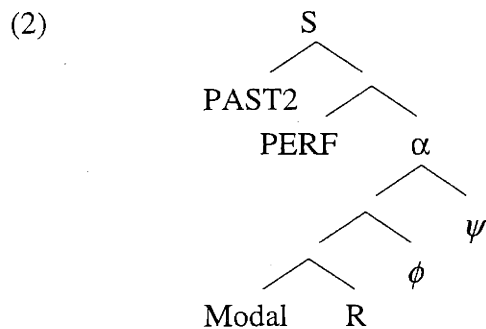
Thus, the two-pasts subjunctive conditional *If they had played the last game tomorrow, Charlie's team would have won* will have the structure below. As you can see, the only difference between a two-pasts subjunctive conditionals and a one-past subjunctive conditional is the presence versus absence (respectively) of a past tense above the perfect operator, i.e. the temporal location of the right boundary of the perfect operator.

(3)

$\exists t_4$: $RB(t_2,t_4)$ & $\forall w[\exists t_1$: $t_4 \supseteq t_1$ & w is accessible from w_c at t_1 and ϕ is true in w
and w resembles w_c no less than any other world $\rightarrow \psi$ is true in w], *defined only if g(2)<t_c.*

$[[\textbf{PAST}_2]]^{g,c}$ $\lambda t_6.\exists t_4$: $RB(t_6,t_3)$ & $\forall w[\exists t_1$:$t_4 \supseteq t_1$ & w is accessible from w_c at t_1 and ϕ is true in
w and w resembles w_c no less than any other world $\rightarrow \psi$ is true in w]

$[[\textbf{Perf}]]^{g,c} =$
$\lambda P.\lambda t_6.\exists t_4$: $RB(t_6,t_4)$ & $P(t_4)=1$

            λt_2. $\forall w[\exists t_1$: $t_2 \supseteq t_1$ & w is accessible from w_c at t_1 and ϕ is true in w
            and w resembles w_c no less than any other world $\rightarrow \psi$ is true in w]

        λt_2. [...] $\forall w[\exists t_1$:$t_2 \supseteq t_1$ & w is accessible from w_c at t_1 and ϕ is
                             true in w and w resembles w_c no less than any other
                             world $\rightarrow \psi$ is true in w]

$\lambda q.\forall w[\exists t_1$:$t_2 \supseteq t_1$ & w is accessible from w_c at t_1 $[[\psi]]^{g,c} = \lambda w_6$. $w_6 \in \psi$
and ϕ is true in w and w resembles w_c no less
than any other world $\rightarrow q(w)]$

               $[[\textbf{Modal}]]^{g,c} =$
               $\lambda p.\lambda q.\forall w[p(w) \rightarrow q(w)]$

                     λw_5. $\exists t_1$:$t_2 \supseteq t_1$ & w_5 is accessible from w_c at t_1 and ϕ is true in w_5
                     and w_5 resembles w_c no less than any other world accessible
                     from w_c at some subinterval of t_2 and in which ϕ is true.

            $[[\textbf{Sim}]]^{g,c} =$
$\lambda p.\lambda w_5$. $w_5 \in p$ and w_5 resembles w_c no
         less than any other world in p $\lambda w_4.\exists t_1$: $t_2 \supseteq t_1$ & $[\lambda t_5.\lambda w_2$. w_2 is
                                      accessible from w_c at t_5 and ϕ is true
                                      in $w_2](t_1)(w_4) =$
                                      $=\lambda w_4.\exists t_1$:$t_2 \supseteq t_1$ & w_4 is accessible
                                      from w_c at t_1 and ϕ is true in w_4

$[[\exists_{\supseteq}]]^{g,c} = \lambda P_{<i<st>>}.\lambda w_4.\exists t_1$: $t_2 \supseteq t_1$ & $P(t_1)(w_4)$ $\lambda t_5.\lambda w_2$. w_2 is accessible from
                                                 w_c at t_5 and ϕ is true in w_2.

                          λt_5.[...] $\lambda w_2.w_2$ is acc. from w_c at x_5
                                             and ϕ is true in w_2

            λw_2. w_2 is accessible from w_c at x_5 $[[\phi]]^{g,c} = \lambda w_3$. $w_3 \in \phi$

       $\lambda t_4.\lambda w_2$. w_2 is accessible from w_c at t_4 x_5

         $[[\textbf{R}]]^{g,c} =$ w_c
$\lambda w_1.\lambda t_4.\lambda w_2$. w_2 is accessible from w_1 at t_4

The truth-conditions for the two-pasts subjunctive conditional will be as follow.

(4) [[**If they had played the last game tomorrow, Charlie's team would have won**]]^{g,c} = 1 iff $\exists t_4$: $RB(t_2,t_4)$ & $\forall w[\exists t_1$: $t_4 \supseteq t_1$ & w is accessible from w_c at t_1 and ϕ is true in w and w resembles w_c no less than any other world $\rightarrow \psi$ is true in w], *defined only if g(2)<t_c*.

Informally, the truth-conditions above say that the two-pasts subjunctive conditional above is true just in case there is an interval of time whose right boundary is some contextually salient past time such that in all the possible worlds accessible from the actual world at some time during the interval and such that it is true that they play the last game tomorrow, it is also true that Charlie's team wins. This is all the semantics gives you. For a world to be *accessible* from the actual time at some past time means that that world is in the set of worlds compatible with what is still *possible* in the actual world at that time: at each point in time, possibilities get foreclosed and, consequently, some worlds that were compatible with the actual world at some time may become incompatible with it at any later point.

In the next section I shall argue that this notion of accessibility is necessary and it constitutes an argument against Lewis (1979)'s analysis of counterfactuals and in favor of an analysis that Lewis himself discussed and dismissed. In doing so, I will also justify the use of the notion of similarity that in the truth-conditions for subjunctive conditionals.

II. Worlds and the direction of Time: Lewis (1979)

Lewis (1979) is concerned with the question of how the asymmetry of counterfactual dependence can be explained by a semantics analysis of counterfactual conditionals. By the expression "the asymmetry of counterfactual dependence", Lewis refers to his view according to which there is a counterfactual dependence in one direction of time (from the past to the future) and counterfactual independence in the other direction (from the future to the past). In other words, whereas it is reasonable to imagine that if the present were different, the future would be different too, it is not as reasonable to suppose that if the present were different, then the past would be different too.

The objective of a good semantic analysis of subjunctive conditionals must account for this asymmetry. The first semantic analysis that Lewis considers builds this asymmetry into the analysis itself.

(5) ANALYSIS 1. Consider a counterfactual "If it were that A, then it would be that C" where A is entirely about affairs in stretch of time t_A. Consider all those possible worlds w such that:

(1) A is true at w;

(2) w is exactly like our actual world at all times before a transition period beginning shortly before t_A;

(3) w conforms to the actual laws of nature at all times after t_A;

(4) during t_A and the preceding transition period, w differs no more from our actual world than it must to permit A to hold.

The counterfactual is true if and only if C holds at every such world w.

Analysis 1 guarantees that the worlds you will be considering are worlds as close as the actual world as possible up to (shortly before) t_A, the time at which the situation described in the antecedent is supposed to take place. If t_C follows t_A, then C may be false at our world, since the actual world is like the possible worlds in which A is true only up to t_A. However, if t_C precedes t_A, then because of point (2) of Analysis 1, C will have to be true in the actual world too. Thus, the counterfactual asymmetry is guaranteed.

Lewis has some arguments against Analysis 1. For example, one argument is that Analysis 1 is built for a special case, that is to say, for cases where the hypothetical situation is about a particular time. However, there are suppositions that are not about particular times, i.e. the examples below.

(6) If kangaroos had no tails ...

(7) If gravity went by the inverse cube of distance ...

I will not have anything to say here about the case of timeless suppositions illustrated in the examples above.[23]

The semantic analysis that Lewis considers to be correct is one which is based on *comparative similarity of possible worlds.*

---

[23] Actually, I may have something to say about examples like (102)-(103), but I will postpone presenting my remarks to the next chapter.

(8) ANALYSIS 2. A counterfactual "If it were that A, then it would be that C" is (non-vacuously) true if and only if some (accessible) world where both A and C are true is more similar to our actual world, overall, than is any world where A is true but C is false.

Overall similarity among worlds is clearly a vague notion. And in fact Lewis takes this to be a good aspect of the theory since counterfactuals are vague. However, something has to be said about what sort of similarity relation can be combined with Analysis 2 to obtain what Lewis calls he standard resolution of vagueness: "one that invalidates back-tracking arguments, one that yields an asymmetry of counterfactual dependence except perhaps under special circumstances, one that agrees with Analysis 1, our asymmetry-by-fiat analysis, whenever it ought to" [Lewis 1986: 42-43].

"If kangaroos had no tails, they would topple over" seems true. Still, if kangaroos had no tails but used crutches, they would *not* topple over. "If Nixon had pressed the button there would have been a nuclear holocaust" also seems true. But, again, if Nixon had pressed the button but the fatal signal had vanished on its way from the button to the rockets, there would *not* have been a nuclear holocaust. Which worlds are to count as the most similar worlds to the actual world in order for the conditionals above to come out true? Lewis' recipe comes in four points, in order of priority.

(9) SIMILARITY FUNCTION.

(1) It is of the first importance to avoid big, widespread, diverse violations of law.

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(2) It is of the second importance to maximize the spatio-temporal region throughout which perfect match of particular fact prevails.

(3) It is of the third importance to avoid even small, localized, simple violations of law.

(4) It is of little or no importance to secure approximate similarity of particular fact, even in matters that concern us greatly.

The claim that I would like to argue for here is twofold. The first part of the claim is that Lewis' Analysis 2 cannot account for the meaning of mismatched past subjunctive conditionals. More generally, it cannot account for the difference between non-past subjunctive conditionals and mismatched past subjunctive conditionals. The second part of the claim is that Analysis 1 can and, as such, it to be preferred.

II.1 Overall similarity is not enough

Charlie's team won the final game yesterday. They say it is because Charlie did not pitch. Imagine a world w_1 in which Charlie's team plays the final game tomorrow. We don't want w_1 to be a world where the actual laws are violated: for example, we do not want w_1 to be a world in which you can actual play the *same* game twice. Thus, w_1 had better be a world in which they did not play yesterday. Good. So, we now have the closest possible world to the actual world that meets the priorities listed in (9).

(10) If Charlie's team had played the final game tomorrow, they would have lost.

Analysis 2 seems correct for the mismatched past subjunctive conditional above: the conditional is true just in case Charlie's team loses in the world w_1 most similar to the actual world where they play the final game tomorrow. The definition of the similarity function guarantees that the conditional above comes out true by excluding worlds where they (also) played the final game yesterday (worlds where you can do the *same* action twice are worlds that do not obey the actual laws), as well as worlds where they play tomorrow but – say – the other team best pitcher is ill and does not play (and so Charlie's team wins).

The problem is that the existence of this world w_1 which is the world closest to the actual world according to the right weighs and priorities, does not account for the felicity difference between the two types of subjunctive conditionals we have been investigating in this chapter, i.e. mismatched past subjunctive conditionals and non-past subjunctive conditionals. Below is the non-past version of the subjunctive conditional above: as we are familiar from the previous discussion, in the scenario described above, the non-past subjunctive conditional is infelicitous.

(11) #If Charlie's team played the final game tomorrow, they would lose.

Lewis' Analysis 2 does not account for the difference in appropriateness. It predicts that the two subjunctive conditionals should pattern alike. After all, what is the difference if all there is to consider is overall similarity between worlds?

II.2 The time of the divergence

We need our modified Analysis 1, *pace* Lewis. Consider the two subjunctive conditionals discussed above. Recall that the problem Analysis 2 faces is that it does not seem to be able to distinguish between the two types of subjunctive conditionals below. Consequently, it does not seem to be able to account for why one but not the other is infelicitous, let alone correlate this difference with the different tense morphology that they employ.

(12) If Charlie's team had played the final game tomorrow, they would have lost.

(13) #If Charlie's team played the final game tomorrow, they would lose.

As it stands, Analysis 1 does not do much better: if we keep Lewis' definition – which I repeat below – both conditionals are predicted to pattern alike. This is because the time of the divergence between the actual world and the possible worlds being considered is the time at which the situation described in the antecedent is supposed to take place. In both conditionals, this time is tomorrow. Thus, in both cases the possible worlds most similar to the actual world are identical to the actual world up to (some time) tomorrow, when they diverge from the actual course of events. But, then, again we predict both types (two-pasts and one-past subjunctive conditionals) to be true and felicitous.

(14) ANALYSIS 1. Consider a counterfactual "If it were that A, then it would be that C" where A is entirely about affairs in stretch of time t_A. Consider all those possible worlds w such that:

(1) A is true at w;

(2) w is exactly like our actual world at all times before a transition period beginning shortly before t_A;

(3) w conforms to the actual laws of nature at all times after t_A;

(4) during t_A and the preceding transition period, w differs no more from our actual world that it must to permit A to hold.

The counterfactual is true if and only if C holds at every such world w.

However, there is a way to amend Analysis 1 while keeping the core of the analysis, i.e. the reference to a specific time in the semantics. My proposal is that the time of the divergence should not be the time that the supposition is about (i.e. the time at which the hypothetical situation is supposed to hold or take place) but the time argument of the accessibility relation. In turn, the time argument of the accessibility relation is determined by the tense of the subjunctive conditional, as I proposed in section VII and VIII. In the two-pasts subjunctive conditionals (below), the second layer of past is interpreted outside the proposition expressed by the antecedent and provides the value for the time argument of the accessibility relation R.

(15) If Charlie's team had played the final game tomorrow, they would have lost.

The structure and the truth-conditions of the two-pasts subjunctive conditional are repeated below.

(16)

$$
\begin{array}{c}
\text{S } t \\
\diagdown \\
\gamma \quad\quad \delta <st> \\
<st,t> \\
\diagdown \\
\text{Modal} \quad\quad \varepsilon <s,t> \\
<<s,t>,<st,t>> \\
\diagdown \\
\beta \quad\quad \sigma \\
<s,t> \quad <s,t> \\
\diagdown \\
\alpha \quad\quad t_2\ [\textbf{past}] \\
<i,<s,t>> \\
\diagdown \\
R \quad\quad w_1 \\
<s,<i,<s,t>>>
\end{array}
$$
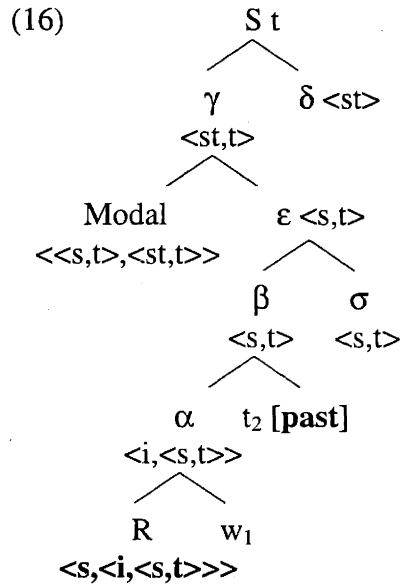
(17) [[**If they had played the last game tomorrow, Charlie's team would have lost**]]^{g,c} = 1 iff $\exists t_4$: $RB(t_2,t_4)$ & $\forall w[\exists t_1$: $t_4 \supseteq t_1$ & w is accessible from w_c at t_1 and ϕ is true in w and w resembles w_c no less than any other world $\rightarrow \psi$ is true in w], *defined only if $g(2) < t_c$.*

Assume, as I did before, the referential analysis of tense. The past time in the accessibility relation will be the contextually salient past time at which something happened that foreclosed the possibility that they play the final game tomorrow, i.e. yesterday, when they actually played the final game. This is the time at which the possible worlds that we are quantifying over in the truth-conditions of the two-pasts subjunctive conditional diverge from the actual world.

One consequence of this analysis is that which time is the time of the divergence is determined by the tense of the subjunctive conditional: it is a past time only if there is a pluperfect in the antecedent. It follows that a one-past subjunctive conditional, where

there is no second layer of past (no pluperfect), will necessarily quantify over possible worlds that diverge from the actual world at whatever time is the time argument of the accessibility relation.

(18) If Charlie's team played the final game tomorrow, they would lose.

In my previous discussion, I have proposed that in one-past subjunctive conditionals the right boundary of the interval of time that the perfect introduces is the utterance time. Suppose that the time at which the possible worlds may have diverged from the actual world is the left boundary of the interval.[24]

(19) [[**If they played the last game tomorrow, Charlie's team would win**]]^{g,c} =

1 iff $\forall w \in W[$ w is accessible from w_1 at g(2) and they play the last game tomorrow in w $\rightarrow$ Charlie's team wins in w], $g(2)=t_c$

If the worlds may have diverged at any time during the interval of time introduced by the perfect, then we can account for the felicity of the following conditional in a situation in which it is known that Zack is dead.

(20) Zack is dead. If he were alive, he would be eighty-six years old.

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[24] The requirement in this case has to be formulated negatively: it is required that the worlds have not yet diverged from the actual world at the utterance time. It is not required that they diverge at the utterance time: they may diverge any time between the utterance time and the future time of the supposition, or they many not diverge at all (if the antecedent of the one-past subjunctive conditional turns out to be true).

The actual world is such that Zack died as some point in the past. However, the set of worlds we are quantifying over includes worlds accessible at any time during the interval: because it is always possible to go back in time so as to find an antecedent-world, this set will include worlds accessible at some time immediately before the time of the divergence, i.e. the time at which Zack died. These are worlds where he did not die then and is alive now.

In other words, quantifying over worlds accessible during the time span set up by the perfect operator allows to quantify over worlds accessible before the time of the divergence even in the case of one-past subjunctive conditionals.

However, if the subjunctive conditional above is felicitous why is the following subjunctive conditional infelicitous in a situation in which it is known that Charlie already quit smoking?

(21) #If Charlie quit smoking tomorrow, he would not run the marathon.

Because we can construe the left boundary of the interval as immediately preceding the time of the divergence (i.e. the time at which Charlie quit smoking), the set of worlds the modal operator quantifies over will include worlds in which Charlie did not quit smoking at some point in the past and still smokes tomorrow. However, the sentence is infelicitous. As we explained in chapter 3, the infelicity of the sentence is due to an additional requirement, i.e. the requirement that the presuppositions of the antecedent be entailed *throughout* the interval, i.e. be entailed by each set of worlds accessible at any subinterval. Although there are worlds where he quits smoking tomorrow, it is not the

case that that Charlie smokes tomorrow is entailed by the context now, i.e. by the set of worlds compatible with what is possible now. For reasons that will become clear later, the same is true for the conditional below.

(22) #If Charlie's team played the final game tomorrow, they would lose.

Before we move to the next chapter, I would like to say a few words on why we needed to use the similarity relation in giving the truth-conditions for subjunctive conditionals. In order to do this, consider this problem. Suppose the speaker utters the conditional below, and suppose that Charlie died six months ago and that Sally decided to attend the ceremony only a week ago.

(23) If Charlie had come to the ceremony tomorrow, he would have met Sally.

According to the analysis that I have argued for above, the conditional above is felicitous if Charlie's coming to the ceremony tomorrow was compatible with what was possible in the actual worlds at some past time. The contextually salient past time is the time at (or immediately before) which Charlie died. In other words, all the worlds we are quantifying over are worlds compatible with what was possible *then*. However, at that past time, many possibility were open and not all entailing the truth of the consequent: for example, although it was possible that Sally would come and that Charlie would meet Sally, it was also possible that Sally would not come and that Charlie would not meet Sally. The problem is that it is not true that Charlie will meet Sally in all the worlds that

were compatible with what was possible in the actual world last year. The reason why the speaker seems to be allowed to say that Charlie *would* have met Sally had he come to the ceremony tomorrow, is that the speaker *now* knows that Sally is one of the invitees, i.e. that the actual world is such that Sally will come to the ceremony tomorrow. Therefore, what we want is not just the set of worlds accessible at a certain past time such that the antecedent is true. What we want is the set of worlds compatible with what was possible at some past time and such that they are *maximally similar* to the actual world. To illustrate this point, reconsider the ceremony example. Call the proposition that Sally comes to the graduation p, and the proposition that Sally does not come to the ceremony $\neg p$: last year, the actual world was compatible with both p and $\neg p$. Thus, the set of worlds accessible at that time included both p-worlds and $\neg p$-worlds. However, in the actual world, only p is true, i.e. the actual world is a p-world. By requiring that the worlds selected by maximally similar to the actual world, we actually eliminate all the $\neg p$-worlds, and are left only with p-worlds in which Charlie comes to the ceremony tomorrow. And in these worlds, it is true that Charlie meets Sally.

In order to restrict the modal operator to antecedent-worlds maximally similar to the actual world, we need a similarity function. Which worlds are to be regarded as the most similar to the actual world is relative to some proposition: thus, we will say that a world w is maximally similar to the actual world with respect to a proposition p just in case there is no p-world more similar to the actual world than w. In our case, we need the set of worlds maximally similar to the actual world among those worlds that are accessible at some past time and where the antecedent is true. The structure of a conditional should look as follows.

(24) $[[\textbf{Sim}]]^w = \lambda p_{<st>}.\lambda w'.\ w' \in p$ and w' resembles w no less than any other

world in p.

(25)

```
                        S t
                       /    \
                     γ        δ <st>
                   <st,t>
                   /    \
               Modal      <st>
            <<s,t>,<st,t>>   /  \
                           ε      Sim <<st>,<st>>
                         <s,t>
                         /    \
                       β        σ
                     <s,t>    <s,t>
                     /    \
                   α        t₂ [past]
                 <i,<s,t>>
                 /    \
                R        w₁
            <s,<i,<s,t>>>
```
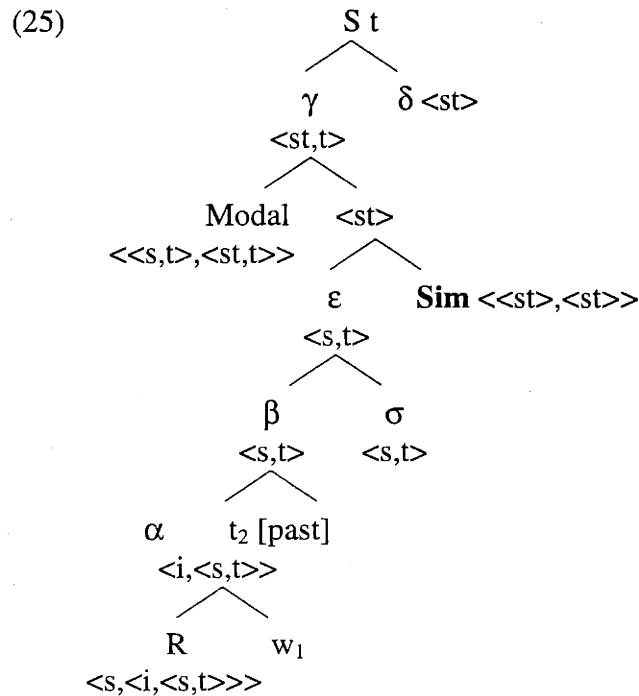
Sim is the function that takes a proposition (ε) – i.e. the set of worlds that are accessible at some past time and such that the antecedent is true – and gives in return the set of worlds among them such that they are maximally similar to the actual world.

To conclude this section, I have shown that a semantic analysis of subjunctive conditionals exclusively based on the notion of overall similarity cannot account for the different types of subjunctive conditionals that we have been considering. Instead, what is needed is an analysis where we have a time-dependent notion of accessibility and a notion of overall similarity.

III. Back to the felicity conditions

Let us go back to where we left before the digression on the notion of accessibility and Lewis' Analysis 1 and 2. Given the truth-conditions we gave above, we are in a position to spell out the felicity conditions for subjunctive conditionals given above. Recall that the felicity condition for non-past subjunctive conditionals requires that the antecedent be compatible with c_3, where c_3 is the set of worlds accessible at any time during the interval whose right boundary is the utterance time. On the other hand, the felicity condition for mismatched past subjunctive conditionals requires that the antecedent be compatible with some other context, c_4. The question we left open in the previous discussion and that we are now in a position to answer is what c_4 is.

(26) **Felicity Conditions**

    A. <u>Non-past subjunctive conditional</u>

       $\phi \cap c_3 \neq \varnothing$

    B. <u>Mismatched past subjunctive conditionals</u>

       $\phi \cap c_4 \neq \varnothing$

The intuition that we tried to account for with our truth-conditions is that a mismatched past subjunctive conditional is felicitous if at some past time the non-past subjunctive conditional would have been felicitous, had it been uttered.

(27) $c_4 = \{w \in W: \exists t_1 : t_1 \subset t_4 \ \& \ w \text{ is compatible with the speaker's knowledge at } t_1\}$

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The corresponding piece of structure is given below.

(28) $\lambda w_4.\exists t_1:t_2\supseteq t_1$ & w_4 is accessible
        from w_c at t_1 and ϕ is true in w_4

                $[[\exists_\supseteq]]^{g,c} =$ $\lambda t_5.\lambda w_2.$ w_2 is accessible from
$\lambda P_{<i<st>>}.\lambda w_4.\exists t_1: t_2\supseteq t_1$ & $P(t_1)(w_4)$ w_c at t_5 and ϕ is true in w_2.

                         $\lambda t_5.[...]$ $\lambda w_2.w_2$ is acc. from w_c at x_5
                                             and ϕ is true in w_2

       $\lambda w_2.$ w_2 is accessible from w_c at x_5 $[[\phi]]^{g,c} = \lambda w_3.$ $w_3 \in \phi$

   $\lambda t_4.\lambda w_2.$ w_2 is accessible from w_c at t_4 x_5

          $[[R]]^{g,c} =$ w_c
$\lambda w_1.\lambda t_4.\lambda w_2.$ w_2 is accessible from w_1 at t_4
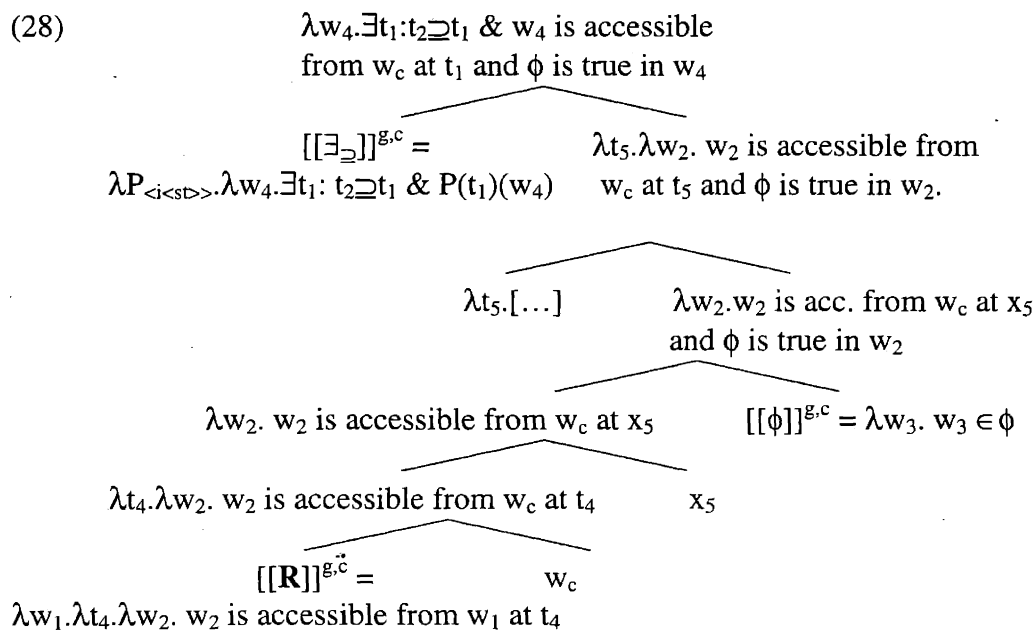
Recall that the perfect operator requires that the presuppositions of the proposition in question be entailed *throughout* the interval, i.e. by each set of worlds accessible at some time during the interval. Now consider again the contrast between a one-past subjunctive conditional and a two-pasts subjunctive conditional. Although they are both about a future hypothetical event, they have very different felicity conditions; in fact, they are in complementary distribution.

(29) *Charlie quit smoking three years ago.*

    a. #If Charlie quit smoking tomorrow, he could participate in the experiment.

b. If Charlie had quit smoking tomorrow, he could have participated in the experiment.

The reason why the (a) sentence is infelicitous is that the antecedent's presupposition (that Charlie smokes tomorrow) is not entailed throughout the interval because it is not entailed by the set of worlds accessible at the utterance time, which is the right boundary of the interval. Thus, PREP is violated.[25] On the contrary, the (b) sentence is felicitous because the interval throughout which the antecedent's presupposition has to be entailed lies entirely in the past (its right boundary is a past time): thus, the presuppositions that Charlie smokes tomorrow is not required to be entailed by the set of worlds accessible at the utterance time: its incompatibility with the main context is irrelevant for the felicity of the example. What is the (contextually salient) past time? It is the time at which (or immediately before which) Charlie quit smoking: at that time the antecedent become impossible. Notice that this also accounts for why the non-past subjunctive conditional we began with (repeated below) was infelicitous in the scenario in which they had already played the last game.

(30) #If they played the last game tomorrow, Charlie's team would win.

The antecedent is incompatible with the main (utterance) context in which they have already played the last game. However, the mismatched past subjunctive conditional is

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[25] The issue is more complicated and in chapter 3 we discussed the issues related to entailment and accommodation.

felicitous in these very circumstances because its appropriateness does not depend on the compatibility between the antecedent and the main (utterance) context.

So far, we have accounted for the infelicitous occurrences of one-past subjunctive conditionals, and for those occurrences of two-pasts subjunctive conditionals that are felicitous. What we have not accounted for yet is those occurrences of two-pasts subjunctive conditional that are infelicitous. For example, we have not accounted for why the following is inappropriate if they have not yet played the last game yet.

(31) If they had played the last game tomorrow, Charlie's team would have won.

This was what at the beginning of this chapter we labeled "the felicity puzzle": differently from non-past subjunctive conditionals, the hypothetical eventuality described by the antecedent of a MPSC is understood as being *impossible*.

If the truth-conditions only talk about worlds accessible from a past time and the felicity condition only requires the antecedent to be compatible with the context at that past time, where does the incompatibility with the current context stem from? My proposal is that the impossibility of the antecedent is a *scalar implicature*. How this implicature is generated is the topic of the next section.

IV. Deriving the impossibility of the antecedent

I take scalar implicatures to be derived from the competition between two propositions. More precisely, given two propositions ϕ and ψ, $\neg\phi$ is implicated just in case (i) ϕ

asymmetrically entails ψ and (ii) the speaker chose to use ψ. A context set is the set of worlds compatible with what is assumed or presupposed to be the case. At each point in time there is a set of propositions that are (taken to be) true in the actual world. Moreover, at each time there is a set of possible worlds which are compatible with the set of propositions true at that time: these are the worlds that the actual world could turn into, i.e. worlds compatible with what is possible in the actual world at that time. With respect to the actual world, the set of possibilities shrinks over time as the set of true propositions (facts) expands. Thus, for any two times t and t', where $t<t'$, in the actual world the set of true propositions at t' is bigger than the set of true propositions at t (the history of the world is bigger), but the set of worlds compatible with what is still possible at t' is smaller than the set of worlds compatible with what is still possible at t. It follows that being compatible with what is possible now entails being compatible with what was possible at any time earlier, but not vice versa because the set of possibilities can shrink over time but cannot expand. The following holds.

(32) For any n, $n<t_u$:

$c_u \subseteq c_n$

Recall the felicity conditions for subjunctive conditionals, repeated below, and recall that c_3 is built over the interval t_3 and c_4 is built over the interval t_4. Now, the interval t_3 is later than the interval t_4, which lies entirely in the past.

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(33) Felicity Conditions
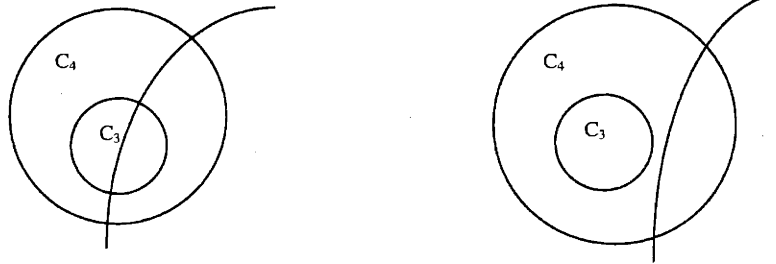
A. Non-past subjunctive conditional

$$\phi \cap c_3 \neq \varnothing$$

B. Mismatched past subjunctive conditionals

$$\phi \cap c_4 \neq \varnothing$$

Given what we said above, it follows that $\phi \cap c_3 \neq \varnothing$ entails $\phi \cap c_4 \neq \varnothing$, but not *vice versa*, as shown in the illustration below.

(34)

Being compatible with what is possible at the utterance time entails being compatible with what was possible at any time earlier than now. If ϕ is compatible with what is possible now, it means that it is not the case that $\neg\phi$. If it is not the case that $\neg\phi$ now, then it is also not the case that $\neg\phi$ at any time earlier than now: because if it was the case that $\neg\phi$ in the past, then ϕ would not be compatible with what is possible now. But not *vice versa*: being compatible with what is possible at some past time does not entail being compatible with what is possible at any later time, because something may occur to the effect that $\neg\phi$ is the case. Therefore, when the speaker chooses to utter a mismatched past subjunctive conditional, she chooses to presuppose something weaker than what she

would have presupposed, had she decided to utter a non-past subjunctive conditional. Hence, the competition can take place.

(35) **Competition:**

  a. You presupposed: $\phi \cap c_4 \neq \varnothing$ where $c_3 \subseteq c_4$

  b. You didn't presuppose: $\phi \cap c_3 \neq \varnothing$

  c. Hence: $\neg(\phi \cap c_3 \neq \varnothing)$ $\equiv$ $\phi \cap c_3 = \varnothing$

The implicature is that the antecedent is not compatible with the current context, that is to say, the antecedent is either false or impossible.

The proposal that I have argued for above is an extension of the classical theory of implicatures stemming from Grice (1975): not only can two assertions in a relation of asymmetric entailment compete, but so can two presuppositions. There must be a principle requiring that speakers maximize their presuppositions (in addition to their assertions). Arguments along these lines were already given by Heim (1991)'s discussion of indefinites. Heim considers the *unexpected* deviance of the sentence with the indefinite article below.

(36) # I interviewed a father of the victim.

(37) I interviewed the father of the victim.

Heim reasons as follows. If we assume the $\exists$-analysis of the indefinite article , the definite and indefinite articles stand in an asymmetric entailments relation – $[a \ \zeta]\xi$

follows from [*the* ζ]ξ (under the Fregean analysis – and, consequently, we expect a scalar implicature to be generated: the use of [*a* ζ]ξ will conversationally implicate that the speaker is not in a position to utter [*the* ζ]ξ. But this is not sufficient to explain the deviance of the sentence above: since it is known that each person has a father, the sentence with the indefinite article conveys as much information as the sentence with the definite article. Why is the former deviant then? In order to solve this puzzle, Heim suggests that there may be a principle at work requiring the speaker to *presuppose as much as possible*: if you can presuppose that *p*, then you must. Thus, the use of the definite article to refer to the father of the victim would be forced. Further evidence in favor of a "maximize presupposition" principle is the following, again due to Heim. Suppose a man is sitting in a restaurant having coffee. If the waiter went to him and asked "Would you like a coffee?", his utterance would be judge infelicitous, as the man is already having *a* coffee. What we expect the waiter to say is something like "Would you like *another* coffee?". As in the father of the victim's example, there is apparently no reason to rule out the use of the indefinite article given that it is common knowledge that the man in the restaurant has already had a coffee, unless we postulate the existence of some principle requiring the use of the item that triggers the presupposition in question (i.e. *another*) instead of the presupposition-neutral one (i.e. *a*).

V. Cancelability

I have argued that the implicature that the antecedent of mismatched past subjunctive conditionals is not true is drawn because the speaker chose to make reference to what was

possible at some past time rather than referring to what is possible at the time of the utterance, which would have been more informative. What distinguishes implicatures from both assertions and presuppositions is that they can be canceled, that is to say, that there may be contexts where the conditions that force the implicature to be drawn are missing, and, consequently, the implicature is suspended. In this section, I will show that this is in fact the case for the implicature that the antecedent of MPSCs is not true. In particular, I will show that the implicature will not be drawn in cases where it would not have been *relevant* to talk about what is currently possible.

Suppose Charlie had to decide when to play the final game of the season. The last time I saw him was a few days ago, and I am now reporting to you bits of the conversation we had, and the thoughts that went through Charlie's mind before he decided to play the day after tomorrow: "He was really torn: true, if they had played the final tomorrow, they might have won. But <u>if they had played the day after tomorrow, they would have certainly won</u>, because the other team's best pitcher will not be playing then. So, he decided that it would be safest to play the day after tomorrow". The point of this example is that I am reporting Charlie's words and thoughts at *the moment of his decision*. What the speaker assumes to be the case at the time of the utterance is irrelevant, and consequently, the implicature of falsity is suspended and the mismatched past subjunctive conditional can be uttered in a context where the speaker believes that the antecedent (that they will play the day after tomorrow) is true.

VI. Presuppositions without presuppositions triggers

Recall how I derived the impossibility of the antecedent in a mismatched past subjunctive conditional: the impossibility of the antecedent is an implicature drawn from the competition between the mismatched past subjunctive conditional and the non-past subjunctive conditional. Drawing this implicature requires evaluating whether the antecedent of a non-past subjunctive conditional is consistent with the utterance context.

However, there are a number of problematic cases where the implicature is drawn but the non-past subjunctive conditional is predicted to be felicitous. To illustrate this case, consider a situation where Jack married Susan yesterday, July 15. In these circumstances, the subjunctive conditional in (a) is felicitous, but the subjunctive conditional in (b) is not.

(38) Jack got married with Susan yesterday (July 15).

    a. If he had gotten married tomorrow, I would have gone to the ceremony.

    b. #If he got married tomorrow, he would have gone to the ceremony.

As in the cases examined above, the intuition is that the two-pasts subjunctive conditional in (a) is felicitous if the hypothetical eventuality described in the antecedent is impossible, which is true in our scenario once we assume that someone can only get married with the same person once.[26] The non-past subjunctive conditional in (b) is

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[26] Of course, Jack and Susan can have several weddings: suppose Jack is American and Susan is Australian and their families cannot travel long-distance. To make both families happy, Jack and Susan may decide to have two weddings, one in the States and one in Australia. Thus, there is a sense in which Jack *can* get married twice with the same person (Susan). However, this is not the sense of getting married that I mean:

infelicitous, which seems to be expected given that in this scenario the antecedent is impossible. However, the infelicity of (b) cannot be due to the incompatibility between the antecedent and the common ground at the utterance time, because subjunctive conditionals – differently from indicative conditionals – can have antecedents incompatible with the common ground.

(39) Jack is dead. If he were alive, he would turn ninety tomorrow.

The proposition that Jack is alive is incompatible with what is assumed, that is to say that Jack is dead. Still, the sentence is felicitous.[27] Therefore, the infelicity of the (b) example before must have a different explanation, but which one?

What is the factor that distinguishes (b) and (39)? If we can point to this difference, we will have found a good candidate for what causes (b)'s infelicity. I would like to suggest that what distinguishes (b) and (39) is Prep, the principle requiring that the presuppositions of a sentence ϕ be entailed by the context with respect to which ϕ is evaluated. Let ϕ be the antecedent of the conditionals we are investigating. Now, (39) vacuously satisfies Prep because its antecedent does not have any presupposition; in this case the following holds: $c_u \subseteq W$. However, I am going to argue that this is not the case for (b): its antecedent does have a presupposition which is incompatible with the common

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despite the fact that Jack and Susan get married twice (they say "yes" twice, in front of two different public officers and according to the laws of two different states), they can only get married with each other once because once they get married once, they are no longer in the unmarried state.

[27] Chapter 3 is devoted to this issue, i.e. how to explain the fact that typically antecedent of subjunctive conditionals are known to be false. We will go back to the felicity conditions we gave before and modify them. For the present discussion, though, assume the felicity conditions for NPSCs I gave above.

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ground, and violates Prep. The task of the remaining part of this section is to find out what this presupposition is.

I propose that the relevant presupposition is the presupposition that is triggered by change-of-state verbs that the eventuality has not occurred yet: for example, the predicate *to get married* is a change-of-state verb and the presupposition that it triggers is that whoever gets married is in the unmarried state before the marriage. The problem with the one-past subjunctive conditional *If he got married tomorrow, he would have gone to the ceremony* uttered in a situation in which Jack and Susan got married yesterday is that the presupposition in the antecedent – that Jack is in the unmarried state until tomorrow – is inconsistent with the context in which it is known that he got married yesterday. Because I am suggesting that the infelicity of the one-past subjunctive conditional *If he got married tomorrow, he would have gone to the ceremony* is due to the change-of-state nature of the predicate involved, we predict that predicates which are not change-of-state should not cause affect the felicity of the conditionals. The subjunctive conditional below shows that this is indeed the case.

(40)   Jack was drunk last week.

        If he were drunk tomorrow at the ceremony, Susan would be upset.

To sum up, for a subjunctive conditional to be felicitously uttered, the antecedent's presupposition must be consistent with the context of evaluation. In cases where there seemed to be no presupposition in the antecedent of the one-past subjunctive conditional, I suggested that a presupposition is generated by the change-of-state predicate, i.e. the

presupposition that the event has not occurred yet. This presupposition is required to be entailed by the context, a requirement that is clearly violated in our wedding example, where it was known that Jack is not in the unmarried state.

Somebody might object that if this were the case, the (a) sentence below should be infelicitous since the antecedent's presupposition that Jack is in the unmarried state next week is inconsistent with what is known, i.e. that Jack will get married tomorrow. The sentence is predicted to be infelicitous. However, it is not.

(41) Jack will get married with Susan tomorrow.

    a. If he got married next week, I would go to the ceremony.

    b. If he had gotten married next week, I would have gone to the ceremony.

The generalization seems to be that when the "foreclosing" event occurs in the past, the one-past subjunctive conditional is infelicitous, but when it occurs in the future (like in the example above), the conditional is felicitous. In (41), both the one-past and the two-pasts subjunctive conditionals are felicitous. However, they are different: when the speaker utters (b), but not when she utters (a), she suggests that she knows that for Jack to get married next week is impossible. The presupposition that Jack is in the unmarried state until next week does not have to be incompatible with the common ground if it is part of the common ground that the wedding has merely been *scheduled* for tomorrow (although it might). Schedules do not have to be viewed as foreclosing possibilities, in that events that have been scheduled may still not happen when they were scheduled to. Thus, the difference between the (a) and (b) examples above seems to follow from the fact that we can think about the future as open and indeterminate. An utterance of (a)

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suggests that the speaker regards the question of when Jack gets married as an open question. However, if she utters (b), the implicature will be drawn that the presupposition of the antecedent is incompatible with the common ground, i.e. that in the common ground it is no longer an open question when Jack did or will get married. In this case, the speaker is conveying that she views the schedule as foreclosing any other future possibility.

We have been talking about *the* wedding being still possible. However, people may get married more than once, maybe even with the same person if they have divorced before. What we need in order to explain the example we began with (which I repeat below) is a way to make sure that the relevant presupposition is about the *contextually salient* wedding.

(42) Jack got married with Susan yesterday (July 15).

    a. If he had gotten married tomorrow, I would have gone to the ceremony.

    b. #If he got married tomorrow, I would have gone to the ceremony.

This is the topic of the next subsection. I will argue that, as in the case of regular noun phrases, the antecedent of a counterfactual can either be a *definite* or an *indefinite* description of an event.

VI.1 Definite descriptions of events

So far I only used the word *event* informally, but here I will use the technical word *event*, a particular kind of entity that words and phrases can refer to. According to Davidson (1967)'s analysis of action sentences, verbs of action (eventive predicates) contain a place for a variable ranging over events. Thus, the predicate *kick* should be thought of as a three-place predicate, rather than a two-place predicate, as shown below. The sentence *Shem kicked Shaun* will be true just in case there is an event of kicking Shaun by Shem.

(43) [[**kick**]] = $\lambda x.\lambda y.\lambda e.$ e is a kicking of x by y.

(44) [[**Shen kicked Shaun**]] =1 iff $\exists e$ [*e* is a kicking of Shaun by Shem]

The advantage of this theory over previous ones is that it derives the correct entailments. That the sentence *I flew my spaceship to the Morning Star* entails *I flew my spaceship* follows from the logical form of this sentence, in much the same way in which that the proposition that I saw a red fish entails that I saw a fish follows from the logical form of these two sentences. Below are the logical forms, according to Davidson (1967).
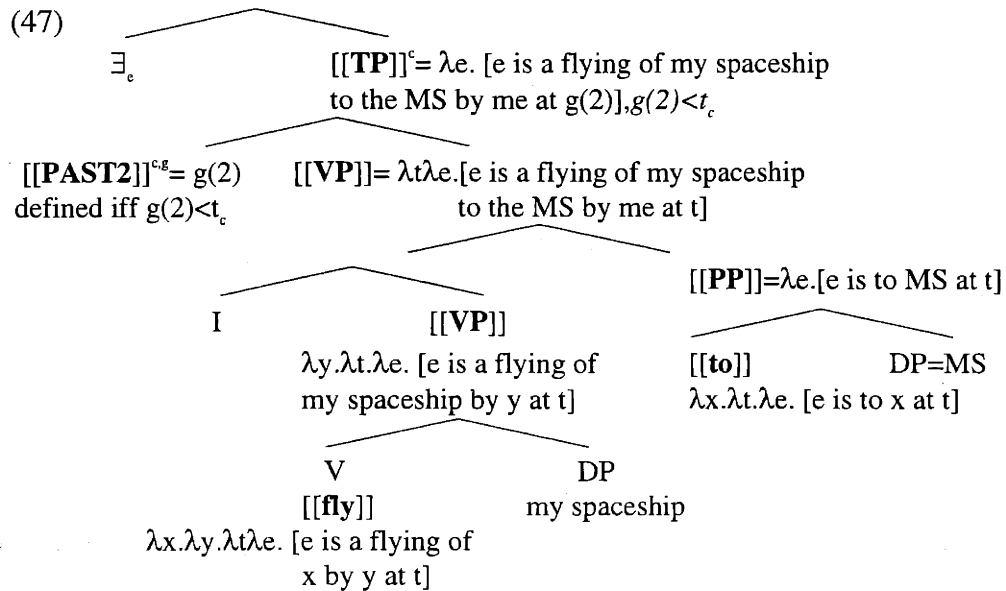
(45) a. $\exists e$ [flew (I, my spaceship, *e*) & to(the Morning Star, *e*)]

b. $\exists e$ [flew (I, my spaceship, *e*)]

(46) a. $\exists x$ [saw(I, x) & fish(x) & red(x)]

b. $\exists x$ [saw(I, x) & fish (x)]

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In the tree that follows, I assume both event and time variables, so that tense can be given a uniform treatment when it is interpreted in the proposition and when it is interpreted in the accessibility relation: in both cases, tense will be (generally) interpreted referentially.

(47)

$\exists_e$ · $[[\textbf{TP}]]^c = \lambda e.$ [e is a flying of my spaceship to the MS by me at g(2)],$g(2)<t_c$

$[[\textbf{PAST2}]]^{c,g} = g(2)$ defined iff $g(2)<t_c$ · $[[\textbf{VP}]] = \lambda t \lambda e.$[e is a flying of my spaceship to the MS by me at t]

$[[\textbf{PP}]]=\lambda e.$[e is to MS at t]

I · $[[\textbf{VP}]]$ $\lambda y. \lambda t. \lambda e.$ [e is a flying of my spaceship by y at t]

$[[\textbf{to}]]$ $\lambda x. \lambda t. \lambda e.$ [e is to x at t] · DP=MS

V $[[\textbf{fly}]]$ $\lambda x. \lambda y. \lambda t \lambda e.$ [e is a flying of x by y at t] · DP my spaceship

In this modified Davidsonian logical form, an existential quantifier binds the event variable introduced by the verb. There is a strong analogy between the logical form of an action sentence and the logical form of a sentence with the indefinite article *a*, according to the Fregean analysis of the indefinite article *a* as an existential quantifier of predicate logic (cf. Heim 1991, 2.1.3, for an overview and discussion of different analyses of the definite and indefinite article).

(48) A woman is at the door.

(49) $\exists x$ [woman(x) & at-the-door(x)]

An action sentence refers to an event (e.g. a kicking event) in the same way an indefinite noun phrase refers to an individual (e.g. a woman).

Now, the correspondence between referring to individuals and referring to events would be strengthened if there existed an analogue in the event domain of a *definite* noun phrase referring to an individual. What (if anything) refers to an event the way the definite noun phrase *the woman* refers to a specific individual in *the woman is drinking a Martini*? I would like to suggest that there are indeed examples of definite descriptions of events too. Recall that, in order to solve the puzzle of one-past subjunctive conditionals we discussed above, we had to interpret the antecedent of the conditional as talking about some *relevant, contextually salient* eventuality. Once we did this, we were able to explain the infelicity of one-past subjunctive conditionals in the cases we considered. Now, in light of the present discussion, that result gains a further advantage: it provides evidence for a complete parallelism between reference to individuals and reference to events.

Reconsider the two subjunctive conditionals uttered in the context in which it is known that Jack got married with Susan yesterday.
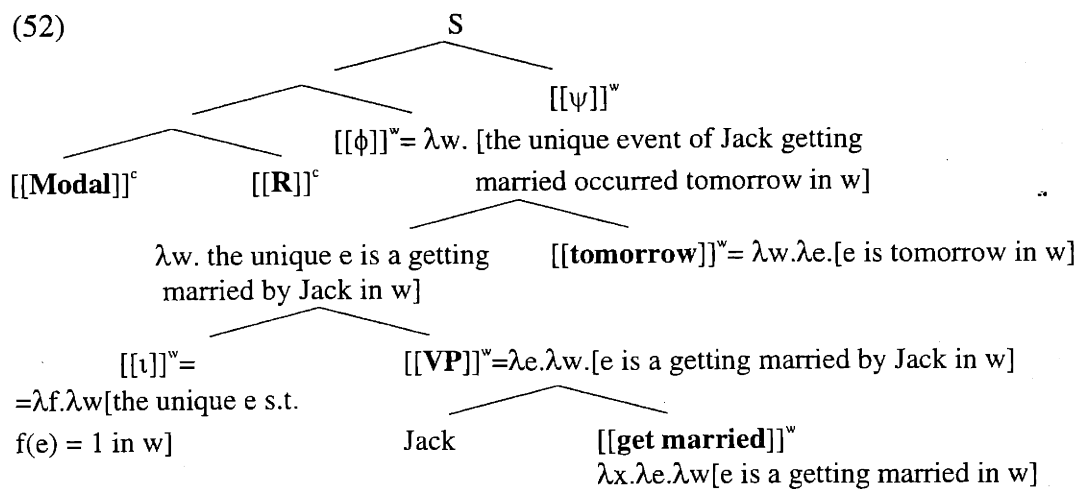

(50) Jack got married with Susan yesterday.

    a. If he had gotten married tomorrow, I would have gone to the ceremony.

    b. #If he got married tomorrow, I would go to the ceremony.

Suppose the antecedent is interpreted as supposing that the contextually salient event of Jack getting married occurs tomorrow. The antecedent also presupposes that *this* event has not occurred yet. Because the context entails that that event took place yesterday, the

antecedent's presupposition and the context are inconsistent, and the sentence is infelicitous. We can then conclude that the antecedent must be interpreted as a definite description whose referent is the contextually salient event satisfying the predicate.[28]

(51) If <u>the event of Jack getting married</u> occurred tomorrow, I could go to the ceremony.

(52)

$$S$$

$$[[\psi]]^w$$

$$[[\phi]]^w = \lambda w. \text{[the unique event of Jack getting married occurred tomorrow in } w]$$

$$[[\textbf{Modal}]]^c \qquad [[\textbf{R}]]^c$$

$$\lambda w. \text{ the unique } e \text{ is a getting married by Jack in } w]$$

$$[[\textbf{tomorrow}]]^w = \lambda w.\lambda e.[e \text{ is tomorrow in } w]$$

$$[[\iota]]^w = \lambda f.\lambda w[\text{the unique } e \text{ s.t. } f(e) = 1 \text{ in } w]$$

$$[[\textbf{VP}]]^w = \lambda e.\lambda w.[e \text{ is a getting married by Jack in } w]$$

Jack

$$[[\textbf{get married}]]^w$$
$$\lambda x.\lambda e.\lambda w[e \text{ is a getting married in } w]$$

(53) $\exists w \in W[R(w,w_c)$ & the unique event of Jack's getting married occurs tomorrow in w & I go to the ceremony in w]

The reason why the antecedent *must* be interpreted as referring to the contextually salient event (i.e. the reason why it must be interpreted as containing a definite description) is that it is part of the common ground that there is (or can be) a unique event of getting

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[28] I am abstracting away from the time argument in the entry of the predicate *getting married*. In the tree below, I only put the event variable since it is relevant for the present discussion. However, a time variable should be there too. As I said in the text, my general claim is that tense can either be interpreted at the proposition level or within the accessibility relation. For this to be possible, though, there must be a time variable in the predicate that the tense will saturate. Thus, properly speaking the type of a proposition is not $<s,t>$ but $<i,<s,t>>$.

married by Jack. We are already familiar with this idea: Heim (1991) suggested that to account for some infelicitous uses of the indefinite article in English, it seems necessary to assume a principle requiring the speaker to maximize his presuppositions. Hence, if the definite article can be used, it must (see section X in this chapter for examples). To pursue the analogy with events, if in the context it is known that there exists a unique event of the relevant kind, then the antecedent must be interpreted as *if [the event ζ]ξ*. Indeed, consider the following example.

(54) Susan gave birth to Charlie last month.

#If she gave birth to Charlie tomorrow, it would have to be a Cesarean section.

Because it is known that you can give birth to the same child only once, the antecedent has to be interpreted as supposing that "the unique event of giving birth to Charlie by Susan" takes place tomorrow. But because that very event is known to have already taken place, the presupposition of the antecedent (that it is an open question when Susan gives birth to Charlie) is inconsistent with the utterance time. Prep is violated, and the sentence is infelicitous. The parallelism between reference to individuals and reference to events is strengthened.

To conclude, whether the antecedent is interpreted as talking about *an* event or *the* event depends generally on the utterance situation, i.e. on the background assumptions the participants in the conversation make. In fact, if the common ground is such that it does not entail that there is (or can be) a unique event of getting married, the sentence *If*

he got married tomorrow, I could go to the ceremony would be felicitous, even if Jack did get married yesterday.

(55) Jack, the polygamist, got married yesterday.

If he got married (again) tomorrow, I could go to the ceremony.

Because the context in this example is such that getting married is not a unique event, nothing forces us to interpret the antecedent as involving a definite description of an event. The antecedent of the conditional can be analyzed as an existential sentence.

(56) If there is an *e* such that *e* is an event of getting married by Jack and *e* occurs tomorrow, I could go to the ceremony.

Notice that the conditional above improves if the word *again* is added to the antecedent. This is exactly what happens with indefinite noun phrases when an object satisfying the relevant predicate already occurs in the context. For example, consider the following example, due to Heim.

(57) (I am sitting in a restaurant and I have already had a coffee. My waiter comes and I say:)

#I would like to have a coffee, please.

I would like to have *another* coffee, please.

Further evidence that in the temporal domain, as well as in the nominal domain, it is not possible to use an indefinite to refer to something that it is known to be unique, can be found in Iatridou (2002). In her analysis of the present perfect as containing an indefinite description of an event, she suggests that the present perfect should be infelicitous when it is known that the eventuality in question is unique.

(58) I have painted the house (many times) since 1990.

(59) a. # She has written this paper since 1990.

b. #The dictator has assassinated his opponent since 1990.

Verbs of destruction and creation like the ones above create unique eventualities. Extending Heim (1991)'s hypothesis to the temporal domain, it follows that we can only refer to these eventualities by means of definite descriptions. Because the perfect contains an *indefinite* description of the eventuality, verbs of destruction and creation are infelicitous in the present perfect.

Let me sum up here my proposal for those cases that contain "presuppositions without presupposition-triggers". If the antecedent *If Jack got married tomorrow* with focus on the temporal adverb *tomorrow*, were to suppose that *an* event of Jack's getting married occurs tomorrow, and were to presuppose that it is an open question when *an* event of Jack's getting married has not happened yet, an utterance of that antecedent would be compatible with a context in which it is known that Jack and Susan got married yesterday, because the only thing that is required is that *a* marriage not have occurred yet. Thus, the infelicity of the one-past subjunctive conditional in (a) would be a mystery.

(60) Jack got married with Susan yesterday.

    a. #If he got married tomorrow, I would go to the ceremony.

    b. If he had gotten married tomorrow, I would have gone to the ceremony.

In order to account for the infelicity of (a), we must suppose that the antecedent *If Jack got married tomorrow* supposes that *the contextually salient* event of Jack's getting married occurs tomorrow, and presupposes that *that* event has not occurred yet. Because in the scenario described above, it is not an open question when Jack gets married, the presupposition of the antecedent is inconsistent with the utterance context. Hence, Prep $(c_u \subseteq p)$ is violated.

    The felicity of the (b) example follows too. This time Prep requires that the presupposition of the antecedent be entailed by the context at some contextually salient past time, for example the time immediately before the speaker learned that Jack got married with Susan yesterday, making the presupposition of the antecedent inconsistent with the actual world now. Choosing to utter (b) instead of (a) will implicate that it is no longer an open question when Jack gets married with Susan.

    We can reason similarly for the example we used at the very beginning of this chapter. Suppose Charlie's team played the last game of the baseball season yesterday and they lost: I can felicitously utter (b), but not (a).

    (61) a. If they played the last game tomorrow, they would win.

        b. If they had played the last game tomorrow, they would have won.

It is part of the meaning of *last* that, for any *x*, the last *x* is unique. Thus, the antecedent of

the subjunctive conditional in (a) has to be interpreted as containing a definite description

of an event, i.e. *the event of Charlie's team playing the last game*. Focus on the adverb

tomorrow in the antecedent of (a) creates the presupposition that is an open question

when *the* event of Charlie's team playing the last game occurs. Because it is in fact

known when they played the last game (yesterday), the presupposition is inconsistent

with the context and the conditional is infelicitous.

VII. Differences among presuppositions triggers

The analysis that I have proposed here accounts for the differences between mismatched

past subjunctive conditionals and non-past subjunctive conditionals for the cases we have

considered with respect to the generalization that whereas the presuppositions in the

antecedent of a NPSC cannot be inconsistent with the context, the presuppositions in the

antecedent of a MPSC do not have to. However, Heim (1992)'s examples seem to be a

counterexample to my generalization. Consider a modified version of her examples.

      (62) If John attended too tomorrow, there would be too many people.

      (63) If John had attended too tomorrow, there would have been too many people.

The particle *too* requires in both conditional sentences that somebody other than John

attend the relevant event. However, according to my proposal we would expect the

mismatched past subjunctive conditional to be felicitous even if the presupposition in the

antecedent (that somebody other than John attends) is not entailed by the context. In our examples with presuppositions triggering items like *sell*, *quit*, *stop*, the contrast between MPSCs and NPSCs did exist. Here, I would like to maintain that the unexpected behavior of the pair above must be reduced to the difference between different presupposition-triggering items. In fact, the particles *too* or *again* contain an anaphoric element, and they roughly mean "in addition to x", where x can range over different kinds of entities in the case of *too*, but only over times (or occasions, eventualities) in the case of *again*. Now, going back to our example above, for the anaphora to be resolved, there must be somebody other than John who is contextually salient and who is going to attend tomorrow. If these conditions are not met, anaphora cannot be resolved and the sentence is infelicitous. And because this follows from the property of *too*, this is true of both two-pasts and one-past subjunctive conditionals.

VIII. Conclusion

In this chapter I have solved the puzzle of mismatched past subjunctive conditionals: the second layer of past morphology that clashes with the future temporal adverb in the antecedent is interpreted in the "modal domain", where by "modal domain" I mean that it contributes to the internal composition of the accessibility relation. More specifically, I have shown that once we have a general theory of subjunctive conditionals (i.e. a theory of the role of the first layer of past morphology), the role of the second past in mismatched past subjunctive conditionals follows. What we see is a real past perfect, and

the second layer of past sets the right boundary of the perfect time span, exactly what happens in non-modal occurrences of the past perfect.

Furthermore, I have argued that neither Lewis' Analysis 1 nor Lewis' Analysis 2 can account for the contrast between a one-past subjunctive conditional and a two-pasts subjunctive conditional. I suggested that only a modification of Analysis 1 can: such a modified analysis is what I am proposing in this thesis and it crucially employs a time-dependent notion of accessibility.

THE PERFECT IN DISGUISE

I. *High* and *Low* Perfects

By this time, you must be already asking yourself: If the hallmark of a subjunctive conditional is the perfect operator, why do we see a past tense? In what follows, I shall answer this question by appealing to semantic, syntactic and morphological considerations. Consider again a one-past subjunctive conditional. Following Heim (1992) and von Fintel (1998), I have been assuming that what drives the interpretation of the whole conditional is the consequent clause and that the mood/tense marking in the antecedent clause is semantically redundant, i.e. just the realization of an agreement relation between the matrix and the subordinate clause.

      (1) If Jack left tomorrow, he <u>would meet</u> my sister.

Morphologically, what we see in both the antecedent and the consequent clauses is a past (the past on *left* [leave+*ed*] in the antecedent and the past on *would* [WOLL+*ed*]). However, if my proposal is right, a perfect operator is interpreted as the time argument of the accessibility relation. Thus, we seem to have a case where what looks like a past is in

fact semantically a perfect. We already know that the reverse occurs: some occurrences of the perfect are interpreted as past. For example, in the sentence (a) below the present perfect *has left* could not have been part of Charlie's original utterance because the present perfect is incompatible with adverbs like *on Monday*. Thus, the past perfect *had left* must be interpreted as two pasts, one "agreeing" with the matrix past and one part of the original utterance. Similarly for the sentence in (b), where what Charlie confessed is "I left at 3pm'.

(2) a. On Saturday Charlie told me that Sally had left on Monday.

Charlie: "Sally left on Monday"

Charlie: # "Sally has left on Monday"

b. Yesterday, Charlie confessed to having left at 3pm.

Charlie: "I left at 3pm"

Charlie: # "I had left at 3pm"

What I am suggesting is that in the semantics there are two objects, the past and the perfect, and that their morphological realization is not always transparent in either way: as there are occurrences of the perfect interpreted as past, there are occurrences of past interpreted as perfect. As for the reported speech examples above, the reason why we have a past perfect is that there is no other way in English to morphologically realize two pasts in the same clause. So now the question is: why does the perfect appear as a past in conditional sentences? Consider the *might*-conditional below.

(3) If Charlie left tomorrow, he might meet Sally.

If, as I claim, a perfect operator occurs in subjunctive conditionals, why can't we see it? That is to say, why can't the conditional below be interpreted as the one above? For some reason that needs to be explained, the perfect must appear in disguise as a past: a conditional like (4) where the perfect occurs overtly in the consequent (*have met*) can only be interpreted as an indicative conditional. In other words, if the perfect appears overtly, it cannot be interpreted as taking scope over the modal but must be interpreted below the modal.

(4) If Jack leaves tomorrow, he <u>may have met</u> my sister.

This is not an idiosyncrasy of conditionals but it is true of the interpretation of modals and tense in general. Let me elaborate on this point. The sentence below is ambiguous between an epistemic and a metaphysical interpretation.
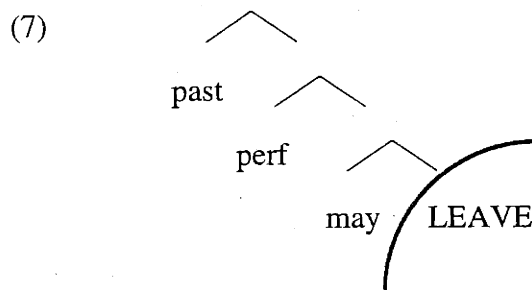
(5) Jack might have left.

    (i)   It is possible that Jack has left/left.   (EPI)

    (ii)   It would have been possible for Jack to leave.   (META)

Going back to some remarks I made in chapter 2, I will extend my proposal for subjunctive conditionals to matrix modal sentences. Let us suppose that the structure of (5) in the epistemic reading is the one below. We have one perfect and either a past or a

perfect below it: the top perfect is the time argument of the accessibility relation (its RB will be the utterance time by default); the other perfect or past is interpreted in the scope of the modal, as the paraphrase for the epistemic reading above indicates. The only way English has to spell out these two heads in the same clause is to spell out one as a past (the past on the modal) and one as a perfect (the auxiliary *have*), thus obtaining the morphology of the pluperfect (past perfect).

(6)

perf

may

perf/past LEAVE
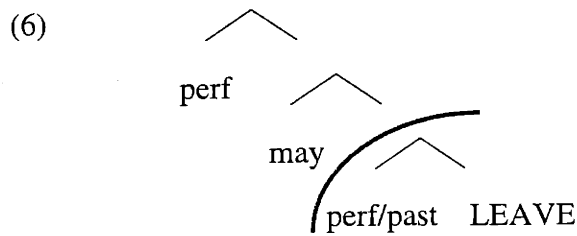
In order to force the metaphysical reading, let us add the adverb *tomorrow* to the modal sentence above, so that the paraphrase will be "It would have been possible for Jack to leave tomorrow". As this paraphrase indicates, the metaphysical reading of (57) will have a different structure. No past or perfect occur in the scope of the modal *can*, thus allowing the future adverb to occur. Everything takes scope over the modal. As a result, the right boundary of the interval constructed by the perfect operator in this case will be a past time.

(7)

past

perf

may LEAVE

Although both the past and the perfect are interpreted above the modal, one piece – *have* –surfaces in the scope of the modal ("Jack might *have* left"). The general observation is that, whereas there is an intuitive mapping between the semantic structure and the morphological pieces in the case of the epistemic reading, there is no clear correspondence in the case of the metaphysical reading. In the epistemic reading, the past (or the perfect) is interpreted in the scope of the modal, and *have* occurs in the complement of *can*. On the contrary, the parallelism between the semantic and the morphological structures breaks down because, although both heads are interpreted above the modal, one of them actually surfaces below it. Let us try to account for the mapping between (7) and the sentence *Jack might have left*.

Given the structure in (7), what we would expect is something like the sequence *Had could leave*, which is clearly ungrammatical. The reason why this sequence is ungrammatical is simply that English modal verbs are not main verbs. The only option available to English is for the modal to realize one head (and be spelled out as *might*) and for the auxiliary *have* to realize the other. We expect languages where modals are main verbs to allow the sequence that English disallows, and indeed this is the case in Italian. *Potere* is the infinitival form of the modal verb 'can'. *Partire* is 'to leave'. The past and the perfect are realized in the same way they would in a pluperfect: an auxiliary is inserted to realize one of them and the past on the auxiliary realizes the other (the main verb, the modal verb *potere* 'can', is realized as a past participle, as usually happens in both English and Italian past perfects). The lexical verb *partire* 'to leave' appears in its infinitival form.[29]

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[29] I should say here that, following Iatridou (2000)'s analysis of the French conditional mood, I take the Italian conditional mood to contain past morphology.

(8)

    past
       perf
         potere   *partire*
   'can'   'leave'
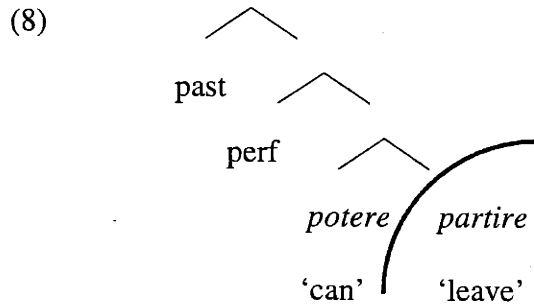
(9) Gigi sarebbe potuto partire domani.

    Gigi be-cond can-past participle leave tomorrow

    'Gigi could have left tomorrow'

Let us go back to the sentence *Jack might have left (tomorrow)* with the metaphysical interpretation. The reason why the past has to take scope over the modal is because it could not be interpreted inside the proposition without clashing with the future adverb *tomorrow*. However, if there is no clash, the past should potentially be able to be interpreted inside the proposition (i.e. in the scope of the modal), with the following structure.

(10)
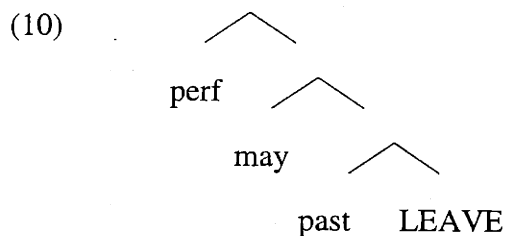
    perf
      may
        past   LEAVE

Indeed, this is a possibility but notice that, because *can* is not a main verb, the only way this possibility can be realized is again as *Jack might have left (yesterday)*: the perfect is

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realized on the modal (= *might*) and the auxiliary *have* is inserted in order to support the past. The same is true in Italian: the only way to realize the structure above is again by means of the same sentence we analyzed above *Gigi sarebbe potuto partire (ieri)* 'Gigi might have left (yesterday)', with the difference that the modal *potere* is a main verb.

The second part of this discussion will be focused on the fact that the sentence below cannot have the metaphysical reading, i.e. that the auxiliary *have* cannot be the morphological realization of a perfect above the modal, as it was in the metaphysical reading of *Jack might have left.*[30]

(11) Jack may have left.

    (i) It is possible now that Jack left/has left.   (EPI)

    (ii) *It would have been possible for Jack to leave.   (META)

The only possible structure for (11) is one in which the perfect/past is in the scope of the modal, which is in the scope of nothing else. This is shown below.

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[30] For some reason, while *Charlie could have left* is ambiguous between an epistemic and a metaphysical reading (on a par with *Charlie might have left*), according to some speaker I have consulted the counterpart of the example in the text above with *can* does not even have an epistemic reading and it is simply bad.

    (i)   *Charlie can have left already.

Surprisingly, though, the sentence becomes good again with the metaphysical reading if negation is inserted, as shown in (ii).

    (ii)   Charlie can't have left already.

(12)

```
         may   past/perf   LEAVE
```
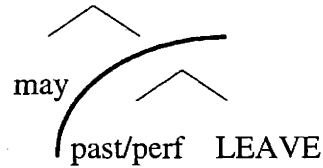
The time of the modal (properly speaking, the time argument of the accessibility relation) will be the utterance time by default. If – as I have just argued – when the modal sentence *Jack might have left* is interpreted metaphysically, the sequence *might have* is the non-transparent realization of the structure [perfect [modal]] necessary for the metaphysical reading, what prevents the sequence *may have* in (11) from being the non-transparent realization of the structure [perfect [modal]] necessary for the metaphysical interpretation? In other words, why can the following structure not be realized as *Jack may have left* by switching the order between the modal and the perfect?

(13)

```
         perf   may   LEAVE
```
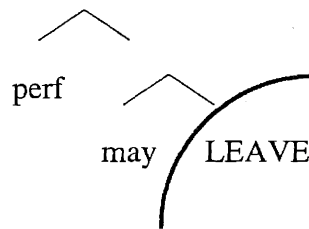
The correct generalization is the following. If no past takes scope over the whole structure, then if the modal is in the scope of a perfect, the perfect must be spelled out in that c-commanding position. However, if a past takes scope over the whole structure, then whether the modal is in the scope of the perfect or takes scope over the perfect, the perfect must always be spelled out lower that the modal. In order to explain this generalization, I will appeal to a general principle according to which the morphology

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I do not know why.

must mirror the syntactic order of the inflectional heads as close as possible. Consequently, if the perfect can be realized on the modal (because no past occurs above it), it must, which accounts for why the structure above in (13) can only be spelled out as *might have*. This also accounts for the fact that if a perfect gets spelled out in the scope of an untensed modal, then that perfect must be actually interpreted in that position, since no switching could have occurred.

Before I turn to conditionals again, let me make a brief digression on the epistemic reading of *Jack might have left*. As the structure in (6) shows, in the epistemic reading the perfect is still interpreted above the modal. When the perfect is interpreted above modals like, for example, *may* or *can*, these modals are spelled out as *might* and *could*. When no perfect occurs above the modals, then these modals are spelled out as *may* and *can*. The prediction is that whether or not a perfect occurs above the modal should affect the meaning of the modal sentences in the same way in which the presence or absence of a perfect above the modal operator distinguishes between indicative and subjunctive conditionals. I was unable to find a perfect minimal pair that would illustrate and confirm this prediction in English, and the closest pair I could find is the epistemic *must* versus the epistemic *should*. To illustrate the difference between these two modals, imagine Charlie is walking by Lucy's apartment and sees that the light is up. He could utter (a), but it would not be felicitous to utter (b). The latter utterance suggests a higher degree of uncertainty, which clashes with the fact that Charlie's current epistemic state entails that Lucy is at home.

(14) a. Lucy must be home.

b. Lucy should be home.

However, if the English pair we have just considered does not convince you, consider the following Italian sentences uttered in the same situation described before.

(15) Lia deve essere a casa.

Lia must-pres,ind be-inf at home

'Lia must be home'

(16) Lia dovrebbe essere a casa.

Lia must-cond be-inf at home

'Lia should be home'

Recall that the morphology that we see in (15) is the morphology of an indicative conditional, while the morphology that we see in (16) is what we see in (the consequents of) subjunctive conditionals (see example (4) in this chapter). As expected, (16) cannot be felicitously uttered in a scenario in which your current epistemic state entails that Lia is at home.

Let us go back to our discussion, and consider the case of conditionals. If we go back to the conditionals in (1) and (2), which I repeat below, we now have an answer to the question why the latter conditional (where a perfect occurs) cannot mean what the former conditional means. Recall that I have proposed that in a one-past subjunctive conditional like (17), a perfect operator occurs above the modal but no past occurs above the perfect. Thus, the structure of the consequent clause will be like (13). Now, because

the perfect can be spelled out on the modal, it must. This generates the sequence *could meet* in (17). Switching the order between the perfect and the modal is not required, thus is disallowed. The only way the perfect can be spelled out below the modal is if it in fact occurs there. But if the perfect occurs below the modal, then it cannot contribute to the interpretation of the accessibility relation and the time argument of the accessibility relation will have to be the utterance time (by default), which is the hallmark of indicative conditionals (cf. (18)).

(17) If Jack left tomorrow, he <u>could meet</u> my sister.

(18) If Jack left/has left tomorrow, he <u>can have met</u> my sister.

In a two-past subjunctive conditional, the composition of the relevant features is different. Consider the consequent clause in the following example.

(19) If they had played tomorrow, Charlie's team would have lost the game.

As explained above, in a two-pasts subjunctive conditional, a perfect operator occurs above the modal and a past tense occur above the perfect. As explained above, because the modal's slot for inflection is filled by the morpheme realizing the past tense at the top of the structure, the only way to realize the perfect is by introducing an extra head, the auxiliary *have*. [31]

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[31] Suppose that we force a perfect tense to be interpreted inside the proposition expressed by either the antecedent or the consequent of a subjunctive conditional by means of a *since* adverbial. Then, only a 2-pasts subjunctive conditional is grammatical, as shown by (i).

If the idea that the past morphology we see in subjunctive conditionals in English is the realization of a perfect operator is correct and if it is correct that the reason why we do not see it has to be traced back to the constraints of English morphology, we expect to find a language whose language-specific morphological constraints do allow the perfect to surface, i.e. a language in which the perfect does not have to (and therefore does not) appear in disguise as a past. Bulgarian seems to be such a language. Bulgarian has both a simple past and the perfect tenses. Now, the difference between an indicative conditional and a subjunctive conditional is illustrated in the pair below.[32, 33]

(i)   a. If the player had been carded twice since the beginning of the soccer game, he would not be playing now.

        b. *If the player were carded twice since the beginning of the soccer game, he would not be playing now.

The ungrammaticality of the (b) sentence follows from the conflict between the need to interpret the perfect as the argument of the accessibility relation (as required by the fact that this is a subjunctive conditional) and the need to interpret the perfect aspectually, as required by the presence of the perfect adverb *since the beginning of the soccer game*. It follows that two perfects are required, which explains the grammaticality of (a). If a perfect were to be interpreted "temporally" in a 2-pasts subjunctive conditional, three layers of perfect would in fact be needed: one layer of past would be interpreted 'modally', and two 'temporally'. However, this is impossible in English, and the pluperfect has to be employed, as shown by the example below which is in fact grammatical. This is what Iatridou calls a case of haplology (Iatridou 2000: 252, fn.26).

(ii) If yesterday the player had (already) been carded twice since the beginning of the world-cup, he would not have played today's game.

In fact, in light of some speculations that we will make later in this dissertation, (ia) too can be regarded as a case of haplology. Briefly, I will suggest that in regular past subjunctive conditionals (past subjunctive conditionals without temporal mismatches), the past can be interpreted in the modal domain as well (setting the right boundary of the interval to some past time) and that, if it is so interpreted, the antecedent is understood to be false. So, if (ia)'s antecedent is known to be false, then both the past and the perfect are outside the proposition expressed by the antecedent. However, the *since*-phrase requires a perfect to be interpreted lower. We would expect another layer of past/perfect morphology (thrre in total), but English cannot have more than two.

[32] I would like to thank Roumi Izvorski, Penka Stateva and Marina Todorova (in alphabetical order) for these data.

[33] There is a variant of the subjunctive conditional in (a) above where the antecedent is marked past:

(i)   Ako Ivan trugneshe utre, bi sreshtnal sestra si.

        If Ivan leave-past tomorrow, BE-3sg-subj meet-perfectparticiple sister refl

        'If Ivan left tomorrow, he would meet his sister'

(20) a. Ako Ivan trugne utre, bi sreshtnal sestra si.

If Ivan leaves tomorrow, BE$_{3sg,subj}$ meet$_{perf\ part}$ sister refl

'If Ivan left tomorrow, he would meet his sister'

b. Ako Ivan trugne utre, shte sreshtne sestra si.

If Ivan leaves tomorrow, will meet$_{3sg}$ sister refl

'If Ivan leaves tomorrow, he will meet my sister'

The participle that occurs in the consequent of the subjunctive conditional in (a) is a perfect participle, that is to say the same participle that occurs in the perfect in Bulgarian. The difference between this occurrence of the participle and an occurrence in the perfect is that whereas in the perfect the participle occurs accompanied by an auxiliary in the indicative mood, in (a) we find the modal particle *bi*, which also occurs in wishes and reported speech. (Does *bi* occur in other environments without the perfect participle? According to one of my informants, *bi*+perfect participle is only found in conditionals). The agreement on the auxiliary is not a default agreement but it actually agrees with the subject. However, what we see in Bulgarian is not the perfect morphological realization of the syntactic ordering of inflectional heads that we have in the consequent clause of the subjunctive conditional in (a), which I repeat below. The perfect is above the modal, but in Bulgarian it appears lower than the modal.

The difference between (a) and (i) is unclear to me at the moment. Even for the speaker who would utter (i) instead of (a) for a FLV conditional, (a) remains different from the indicative conditional in (b). In order to test whether (a) is in fact different from the indicative conditional, we would need to ask this speaker

(21)

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        /\
   perf   /\      /
      Modal / meet
           /
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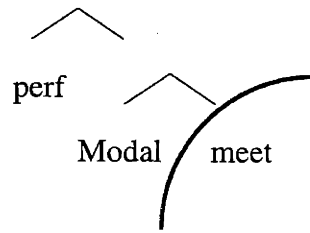
So, Bulgarian seems to raise the complement problem of the problem that English raised: in English we had to explain why the LF order [Perf [Modal]] could not be realized as [Modal [Perf]]; in Bulgarian, on the other hand, we have to explain why the order [Perf [Modal]] must be spelled out as [Modal [Perf]] (instead of [Perf [Modal]]). Our explanation of the English case appealed to a principle according to which the order in which the morphology spells out inflectional heads must be as close as possible to the ordering of those heads in the syntax. Thus, this principle forced the perfect to be spelled out on the modal itself. As for Bulgarian, the overt [Modal [Perf]] order is forced by the impossibility to spell out the aspectual head on the modal particle *bi*: differently form English *woll*, *bi* can be inflected for agreement features but not for tense. Assuming that no finite verb can be spelled out above a modal, the perfect operator can only be spelled out below the modal. Furthermore, as observed by Iatridou, Anagnostopoulou and Izvorski (2000), in Bulgarian but not in English the perfect participle can occur without the auxiliary, as shown by the possibility of having transitive, active reduced relative clauses in Bulgarian but not in English.[34] Therefore, because the modal particle *bi* in

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whether she could utter (a) in a scenario in which she feels almost certain that Ivan will leave tomorrow. If the answer is no, then – whatever the difference is between (a) and (i) – (a) is a subjunctive conditional.

[34] Whereas English can only form reduced relatives with unaccusative and passive verbs, Bulgarian can form reduced relatives with transitive active verbs. This is shown in the example below from Marvin (2000).

(i)   *The man bought the book is John.
(ii)   Zaposnah se sas žena-ta   napisala   knigata.   (Bulgarian)
       met-REFL   with woman-the written-PF book-the
       'I met the woman who has written the book'

Bulgarian can carry agreement features, and the perfect participle can occur without auxiliary the morphology can closely mirror the hidden structure of the modal domain.[35]

The hypothesis is that how languages spell out the perfect depends on language-specific constraints. Above we have tried to account for the way the temporal and aspectual elements of modal sentences are realized in English and Bulgarian. Now, I will consider the case of Greek, which realizes the temporal and aspectual components of a modal sentence in yet another way. In Greek subjunctive conditionals, the modal particle θα occurs in the consequent. The tense following θα (and occurring in the antecedent) may be past or non-past: if it is past, we have subjunctive conditionals; if it is non-past, we have indicative conditionals. This is shown in the pair below.

(22) a. An pari afto to siropi θα γini kala.

If take-pres-perf this syrup FUT become-pres-perf well

'If he takes this syrup, he will get better'

b. An eperne afto to siropi θα γinotan kala.

If take-past-imp this syrup FUT become-past-imp well

'If he took this syrup, he would get better'

As we did in the case of English, I will focus on the consequent clause. What we find in the consequent clause of the one-past subjunctive conditional in (b) is a finite past imperfective verb. I'd like to show that what you see in (b) is the best Greek morphology

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[35] Notice that the fact that in English a perfect participle cannot occur without an auxiliary is another possible argument for why [Modal [Perf]] must be spelled out as *might leave* and why the sequence *might*

can do. As I said, what we expect is $\theta\alpha$+perfect. Instead, what we find is $\theta\alpha$+$V_{past/imp}$. Differently form Bulgarian, the particle $\theta\alpha$ cannot carry agreement features and a finite tense is thus required. Again, assuming that a finite tense cannot be realized above a modal, we expect the finite tense in Greek to be realized below it. What prevents the sequence Aux_{Pres} + Perfect participle (where the perfect participle would realize the perfect operator and the present auxiliary would be inserted to satisfy the finiteness requirement of the clause) to occur in the scope of $\theta\alpha$? One tentative answer is that, because there is no present tense above the modal (t_c is in fact only a default), there is nothing that could possibly be realized below the modal as a present tense. If a present tense occurs under the modal, it will have to be interpreted where is occurs, i.e. inside the proposition expressed by the antecedent. This would also explain the lack of auxiliary in Bulgarian.

(23)

perf

Modal become
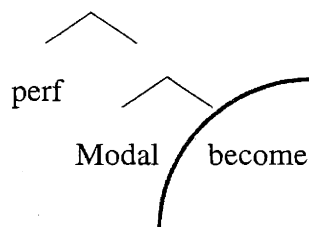
However, if a past occurs above the perfect operator, then both the perfect and the past will have to be realized below the modal $\theta\alpha$, thus explaining the occurrence of a pluperfect in two-pasts subjunctive conditionals in Greek.

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left (leave + past participle) is not a possible realization. Above we already discussed why [Modal [Perf]] cannot be realized by the sequence *would have left*.

(24) An iχe pari to siropi θα iχe γini kala.

if had taken the syrup FUT had become better

'If he had taken the syrup, he would have gotten better'

Are there other cases where the perfect operator is interpreted in the modal domain (i.e. as the time argument of the accessibility relation)? One way to tell whether there are other cases of the perfect being interpreted modally is to look at languages where the morphology is transparent. Bulgarian is such a language. So, are there other modal uses of the perfect in Bulgarian? As Izvorsky (1997) showed, the answer is yes. In the next section, I shall present the relevant facts and show how they follow from and strengthen my proposal.

II. The Perfect of Evidentiality

In Bulgarian (and other languages too) the perfect may be used to indicate that some *indirect* evidence for the truth of a proposition is available to the speaker. Izvorsky calls this phenomenon "the perfect of evidentiality". When a sentence occurs in the perfect, it can have two interpretations: the *report* interpretation, where the evidence for p is having heard that p, and the *inference* interpretation, according to which the evidence for p is some fact allowing the speaker to make the inference that p.[36] In both cases the evidence is indirect, where 'indirect' refers not to the fact that the evidence is not perceptual, but to the fact that the speaker does not have (and she knows he does not have) *justification* for

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[36] See below for more on the two readings.

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believing that p, that is to say, she does not know that p.[37] When glossing the Bulgarian sentences, we will paraphrase the perfect of evidentiality with the adverb *apparently*, which according to Izvorski's intuition is its best semantic counterpart in English.

The perfect of evidentiality (as well as the adverb *apparently* in English) is different from the epistemic *must*, as shown by the contrast in (25). According to Izvorski, the contrast in (25) is due to the fact that the perfect of evidentiality requires the existence of some kind of evidence external to the speaker, since what the speaker knows (or believes) is insufficient to use the perfect. The relevant kind of evidence may be of different types: it may be the rumor that John got drunk yesterday, or it may be seeing empty bottles of wine in John's living room.

(25) Knowing how much John likes wine...

    a.   ... toj triabva da e izpil vsičkoto vino včera.

            he must   is drunk all-the wine yesterday

            '... he must have drunk all the wine yesterday

    b. #... toj izpil   vsičkoto vino včera.

            he drunk-PE all-the wine yesterday

            '#... he apparently drank all the wine yesterday'

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[37] The notion of evidence or justification is relative to a knowledge (belief) system. I take Izvorski's distinction between *evidence* and *justification* to be the following: a proposition *p* may be evidence for another proposition *q* with respect to a given knowledge system even though *p* may not be justification for *q*: normally, some evidence E, e.g. E=that-*it appears to me that there are trees*, counts as justification for believing that there are trees; however, if I know that I am hallucinating (that is, with respect to a different belief system), that very evidence (that is appears to me that there are trees) would not justify me in believing that there are trees.

The same point is made by the following example. In order to use the perfect of evidentiality, it is necessary that the speaker has some (indirect) evidence.

(26)   Ivan izpil   vsičkoto vino včera.

       Ivan drunk-PE all-the   wine yesterday

       '... Ivan apparently drank all the wine yesterday'

       #But I have no evidence for that.

Despite being a perfect, the perfect of evidentiality has none of the temporal and aspectual features of the perfect. The perfect of evidentiality has the temporal and aspectual meaning of its corresponding indicative form. The examples below illustrate this point. The adverb *včera* 'yesterday', *snošti* 'last night', *točno v 3 časa* 'exactly at 3 o'clock', *točno sega* 'right now' and *točno v toozi moment* 'right in this moment' are incompatible with the present perfect in its standard aspectual interpretation (sentences (a) below). However, when the perfect is interpreted as the perfect of evidentiality, their occurrence with the perfect is unproblematic, as shown in the (b) sentences.

(27) a. Te   sa došli   (??včera)/ (??snošti)/ (??točno v 3 časa).

        They are come-PP yesterday/ last night/ exactly at 3 o'clock

        '*They have come yesterday/last night/ exactly at 3 o'clock'

   b. Te   došli   včera/   snošti/   točno v 3 časa.

      They come-PE yesterday/ last night/ exactly at 3 o'clock

      'They apparently came yesterday/last night/exactly at 3 o'clock'

(28) a. Toj e pišel   pismo (*točno sega)/ (*točno v toozi moment).

       He is written-PP letter   right now/   right in this moment

       '*He has written a letter right now/right in this moment'

    b. Toj pišel   pismo točno sega/ točno v toozi moment.

       He written-PE letter   right now/   right in this moment

       'He is apparently writing a letter right now/ at this very moment'

The fact that the present perfect does not clash with these adverbs in the *evidential* interpretation suggests that the perfect is not interpreted in the same domain as the temporal adverbs and, thus, suggests that it is the perfect itself the source of the evidential meaning. The example in (29) shows again that the perfect of evidentiality does not receive the temporal and aspectual interpretation of a present perfect.

(29) Ajnštajn (#e)   posetil Prinstân.

     Einstein (be-3sg) visited Princeton

     '#Einstein has visited Princeton'

       'Einstein apparently visited Princeton'

I believe that Izvorski's insight that these sentences are modal and that their evidential meaning comes from the perfect is correct. The question that I will address in what follows is how, in light of the analysis that I have developed for subjunctive conditionals and modal sentences, the evidential meaning is constructed form the pieces of which the sentence is composed.

Izvorski (1997)'s analysis is based on Kratzer (1981), according to which there are two coordinates that have to be considered in giving the truth-conditions for a modal sentence: the modal base, and the ordering source. Izvorski takes the modal base to be the function f which assigns to every possible world the set of all the propositions that constitute the available indirect evidence in that world. The ordering source, on the other hand, is the function g that assigns to every possible world the set of propositions that the speaker believes in that world. (a) below is the set of propositions that the speaker regards as indirect evidence in some possible world; (b) is the generalized intersection over the set in (a), i.e. the set of all the worlds where all that the speaker regards as indirect evidence in w is true; (c) is the set of the speaker's beliefs in w; and finally, (d) defines an ordering relation on the set of possible worlds, where higher ranked worlds are worlds where a greater number of the speaker's beliefs in w are true.

(30) a. $f(w) = \{p$: the speaker considers p indirect evidence in w$\}$

   b. $\cap f(w) = \{w' \in W: \forall p[p$ is indirect evidence in w $\rightarrow w' \in p]\}$

   c. $g(w) = \{p$: the speaker believes p in w$\}$

   d. $\forall w', w'' \in W: w' <_{g(w)} w''$ iff $\{p: p \in g(w) \wedge w'' \in p\} \subset \{p: p \in g(w) \wedge w' \in p\}$

(31) [[**Toj pišel pismo točno sega**]] = 1 iff

   $\forall w \in W[w \in \cap f(w_c) \wedge \neg \exists w' \in W(w' \in \cap f(w_c) \wedge w' <_{g(w_c)} w) \rightarrow$ he writes a letter

   right now is true in w]

The evidential sentence *Toj pišel pismo točno sega*, 'He is apparently writing a letter right now', is true just in case in all the worlds that are ranked higher with respect to the speaker's actual beliefs among those where what counts as indirect evidence in the actual world is true, it is true that he writes a letter right now.

According to Izvorski, the difference between a perfect of evidentiality sentence and an epistemic sentence lies in the nature of the f function: in an epistemic sentence like (32), $f(w)$ is *what is known in w*, whereas in a perfect of evidentiality sentence like the one whose truth-conditions we gave above, $f(w)$ is *what is indirect evidence in w*, which – according to Izvorski – is more restricted that the former one since it is not sufficient for a proposition to be known for it to be considered (indirect) evidence for the core proposition. This distinction was based on one of the examples we gave above (repeated in (33)), where what was known was not sufficient to felicitously utter a perfect of evidentiality.

(32) He must be writing a letter right now.

(33) Knowing how much John likes wine...

    a. ... toj triabva da e izpil vsičkoto vino včera.

       he must   is drunk all-the wine yesterday

       'he must have drunk all the wine yesterday'

    b. #... toj izpil   vsičkoto vino včera.

       he drunk-PE all-the   wine yesterday

       '#he apparently drank all the wine yesterday'

In the same spirit as Iatridou (2000), Izvorski's core idea is that the perfect has a core meaning which can either be interpreted temporally or modally. How Izvorski actually derives this from the semantics of the perfect is not clear to me and I will not go over the details of her proposal here. Notice that in her analysis the notion of *indirect evidence* is not derived but assumed to be part of the content of the function *f*. Moreover, she claims that the difference between the report and the inference readings is a difference in quantificational force and that this variability comes from the context: if the kind of (indirect) evidence in question is regarded as very reliable for the truth of some proposition (e.g. *seeing* empty bottles in John's living room), quantification will be close to universal; if the evidence is not regarded as very reliable (e.g. the *rumor* that John got drunk), quantification will be closer to existential. In what follows, I will develop a different analysis of the perfect of evidentiality without going through a detailed analysis of Izvorski's proposal. I will show that the properties of the perfect of evidentiality follow from the proposal that I have developed above: the perfect will be interpreted as constructing an interval of time, as usual, and the notion of *indirect evidence* will be derived.

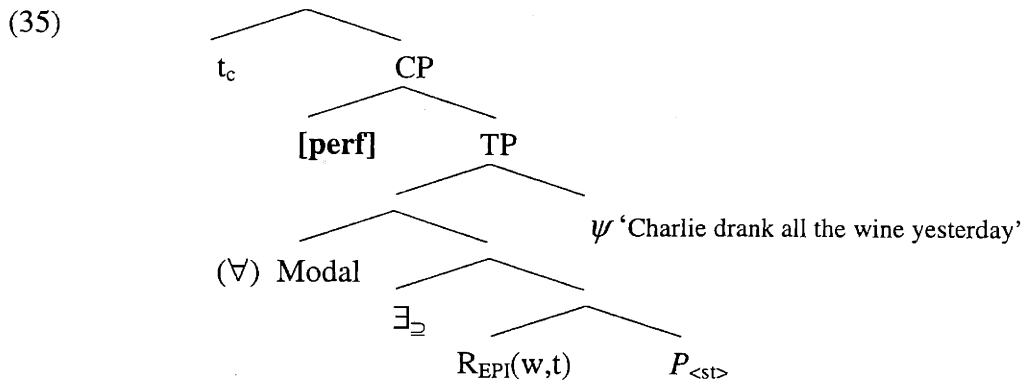## II.1 Do you trust your evidence?

Suppose I hear from Sally that yesterday Charlie drunk all the wine that she had bought for her birthday party this coming week. When you ask me why Sally no longer talks to Charlie, I utter the sentence below.

(34) Toj izpil   vsičkoto vino včera.

he drunk-PE all-the   wine yesterday

'Apparently he drank all the wine yesterday'

I may continue saying, "...that's crazy! He would never do anything like that", or I may continue saying, "I never trusted that guy". But, in both cases, my utterance conveys the meaning that I am not endorsing the proposition the Charlie drank all the wine yesterday, even though I am entertaining the possibility the p in light of some available evidence (that is, the fact that Sally told me so). Izvorski's (and our) hypothesis is that this meaning is constructed by using the perfect. But how is it compositionally derived and what is exactly the role of the perfect? My proposal is that the perfect is interpreted in the way I suggested in the preceding sections of this chapter: it contributes to the meaning of the accessibility relation, by building an interval (whose right boundary is the utterance time, by default) such that the worlds in the domain of quantification will be worlds accessible during that interval. The skeletal structure of a perfect of evidentiality sentence is the following.

(35)

t_c ... CP

[perf] ... TP

($\forall$) Modal

$\exists_{\supseteq}$

$R_{EPI}(w,t)$ $P_{<st>}$

ψ 'Charlie drank all the wine yesterday'

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By now, we should be familiar with the work of the perfect operator, the present tense and the $\exists_{\supseteq}$ operator and R. As for ψ, this is the bare proposition that Charlie drank all the wine yesterday. The variable P plays the same role as the antecedent of a conditional statement, it is of type <s,t> and its value depends on the context: it is some proposition that establishes the appropriate justification relation between two other propositions. For example, in the scenario described above, P may be the proposition that-Sally says that p only if p, i.e. the set of worlds where Sally says that p only if p is true.

Given the structure above, the truth-conditions for the sentence *Toj izpil vsičkoto vino včera*, 'He apparently drank all the wine yesterday' will be as follows. The sentence is true just in case there is an interval t_3 such that all the worlds w epistemically accessible from the actual world at some subinterval of t_3 such that the fact that Sally says p is justification (direct evidence) for believing that p in w and such that she says that Charlie drank all the wine yesterday in w, are worlds where Charlie drank all the wine yesterday.

(36) $[[\textbf{Toj izpil vsičkoto vino včera}]]^{g,c} = 1$ iff $\exists t_3 \forall w \in W[\exists t_1 \subset t_3$: w is epistemically accessible from $w_@$ at t_1 and such that in w Sally says that p only if p and such that in w Sally said that Charlie drank all the wine $\rightarrow$ Charlie drank all the wine yesterday is true in w].

I will assume that the same felicity requirement at work in subjunctive conditionals is at work in perfect of evidentiality sentences, that is to say, the requirement that the intersection between R and P not be empty (in other words, that P be compatible with the

set of worlds epistemically accessible): for this to be true, then, there must be at least some time during the interval at which some epistemically accessible worlds where P-worlds. And as we did before, we may view this requirement as one instantiation of the requirement that quantifiers not have empty domains. Now, the universal quantification in (36) is restricted to P-worlds that are epistemically accessible at any time during the interval built by the perfect operator. This interval includes the utterance time, but it is perfectly compatible with the truth-conditions above that no world epistemically accessible at the utterance time is a P-world, i.e. a world in which Sally says p only if p. Thus, it is felicitous to utter (34) even though the speaker does not take the fact the Sally says p as justification for believing that p. In what follows we will see that not only is it possible to utter (34) when no world epistemically accessible at the utterance time is a P-world, but that for a perfect of evidentiality sentence to be felicitous the speaker must not take the actual world to be a P-world, i.e. the speaker does not believe that Sally says that p only if p is true.

Consider the epistemic counterpart of the evidential sentence we considered above.

(37) Toj triabva da e izpil vsičkoto vino včera.

'He must have drunk all the wine yesterday'

Perfect of evidentiality sentences have the same structure as subjunctive conditionals (and modal sentences with *would*). On the other hand, regular epistemic sentences like the one above have the same structure as indicative conditionals (and modal sentences

without *would*): here, because no past or perfect operator takes scope over the modal, the time of the accessibility relation for indicative sentences is always the utterance time (see section X for more details). Since the utterance time is included in the interval introduced by the perfect operator, in indicative epistemic sentences such as (37) where there is no perfect operator, the set of accessible P-worlds is a subset of the set of accessible P-worlds in perfect of evidentiality sentences like (34), where a perfect operator occurs above the modal. It follows that the felicity condition for perfect of evidentiality sentences ($P \cap c_u \neq \varnothing$, where t_3 is the interval introduced by the perfect operator) asymmetrically entails the felicity conditions for indicative epistemic sentences ($P \cap c_u \neq \varnothing$). Thus, when the speaker chooses to utter the perfect of evidentiality sentence instead of its indicative epistemic counterpart, she is presupposing something weaker, and, as we explained in chapter 2, her interlocutors will draw the implicature that she was not in a position to make the stronger presupposition, i.e. she was not in a position to presuppose that P (Sally says p only if p is true) is compatible with what she knows at the utterance time. In other words, when uttering the perfect of evidentiality sentence, the speaker is suggesting that given what she knows it would be wrong of her to take what Sally says as justification. Is this correct? Consider the English equivalent of the perfect of evidentiality *Toj izpil vsičkoto vino včera*, uttered in the same scenario.

(38) Apparently Charlie drank all the wine yesterday.

When she utters (38), the speaker is not endorsing the proposition that Charlie drank all the wine yesterday: the speaker has some evidence for believing that proposition, i.e. the

fact that Sally said so, but given the *current epistemic state of the speaker* this evidence is not good enough to justify the belief that Charlie drank all the wine yesterday. To use Izvorski's terminology, an utterance of (38) suggests that the evidence the speaker has is *indirect* (i.e. insufficient to justify a certain belief), which is precisely one of the properties of the perfect of evidentiality, as the following example will remind the reader.

(39)   Maria celunala Ivan.

Maria kiss-PE Ivan

'Maria apparently kissed Ivan'

#(Actually) I witnessed it./#(Actually) I know that for a fact.

If the speaker believed that the evidence she has is in fact good enough to justify believing p, then she would be forced to use the indicative epistemic sentence in (37), which is true just in case in all the worlds epistemically accessible from w now that are most similar to what is normally the case in w, Charlie drank all the wine yesterday (see Kratzer 1991). Moreover, if the speaker does not believe that Charlie drank all the wine yesterday, it would be inconsistent to utter the indicative epistemic sentence. However, it would be perfectly appropriate to utter the perfect of evidentiality sentence in (34). This is because for a perfect of evidentiality sentence to be true, it is enough that there be some worlds epistemically accessible at some point in the interval in which Sally says that p only if p is true (for example, these may have been worlds accessible before I learned that what people say can be wrong; that they may be deceitful; that Sally is a liar; that Charlie does not like wine; etc.).

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Recall the contrast Izvorski points out, exemplified in the examples given above and repeated below: just *knowing* something does not make a perfect of evidentiality sentence appropriate.

(40) Knowing how much John likes wine...

    a. ... toj triabva da e izpil vsičkoto vino včera.

        he must   is drunk all-the wine yesterday

        'he must have drunk all the wine yesterday'

    b. #... toj izpil   vsičkoto vino včera.

        he drunk-PE all-the wine yesterday

        '#he apparently drank all the wine yesterday'

The clause *knowing how much John likes wine* restricts the domain of quantification to what the speaker knows now. Thus, the use of a perfect of evidentiality which quantifies over worlds epistemically accessible during an interval of time which properly includes the utterance time is not allowed: the set of worlds epistemically accessible now is a subset of the set of worlds epistemically accessible during the interval introduced by the perfect, and in the course of a discourse, it is not a good practice to first utter p and then q if p entails q.[38] In other worlds, the infelicity of the (b) sentence below is due to a clash

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[38] In an analogous way, while it is appropriate to say *Every man is a bachelor*, it is odd to say *Every bachelor is a man* (Heim, p.c.). Similarly, it is inappropriate to say *I have two children* after I have said *I have three children*. von Fintel 2000 discusses a pair of examples that I think are related to the point I have just made. The first is due to Lewis, the second is due to Heim.

(i)   If the USA threw its weapons into the sea tomorrow, there would be war; but if all the nuclear powers threw their wapons into the sea tomorrow, there would be peace.

(ii)   ??If all the nuclear powers threw their weapons into the sea tomorrow, there would be peace; but if the USA threw its weapons into the sea tomorrow, there would be war.

between the size of the background context and the size of the set of worlds quantified over by the modal operator. This difference in size follows from the way these two sets are constructed.

Because the perfect is not interpreted inside the proposition expressed by the sentence, the eventuality talked about by the sentence does not have to be located in the past. I repeat here the relevant example: differently from the past and the regular interpretation of the perfect, the perfect of evidentiality can co-occur with the present adverb *right now*.

(41) a. Toj e pišel   pismo (*točno sega)/ (*točno v toozi moment).

      He is written-PP letter   right now/   right in this moment

      '*He has written a letter right now/right in this moment'

    b. Toj pišel   pismo točno sega/ točno v toozi moment.

      He written-PE letter   right now/   right in this moment

      'He is apparently writing a letter right now/ at this very moment'

Finally, let me spend a few words on the *inferential reading*. I have followed Izvorski's assumption that the two readings do not represent a case of ambiguity. Izvorski draws a distinction between the two readings: while in the report interpretation, the speaker does

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If the order of the two counterfactuals that occur in (i) are reversed, the sequence does not longer work. If you have considered the possibility that the USA disarm, then you can go on considering the possibility that all the nuclear powers do, because worlds in which the USA disarm are not all worlds where all nuclear powers do. However, if you have considered the possibility that all nuclear powers disarm, then you cannot go on considering the possibility that the USA disarm because worlds where all the nuclear powers disarm are worlds where the USA do. The only way to utter (ii) felicitously is to explicitly prevent the entailment relation, for example by adding *only* to the second antecedent, so that the worlds where the USA disarm will not be members of the set of worlds where all nuclear powers do.

not have to come to believe that *p*, in the inference reading she does come to believe that *p* even though still lacks justification. The difference is said to be a difference in quantificational force (universal versus existential). In my proposal, both readings receive the same analysis (universal quantification) and in both reading there is an implicature that whatever evidence the speaker has for a certain proposition, she cannot take it to be justification for believing that proposition.

Before concluding this chapter, let me mention an additional fact that seems to support our analysis. Recall the proposal I argued for at the beginning of this chapter: the hallmark of subjunctive conditionals is a perfect operator, which in English appears in disguise as a past for morphological reasons. In Bulgarian, however, subjunctive conditionals did show the perfect participle morphology, and in this section I have discussed the evidential use of the perfect in Bulgarian which was argued to be another instance of the mechanisms at work in subjunctive conditionals. In what follows, I would like to show that one way in which English expresses evidentiality surfaces with the same morphology employed in subjunctive conditionals. If my analysis of Bulgarian is correct, (at least some) evidential sentences employ a perfect operator. Moreover, I suggested that whether the perfect operator that occurs in subjunctive conditionals is actually realized with the perfect morphology depends on language-specific constraints: thus, whereas this is possible in Bulgarian, in English the perfect must be realized by a past morpheme. Now, if (at least some) English evidential sentences employ a perfect operator, we expect it to be realized as a past morpheme too, due to the same morphological constraints at work in subjunctive conditionals. I believe this is correct.

Suppose somebody (a lawyer, for example) uttered the following sentence.

(42) According to the defendant, Mr. Jones would have called his boss at 4pm on

   March 23.

If she did, she would not be endorsing the proposition that Mr. Jones called his boss at

4pm on March 23, but she would be just reporting some piece of evidence that he did so,

i.e. the defendant's testimony. Using the terminology we used above, the defendant's

testimony constitutes a piece of evidence: in worlds where the defendant says that p only

if p is true, Mr. Jones called his boss at 4pm on March 23. Normally, however, we do not

believe things like that.

   As we expected, the morphology used to express evidentiality in the example

above is the same morphology that is employed in subjunctive conditionals. If the

situation that the proposition is about is future, the morphology is that of a one-past

subjunctive conditional. Suppose you are a spy reporting on what you have found out.

   (43) According to the CIA, Mr. Jones would leave tomorrow at 9pm.

The same is true for Italian, where the same morphology that appears in subjunctive

conditionals is used in the evidential sentences we are considering.

(44) EVIDENTIAL SENTENCE

Secondo l'imputato, il Sig. Luini <u>avrebbe telefonato</u> al suo capo alle 4pm del

23 marzo.

'According to the defendant, Mr. Jones would have called his boss at 4pm on

March 23'

(45) SUBJUNCTIVE CONDITIONAL

Se Carlo fosse arrivato in tempo, <u>avrebbe telefonato </u>al suo capo alle 4pm del

23 marzo.

'If Carlo had arrived in time, he would have called his boss at 4pm on March

23'

The same true is true for the Italian equivalent of (43).

III. Conclusion

We discussed the occurrence of the past morphology in one-past subjunctive morphology

in chapter 2. There I proposed that the piece of past morphology that we see is in fact a

perfect operator in disguise. In this chapter, I speculated that the reason why the perfect

in English or Italian must be morphologically realized in different ways has to do with

the morphological restrictions at work in each language. However, we did find a

language, Bulgarian, where subjunctive conditionals are marked by an occurrence of the

perfect participle. As in the previous case, what we have is a temporal operator interpreted as the time argument of the accessibility relation, in the way explained above.

Finally, Bulgarian being a language that allows the perfect to be realized as such in modal contexts, we expected to find other modal uses which could be accounted for in the way suggested here. Indeed, in the last sections of this chapter, I tried to relate the use of the perfect participle in Bulgarian with the perfect of evidentiality. This part was more tentative. More work is required before all the puzzles having to do with the perfect of evidentiality construction are solved.

REMARKS ON *INVERTED* CONDITIONALS

AND CONCLUSION

I. Inverted Conditionals

English shows subject-verb inversion in conditionals. As pointed out by den Besten (1963), Holmberg (1986) and Pesetsky (1989), the complementarity between the inversion with the conditional complementizer *if* suggests that the subject-verb inversion in conditional is in fact movement of the verb up to the complementizer position Comp. One important property of this phenomenon is that subject-verb inversion is only possible in subjunctive conditionals. If inversion takes place in indicative, the result is ungrammatical.

(1) Had Charlie played last night, his team would have lost.

(2) *Did Charlie play last night, his team lost.

The fact that indicative conditionals are ungrammatical when subject-verb inversion takes place could be reduced to the fact that, in general, *do* does not undergo the conditional inversion. The example in (3) shows that even in subjunctive conditionals, *do* cannot

move to the complementizer position. However, inversion is out in indicative conditionals regardless of what type of verb moves to the complementizer position. In the example in (4), it is the modal verb *may* that moves to the complementizer position, and the sentence is ungrammatical.

(3) *Did Charlie play, his team would lose.

(4) a. *May Charlie play, he will.

   b. *Will they pay him more, Charlie will work for them.

In other words, although the ungrammaticality of the example in (3) may be due to the fact that *do* cannot undergo movement to Comp, the examples in (4) show that verb movement to Comp is always disallowed in indicative conditionals, regardless of what moves to Comp. The correct generalization seems to be that only subjunctive conditionals can invert, and whether a conditional can or cannot be inverted is not a function of whether the conditional is counterfactual, as frequently put in the literature. In the discussion that follows I will only consider English, although conditional inversion is a phenomenon found in several Germanic and Romance languages as well.

The second important property of inverted conditionals is that subject-verb inversion correlates with counterfactuality in two-past subjunctive conditionals but not in one-past subjunctive conditionals. As we explained in chapter 2, non-inverted conditionals are also normally understood to be counterfactuals but this component of their meaning was shown to be an implicature, and as such cancelable in the right

contexts (Anderson 1951). However, the implicature of falsity does not seem defeasible in inverted conditionals. Iatridou and Embick (1994: 201) report the following pair.

(5) If he had broken his leg in his childhood, which in fact he did, he would have exactly this type of scar.

(6) #Had he broken his leg in his childhood, which in fact he did, he would have exactly this type of scar.

Whereas it is possible to cancel the implicature that he did not break his leg in his childhood in a regular subjunctive conditional, the counterfactuality of the inverted conditional resists the cancelability test above. However, someone could utter the one-past subjunctive conditional below if she does not know whether Charlie is in his office or not, and in fact she could continue by saying, "Let's go find out".

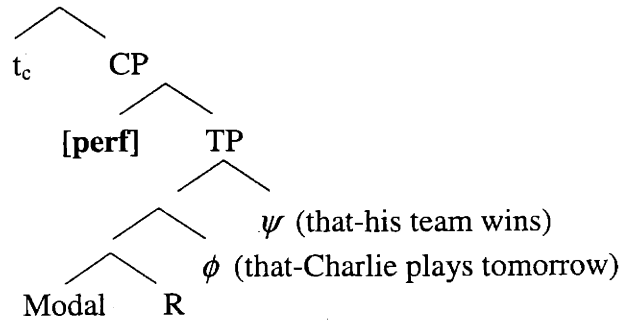(7) Were Charlie in his office, we could invite him for lunch.

To recapitulate, in this chapter, we will focus on these three properties of inverted subjunctive conditionals: (A) inverted conditionals can only be subjunctive conditionals; (B) two-pasts inverted conditionals are counterfactuals; but (C) one-past inverted conditionals are not. We will pursue an account that relates these properties to the subject-verb inversion. But how is the meaning of these subjunctive conditionals affected by the tensed auxiliary's movement to (or base-generation in) the complementizer position? In this chapter, we will present the beginning of an analysis that tries to relate

the semantic properties of inverted conditionals to the syntactic subject-verb inversion in light of the proposal that I developed in chapter 2 and 3. Little is known about the relation between the syntactic and the semantic structures of a conditional sentence, and in particular about (i) how the antecedent ends up being interpreted in the restriction of the modal operator, and (ii) where precisely the modal operator is located syntactically. I will not address these questions in the following discussion, which may at times be annoyingly vague.

The hallmark of "subjunctive" conditionals is the perfect. A perfect operator introduces an interval of time which will be interpreted as the time argument of the accessibility relation in the way I proposed in chapter 2. The past morphology that we see in subjunctive conditionals is the morphological realization of this perfect operator interpreted in the modal domain. The right boundary of the interval introduced by the perfect is determined by the tense that occurs above the perfect operator. In one-past subjunctive conditionals, the one layer of past that we see is precisely (the morphological realization of) the perfect operator: since no other tense is present, the right boundary of the interval will be the utterance time by default. On the other hand, in two-pasts subjunctive conditionals, we have precisely the structure of a past perfect, where a past tense occurs above the perfect operator. As a result, the right boundary of the interval will be a past time. The simplified structures below show that, although the one or two layers of past are spelled out within the antecedent and the consequent clause, they are interpreted outside either proposition. ψ is the consequent, ϕ the antecedent, R the accessibility relation.
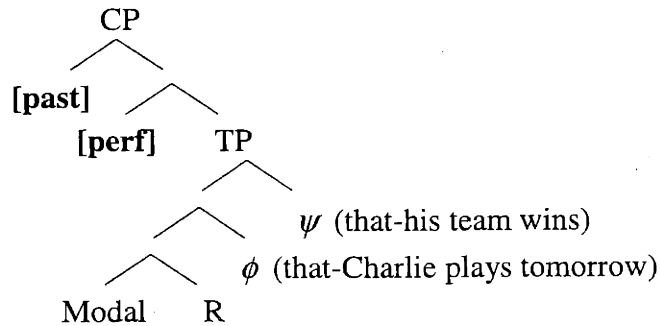
(8) If Charlie played tomorrow, his team would win.

(9) ONE-PAST SUBJUNCTIVE CONDITIONALS

```
        ╱‾‾‾‾‾╲
      tc        CP
              ╱‾‾‾╲
          [perf]    TP
                  ╱‾‾‾╲
              ╱‾‾‾╲   ψ (that-his team wins)
          ╱‾‾╲  φ (that-Charlie plays tomorrow)
      Modal   R
```

(10) If Charlie had played tomorrow, his team would have won.

(11) TWO-PASTS SUBJUNCTIVE CONDITIONALS

```
              CP
            ╱‾‾╲
       [past]  ╱‾‾╲
           [perf]   TP
                   ╱‾‾╲
               ╱‾‾╲   ψ (that-his team wins)
           ╱‾‾╲  φ (that-Charlie plays tomorrow)
       Modal   R
```

As we explained in chapter 2 and chapter 3, despite the fact that temporal and aspectual heads appear inside the antecedent and the consequent clause, the perfect operator and the past are in fact interpreted outside these propositions, and above the modal operator. Interpreting the past outside the proposition in mismatched past subjunctive conditionals such as (12) below is forced by the presence of the future adverb *tomorrow* which would clash with the past, were the past to be interpreted in the same clause.

(12) If they had played the last game tomorrow, they would have won.

Assuming that *woll* is the modal in English, in the previous chapter we speculated that the reason why the perfect and the past cannot be spelled out above the modal (where they are actually interpreted) has to do with the nature of modal verbs in English, i.e. with the fact that English modal verbs are not main verbs. Recall that we are assuming that the morphology we see in the antecedent is semantically redundant, just the consequence of the antecedent clause being governed by the consequent clause: however, because there is no modal in the antecedent clause, if the perfect and the past are interpreted in some higher position, they should be able to be spelled out in the antecedent where they are interpreted. In a mismatched subjunctive conditional, whose structure was given in (11), both the perfect operator and the past occur above the modal. As in a past perfect, we expect the perfect to be realized by the auxiliary *have* and the past to be realized by past morphology on the auxiliary itself. Inverted conditionals meet this expectation. Consider the inverted version of the mismatched subjunctive conditional above. The past auxiliary *had* is in the complementizer position.

(13) *Had* they played the last game tomorrow, they would have won.

As I explained in chapter 2, interpreting the past as contributing to the definition of an accessible world triggers the implicature that the antecedent is false. In the case of mismatched past subjunctive conditionals, inverted and non-inverted conditionals will not be different because the past must always be interpreted outside the proposition expressed by the antecedent in order not to conflict with the future temporal adverb (*tomorrow* in our examples). Thus, the counterfactuality of the inverted conditional in (13) is expected. However, in non-mismatched past subjunctive conditionals, the (second layer of) past

does not have to be interpreted above the modal. If it does, however, we expect the implicature of falsity to arise. In other words, we expect inverted and non-inverted past subjunctive conditionals with no temporal mismatch to be different with respect to the falsity of their antecedents. This is correct. Two-pasts inverted conditionals are counterfactuals. Consider the pair below.

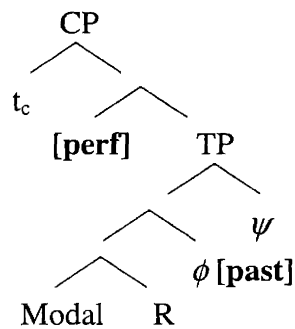(14) If he had broken his leg in his childhood, which in fact he did, he would have exactly this type of scar.

(15) #Had he broken his leg in his childhood, which in fact he did, he would have exactly this type of scar.

Both subjunctive conditionals talk about a past hypothetical situation, i.e. one in which some contextually salient male individual broke his leg in his childhood, but whereas in the non-inverted one the counterfactuality is canceled by the phrase *which he did*, the counterfactuality of the inverted conditional is not canceled and the co-occurrence with the phrase *which he did* causes the infelicity of the whole conditional. This fact, which had remained mysterious up to now, follows from the proposal developed in this dissertation if we assume that, where there is no temporal mismatch between the past and the temporal adverbial phrase, interpreting the past above the modal is optional. Thus, (15), where the inversion in the antecedent tells us that the past occurs above the modal in the matrix clause, is counterfactual.
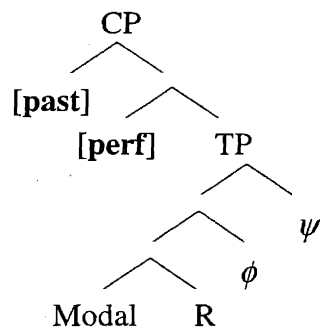
Let us consider the non-mismatched non-inverted conditional such as (14). So far we have discovered that (i) interpreting the past above the modal is possible in non-

mismatched past subjunctive conditionals too, as we have just shown; and that (ii) for the

past to be interpreted above the modal, it does not have to occur overtly above the modal,

as shown by the mismatched past subjunctive conditionals. Therefore, it follows that the

past *can* be interpreted above the modal even in non-mismatched past subjunctive

conditionals such as (14). Hence, (14) could in fact be ambiguous: it could have the

structure in (16) or the structure in (17).

(16)   Non- counterfactual

```
              CP
             /  \
           t_c    \
                 /  \
             [perf]  TP
                    /  \
                   /\    ψ
                  /  \  φ [past]
               Modal  R
```

(17)   Counterfactual

```
              CP
             /  \
          [past]  \
                 /  \
             [perf]  TP
                    /  \
                   /\    ψ
                  /  \   φ
               Modal  R
```

The structure in (16) is like the structure of a one-past subjunctive conditional where only

a perfect operator occurs above the modal, and consequently there is no counterfactual

implicature. On the other hand, the structure in (17) is precisely the structure of a

mismatched past subjunctive conditional, and like for mismatched past subjunctive conditionals, the counterfactual implicature is triggered.

Recall that, traditionally, the counterfactuality of a subjunctive conditional like (14) is said to be an implicature exactly because, although two-pasts subjunctive conditionals are generally understood as being counterfactual, they can sometimes be uttered even if they are known to be true (Anderson 1951). But, in light of the speculations above, subjunctive conditionals like (14) fall into a new perspective. What seemed to be a cancelable implicature may be a case of ambiguity.

Two questions arise. First, if the structure in (17) is possible, where ϕ is about a past situation but there is no past in ϕ, why is it not possible to have a a one-past subjunctive conditional whose antecedent is about the past, i.e. where ϕ is about a past situation but is not marked as past? In other words, why can a one-past subjunctive conditional only be about non-past (present or future) hypothetical situations? Why is the following impossible?

(18) #If they played yesterday, his team would win.

The generalization is that if the proposition expressed by the antecedent is not marked as past, it will be interpreted as non-past relative to the evaluation time, which, in the case of a one-past subjunctive conditional, is an interval whose right boundary is the utterance time. This means that in a one-past subjunctive conditional, the time of the supposition will be interpreted as non-past relative to the interval's right boundary, unless marked otherwise, i.e. unless the proposition is past. This captures (18): because the proposition

is not past, the time of the supposition is required to be future to or simultaneous with the utterance time, which conflicts with the fact that the time of the supposition is said to be yesterday. However, the structure in (16) for the two-past subjunctive conditional *If he had broken his leg in his childhood, he would have exactly this type of scar* does not face this problem because the antecedent is marked as past. As for the structure in (17), the antecedent is not marked as past but this is not a problem here because, although the proposition is about a past time (someone's past childhood), we do not want the time of the supposition to precede the evaluation time: in fact, the evaluation time in this case is a past interval (the right boundary is a past time) and, as I argued for in chapter 4, uttering now a past subjunctive conditional with the structure in (17) is like uttering at some past time a one-past subjunctive conditional whose antecedent will then have to be interpreted as non-past relative to that past time. Thus, in (17) the time of the supposition will be interpreted as non-past relative to the past evaluation time, which is exactly what we need. However, why this generalization holds is not clear.

The second question is the following. Why are inverted *one*-past subjunctive conditionals not counterfactuals in the way that inverted two-pasts subjunctive conditionals are? Below is the example we considered above.

(19) Were Charlie in his office, we could invite him for lunch.

As we already pointed out, someone who uttered this conditional would not have to believe that Charlie is not in his office. Similarly, someone who uttered the following

conditional does not have to believe that Charlie will never find out that they played without him. Quite the contrary: the speaker must believe that Charlie might find out.

(20) Were Charlie to find out that they played without him, he would be upset.

The reason why only inverted *two*-pasts subjunctive conditionals are counterfactuals in the way that mismatched past subjunctive conditionals are follows from our proposal: the tensed auxiliary that moves to the complementizer position in inverted *one*-past subjunctive conditionals such (20) is not a past tense but the perfect operator. Hence, the implicature of counterfactuality that we talked about in chapter 2 cannot arise because there is no past. As I explained in chapter 2, the perfect operator is always – that is, in non-inverted as well as in inverted conditionals, in one-past as well as in two-pasts subjunctive conditionals – interpreted above the modal. Therefore, both inverted and non-inverted one-past subjunctive conditionals have the same truth and felicity conditions.

II. Is the morphology in the antecedent semantically redundant?

One point before I conclude needs some clarification. As I said above, I have not addressed the question of how exactly the syntactic structure of a conditional sentence is mapped into the structure we have been assuming, i.e. a modal operator taking the antecedent as its restriction and the consequent as its nuclear scope. We have not addressed the question of whether the modal operator of a subjunctive conditional sentence is *woll*. See von Fintel (1994) for a discussion of these problems. Moreover,

throughout this work, I have been vague about whether the temporal and aspectual pieces that get interpreted are those in the antecedent or those in the consequent. Actually, I have been assuming with Heim (1992), von Fintel (1998) and others, that the tense marking that we see in an antecedent clause is semantically redundant and what is interpreted is the tense marking in the consequent clause (the main clause). However, although this is an appealing view, it raises some questions. Consider the conditional below. Suppose Charlie arrived today.

(21) If Charlie had arrived tomorrow, Sue would not be having dinner with him now.

This conditional has all the properties of a mismatched past subjunctive conditional, i.e. it is counterfactual and its counterfactuality resists the cancelability test.

(22) #If Charlie had arrived tomorrow, which he will, he would not be having dinner with Sue now.

However, the consequent does not force counterfactuality in itself: when the consequent is part of a one-past subjunctive conditional, the conditional could be uttered whether the speaker knows it to be false or not. In the example below, the speaker does not know whether Charlie is having dinner with Sue, so for all she knows it may be possible that Charlie will actually arrive tomorrow.

(23) All we know is that if Charlie arrived tomorrow, he would not be having

dinner with Sue tonight. Let us find out whether he is, and will know

whether he has already arrived or not.

Therefore, in (21) it is only the antecedent that carries the elements that force the

counterfactual reading. In this case at least, it is not true that the type of the conditional is

determined by the consequent clause. However, if the time of the supposition that the

consequent is about follows the time of the antecedent's supposition, the sentence seems

odd.

(24) #If Charlie had arrived tomorrow, he would have dinner with Sally.

But if the time of the consequent's supposition is future relative to the utterance time but

precedes the time of the antecedent's supposition, the sentence is better.

(25) If Charlie had left in a week, he would have dinner with us tomorrow.

Hence, the generalization seems to be that if the antecedent is that of a mismatched past

subjunctive conditional and the consequent that of a one-past subjunctive conditional, the

conditional is felicitous if the time of the consequent's supposition precedes the time of

the antecedent's presupposition. Why this is so, I do not know, and I have to leave this

question open for the future.

One question that arises is what happens in the reverse case, that is to say, when all the elements necessary to construe the counterfactual meaning (the perfect and the past) occur in the consequent but not in the antecedent: according to the view that the morphology in the antecedent is semantically redundant, the conditional should be good and counterfactual. However, the example below shows that the outcome is infelicitous. The intended reading is one in which Sally's picking Charlie up at the station occurs tomorrow.

(26) #If Charlie took the train tomorrow, Sally would have picked him up at the station.

The hypothesis that sentences like this are ruled out by some independent morphological constraint requiring the two clauses to match morphologically in their tense marking is excluded by the example discussed above, which are good even though the two clauses do not match morphologically.

If the time of the consequent's supposition precedes the time of the antecedent's supposition, conditionals that are mismatched only in their consequent improve and are fully counterfactual.

(27) If Charlie left in a week, he would have had dinner with Lucy tomorrow.

The tentative generalization is that in subjunctive conditionals where either the antecedent or the consequent (but not both) has the morphology of a mismatched past

subjunctive conditional, the time of the consequent's supposition must precede the time of the antecedent's presupposition. [39,40] However, I believe the sentence in (27) is different from (21) and (25): whereas (21) and (25) feel like normal counterfactual, the conditional in (27) seems to have the structure and meaning of the kind of conditionals that Anderson discusses, in which the falsity of the antecedent is not presupposed but only inferred from the fact that the consequent is false: the antecedent does not have to be understood counterfactually but the mismatch in the consequent forces us to understand the consequent clause counterfactually; therefore, for the whole conditional to be true, the antecedent must be false too.

The remarks in this section were meant to highlight the complexity involved in accounting for the relation between the two clauses of a conditional sentence. I started form the view that I have adopted in this work, i.e. that what drives the interpretation of a conditional is the consequent clause. However, the examples I mentioned suggest that more factors have to be taken into account. I will stop here, then, hoping to have at least laid down some interesting facts.

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[39] In Navajo subjunctive conditionals only the consequent clause shows tense morphology. Krause (2001) has argued that there are syntactic reasons why the antecedent clause lacks tense morphology: the antecedent clause in Navajo conditionals is not a full clause but a participial clause. And participial clauses are smaller than CP.

[40] There exist conditionals that are problematic in a theory in which the temporal contribution of the antecedent is semantically redundant. As mentioned in von Fintel (1998), McCawley (1996: 91, Fn. 7) points out that examples such as the following (attributed to Johnson-Laird) are problematic unless the antecedent is being interpreted. See also Iatridou (1990).

III. Conclusion of the Dissertation

In this dissertation I have argued that accessibility relations are complex relations involving not only a world but also a time of evaluation. The truth-conditions and felicity-conditions of modal sentences depend on the time of the accessibility relation. In indicative conditionals and indicative modal sentences, the time of the accessibility relation is the utterance time, in that no temporal element occurs above the modal at logical form. However, in subjunctive conditionals and non-indicative modal sentences where a past tense obligatorily occurs, a perfect operator occurs above the modal operator at logical form: the perfect creates an interval of time such that the modal operator quantifies over worlds accessible at some time during the interval.[41] In subjunctive conditional and modal sentences where only one layer of past occurs, the right boundary of this interval is the utterance time, by default. However, in subjunctive conditionals and non-indicative modal sentences with two layers of past morphology, the role of the second layer of past is to shift the right boundary of the interval to some time earlier than the utterance time, so that the whole interval is past relative to the utterance time. Thus, temporal and aspectual operators can occur *low* or *high* in a structure. *Low* occurrences of the perfect and the past are occurrences below the modal: they are the "normal" uses of perfect and past like in the sentences *Charlie has been to Boston once* and *Charlie came to Boston once*, respectively. *High* occurrences of perfect and past are what we sometimes called "modal" occurrences: they occur above the modal operator, and are used to construct the relevant domain of quantification for the operator. Temporal

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(i) If you had needed money, there was plenty in my bank account.

mismatches force these temporal elements to be interpreted high so as not to clash with the temporal adverb that occurs inside the relevant proposition.

This proposal offered an account of the systematic difference between indicative and subjunctive conditionals, as well as of the difference between indicative and non-indicative modal sentences. While explaining what is the common element to all "subjunctive" conditionals, it also allowed us to account for the difference among subjunctive conditionals, i.e. between one-past subjunctive conditionals and two-pasts subjunctive conditionals with respect to their felicity conditions.

The notion of accessibility that I showed to be necessary is *time-dependent*, and I argued that the notion of *overall similarity* that Lewis proposed does not account for the cases studied in this dissertation.

Finally, in my analysis of conditionals I have chosen to follow Stalnaker (1975) and Heim (1992) in taking the notion of *context set* to be central, even though I departed from their views in substantial ways. Furthermore, I discussed both analyses discussed in Lewis (1979) – Analysis 1 and Analysis 2 – and I argued that neither of them is able to account for the differences in truth and felicity conditions between one-past subjunctive conditional and mismatched two-pasts subjunctive conditional. However, our analysis which employs a time-dependent notion of accessibility can.

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[41] When I say that a past tense occurs, I mean that some tense occurs that has a past component or expresses a past meaning.

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