

On the Consequences of Event-Quantification in Counterfactual Conditionals

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1. Introduction

In this paper I investigate the effects of aspectual morphology in conditionals headed by the modal *would*, arguing for a unified account within a Lewis-Stalnaker-style framework. The main claim is that the antecedent clause proposition in *would*-conditionals varies depending on aspectual morphology, and that this brings about variation in the quantificational domain of the modal. I argue that a unified analysis for *would* can be maintained once we recognize the differences in the semantic contribution made to the antecedent clause by aspectual heads that quantify over events versus aspectual heads that make reference to events.

The paper is organized as follows. In Section 2, I present examples illustrating the basic contrast that will interest me here; in Section 3, I sketch the basics of a Lewis-Stalnaker account. In Section 4, I present an analysis of the data in Section 2 based on differences in the interpretation of aspect. In Section 5 I briefly discuss an alternative proposal put forward in Ippolito (2003), concerned with similar examples.

2. The data

This paper investigates the contrast between *would*-conditionals in which there is a perfect in the antecedent clause versus examples with simple tense morphology. Illustrations are provided below.

- (1) Suppose you are about to go on holidays, and ask me to look after your plants. I accept, but I am rather nervous. I am not very good with plants:

You: Could you look after my plants next week, while I'm gone?

Me: Of course, but I am rather nervous. If your plants died next week, I would be very upset.

In this example we find a *would*-conditional with simple tense morphology and an eventive verb in the antecedent clause. The antecedent clause makes a hypothesis about the something happening in the future. A similar effect can be achieved with perfect morphology in the antecedent clause:

- (2) (continuation) Suppose that your plants die before you leave on holidays, and you cancel your request. I feel sorry, but also relieved:

You: Don't worry about looking after my plants. They died yesterday.

Me: I am sorry, but also a bit relieved. If your plants had died next week, I would have been very upset.

While this example also makes a hypothesis about a future death of the plants, it would be very odd to have a simple tense antecedent in such a context:

- (3) You: Don't worry about looking after my plants. They died yesterday.

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Me: I am sorry, but also a bit relieved. #If your plants died next week (instead), I would be very upset.

The antecedent clause in (3) does not make a hypothesis about an alternative time for the plants' death. We can only interpret the conditional in (3) as making a hypothesis about an additional death (thus the conditional sounds very odd). It would be a mistake, however, to explain the contrast above by claiming that a perfect is always needed to obtain a 'real' counterfactual interpretation (giving us access to an alternative time for the plants' death). As the stative example below shows, 'real' counterfactual interpretation can be available with simple tense morphology in the antecedent clause:

(4) Suppose you keep your plants in a dark closet in the kitchen, and are worried because they are not growing. I can see what is going wrong:

You: I am worried about my plants.

Me: Oh, they simply don't have enough light. If they had enough light, they would be doing much better.

The generalization that emerges from examples like these is the following: perfects and statives pattern together in that, as the antecedents in *would*-conditionals, they allow us to make hypothesis that are contrary to fact (in this sense, they can be said to give access to a 'real' counterfactual interpretation). Simple tense eventives don't appear to let us do that. Those antecedents somehow remain anchored to what is happening in the actual world. In Section 4 I will argue that this is because the proposition corresponding to the antecedent in (1/3) is not the same as the proposition corresponding to the antecedent in (2).

3. Implementing a Lewis-Stalnaker account

Both Lewis (1973) and Stalnaker (1968) made proposals for the interpretation of conditionals. Their accounts differ in various respects, but there is enough similarity to allow us to talk about a Lewis-Stalnaker analysis. I will adopt the basic idea in their analysis, and say a few words about that below.

3.1 A similarity-based analysis

Under a Lewis-Stalnaker analysis, a conditional of the form *if* α , *would* β , with antecedent proposition α and consequent proposition β , is true in a world w iff the most similar worlds to w in which α is true are also worlds in which β is true. Similarity with the evaluation world is responsible for identifying the relevant antecedent worlds.

There are important differences between the analysis proposed by Lewis and Stalnaker, which I will set aside here (I am simply adopting the Limit Assumption and allowing for ties in similarity). One of the differences between the proposals is the range of natural language constructions that are meant to be elucidated by their proposed logics. Lewis considers his proposal to be for counterfactual conditionals, while Stalnaker considers that it explains a wider set of conditionals. I will take an intermediate approach, and treat the Lewis-Stalnaker analysis as a unified account for the semantics of conditionals headed by the modal *would*.

There are many issues to consider when thinking about the interpretation of *would*. Here I am mainly interested in the effect of aspectual marking on the domain of quantification of the modal. I have simplified various details, notably concerning the interpretation of tense (see Arregui (2004) for a more thorough discussion). For the sake of concreteness, I spell out a (relatively simple minded) approach below. I assume that the modal in a *would*-conditional combines with properties of times, and is responsible for shifting the reference times of such properties to a non-past time (the idea that a modal is responsible for shifting reference times can be found in many places in the literature, a.o. Eng 1996).

(5) Where t_i is a contextually salient non-past time and P and Q are properties of times,

$[[\textit{would}]](P_{\langle i, \langle s, t \rangle \rangle})(Q_{\langle i, \langle s, t \rangle \rangle})(w) = 1$ iff the most similar worlds to w in which $P(t_i)$ is true are also worlds in which $Q(t_i)$ is true.

According to (5), *would* combines with two properties of times P and Q and results in a proposition that is true in a world if the most similar worlds in which the 'antecedent proposition' obtained by applying P to a salient non-past time is true are also worlds in which the 'consequent proposition' obtained by applying Q to the non-past time is true (more details about this proposal can be found in Arregui 2004).

3.2 A simple implementation

The task of discussing the semantics of *would*-conditionals requires saying something about their syntax, and this is not an easy task. I will make the (common) simplifying assumption that *would*-conditionals set up tripartite structures, in which the antecedent clause restricts the domain of quantification of the modal:

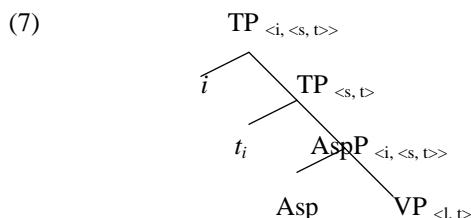
(6) $[[\textit{would} \textit{ [if-clause]]consequent-clause}]$

Given this view, the property of times corresponding to the antecedent clause is responsible for identifying the proposition that fixes the domain of quantification of the modal. In other words, the proposition corresponding to the *if*-clause helps to restrict the domain of quantification of the modal, and the proposition corresponding to the consequent serves as the nuclear scope. In the next section I will argue that the presence/absence of perfective/perfect aspect has important consequences with respect to the proposition corresponding to the antecedent clause. An antecedent clause with perfect aspect will result in a different antecedent proposition than one perfective aspect. This will affect the quantificational domain of the modal, and account for the differences in interpretation.

4. The semantic contribution of aspectual heads

4.1 Aspectual heads and events

Aspectual information comes in many kinds. The kind of aspect that relates the running times of events to a reference time is sometimes called 'situation aspect' (see a.o. Smith 1991). Here I will adopt, and adapt, a proposal for the semantics of aspectual heads found in Kratzer (1998) (inspired by Klein 1994). According to Kratzer (1998), aspectual heads map properties of events to properties of times. They project in syntax between the VP and TP layers. A schema of the semantic interaction between the different projections is given in (7) below. I have adopted a referential approach to tense, according to which tenses denote temporal intervals, and allow for abstraction over free variables (see Partee 1973, Heim 1994, Kratzer 1998 a.o.; also Arregui 2004). As a result, TPs can denote properties of times and provide suitable arguments for a modal:



According to Kratzer (1998), VPs denote properties of events. There are many ways of thinking about events. To a large extent, the way we think about events is shaped by the larger issues we are trying to understand. In this paper I am interested in how some antecedent clauses are 'anchored' to actual world events, and I will adopt a Lewis-style approach (Lewis 1986) to events that will allow me to make explicit certain assumptions about the temporal location of events and the matching of events across worlds. According to Lewis, events can be thought of as functions from worlds to spatiotemporal regions of worlds. For any given world, the output of an event function with respect to

that particular world will be the spatiotemporal region where the event occurs ('events are particulars'). An event need not occur in all possible worlds ('events are contingent'), so an event function will not be defined for every possible world. In my proposal, event functions are rather strict: they pick out 'matching' spatiotemporal regions, the events occur at the same time. This does not mean that events could not have modal properties (they could have happened at different times). It simply means that an event function picks out matching spatiotemporal regions (see Arregui 2004).

4.2 *Perfects vs. perfectives*

There are many puzzles surrounding the interpretation of perfect aspect (see McCoard 1978 for a description of the kinds of meaning-flavours associated with the perfect in English, and Portner 2001 for a more recent overview). Kratzer (1998)'s proposal fits together with Parsons's view (Parsons 1990, 1994) according to which perfect aspect makes available a resultant-state interpretation (the state of the event having culminated). Here is Kratzer's proposal, slightly modified:¹

$$(8) \text{ [[perfect]] (P) = } \lambda t \lambda w \exists e [P(e)(w) \ \& \ \tau(e)(w) < t]$$

According to (8), perfect aspect maps properties of events to times that follow the events. The modal then shifts the properties of times towards the future. Given the semantics for *would* proposed in (5), the proposition corresponding to the antecedent clause in (2) would be (9):

$$(9) \text{ for some non-past time } t_i \\ \lambda w \exists e [\text{your-plants-die-next week } (e)(w) \ \& \ \tau(e)(w) < t_i]$$

With this antecedent proposition, the modal in (2) quantifies over the most similar worlds to the actual world in which there is an event of your plants dying that takes place next week. Given our usual understanding of similarity, the most similar such worlds will be worlds in which your plants haven't already died. The most similar worlds in which your plants die next week are worlds in which death, as is currently usual, only happens once. We end up quantifying over worlds in which the death of the plants takes place at an alternative time. The plants die next week instead of yesterday. This antecedent clause proposition gives us access to worlds that differ from the actual world with respect to the event of your plants death. It allows us to make a 'real counterfactual' hypothesis.

In the absence of perfect morphology in the antecedent clause, I will take it that the (default) aspectual head (for eventive verbs) is perfective. Arguments in favor of characterizing perfective aspect as default aspect in English can be found in Bennett and Partee (1978). One of the interests of Bennett and Partee in that paper was to explain well-known aspectual restrictions on the English present tense. In English, only stative (completely homogeneous) eventualities receive a standard 'ongoing' interpretation in the present tense. Other kinds of eventualities get habitual, generic or quantificational-type readings. Bennett and Partee explain this by saying that only states, by virtue of being completely homogeneous, and thus divisible into tiny parts that are still stative eventualities of the same kind, can be 'small enough' to fit into the instantaneous speech time that corresponds to the present. Thus, only states can receive an 'ongoing' event in the present tense. To illustrate: if I live in Ottawa, there is a tiny eventuality of me living in Ottawa that happens within the speech time. And I can say *I live in Ottawa* to report just that. But if I make a soufflé, the tiny eventuality that fits into the speech time is not an eventuality of me making a soufflé. Thus, I cannot say *I make a soufflé* to convey an ongoing soufflé-making interpretation. Part of Bennett and Partee's proposal is the claim that the time of the eventuality must fit into the time taken as reference time. I will adopt this view, and claim in English, the default aspectual head is perfective. The absence of aspectual restrictions on the past tense, of course, is not a problem, given that in the case of past we may be dealing with temporal intervals that are much larger than the instantaneous speech-time, and thus much better able to accommodate large eventualities and receive a standard interpretation.

We have observed in Section 2 that perfective aspect 'anchors' the antecedent clause to events in the actual world. I want to claim that this is because perfective aspect makes direct reference to events,

¹ I have modified the proposal slightly by allowing τ to give the running time of the e in w .

in the actual world and across possible worlds. It is the referential nature of perfective aspect (as opposed to the quantificational nature of perfect aspect) that is responsible for tying perfective antecedents to what is actually going on. In my implementation, perfective aspect introduces an event pronoun (I have modified Kratzer (1998)'s proposal for perfective aspect accordingly):

$$(10) [[\textit{perfective } e_i]]^{\text{g}, w^0} = \lambda P \lambda t \lambda w [P([[e_i]]^{\text{g}, w^0})(w) \ \& \ \tau ([[e_i]]^{\text{g}, w^0})(w) \subset t]$$

The event pronoun is interpreted via the function assigning values to variables. In combination with a property of events, the aspectual head-plus-pronoun denotes a property of times true of a time in a world iff the event referred to by the pronoun has the relevant property, occurs in the world in question, and has a running time included within the relevant time. Given the proposal in (10), the proposition corresponding to the antecedent clause of (1/3) will be (11):

$$(11) \text{for some non-past time } t_i \\ \lambda w [\textit{your-plants-die-next week} ([[e_i]]^{\text{g}, w^0})(w) \ \& \ \tau ([[e_i]]^{\text{g}, w^0})(w) \subset t_i]$$

This proposition is different from the proposition in (9). Under the assumptions we have been making about Lewis-style events, the denotation of the event pronoun in (11) will be a function from worlds to spatiotemporal regions. In each world, it will pick out the spatiotemporal region in which the event occurs. Given the proposal so far, the spatiotemporal regions corresponding to an event will match each other. A particular event will occur in 'the same' spatiotemporal regions in all worlds in which it occurs. So, for example, if the event of your plants dying has occurred yesterday in the actual world, that event will occur yesterday in all worlds in which it occurs. Of course, this does not mean that your plants could not have died at a different time. There will be worlds in which this event of your plants dying does not occur, but there are other events of your plants dying. So it is perfectly possible for your plants to have died at a different time. I am simply claiming that then they would not have died this particular death, meaning this in the narrow sense that the death would not have occurred in one of the spatiotemporal regions referred to by this event pronoun.

This view of how event pronouns work has consequences with respect to the predicates that can successfully be applied to them. Suppose the event pronoun picks out the death of the plants in the actual world and the corresponding death in other worlds. The spatiotemporal regions in the denotation of the event pronoun in the different worlds will be matched temporally. This means that, if the plants died yesterday in the actual world, they will have died yesterday in all the other worlds in which this event picks out a spatiotemporal region. As a consequence, the hypothesis that this death took place at a different time could never be true in any possible world. Such a hypothesis wouldn't be a suitable antecedent for a counterfactual conditional (the domain of quantification of the modal would be empty). This explains the oddity of (3).

4.3 *The case of states*

One of the distinguishing properties of states, that differentiates them from events, is that they behave differently with respect to their reference time. What is crucial to me here is that states are not perfective and LFs with stative verbs do not make reference to states (or events). I will follow Katz (1995) in characterizing the difference between states and events by claiming that states are able to predicate directly over times (this may be a bit of a simplification, though; see Parsons (1990) for a discussion about the 'ontological status' of states). Given this proposal, stative VPs denote properties of times. The stative antecedent clause in (4), in combination with a modal, will pick out the antecedent clause proposition in (12):

$$(12) \lambda w [\textit{your-plants-have-enough-light}(t_i)(w)] \\ \text{where } t_i \text{ is a non-past time.}$$

This is the proposition that is true in a world iff your plants do not have enough light at some non-past time.

Stative antecedent clauses do not make reference to states (or events). They are not matched with eventualities in the actual world, and, as such, allow for a 'true' counterfactual interpretation. The

modal in (4) will quantify over the most similar worlds in which your plants currently have enough light. These will be worlds that differ from the actual world, where your plants do not currently have enough light.

Statives and perfects, characterized both as properties of times, give the modal in *would*-conditionals access to worlds that differ from the actual world with respect to the proposition corresponding to the antecedent clause. The quantificational domain of the modal is established purely on the basis of similarity with respect to the actual world. In the absence of direct reference, there is no anchoring to actual world events.

5. An alternative analysis: Ippolito (2003)

There has recently been some interest in the interpretation of tense and aspect morphology in modal contexts (amongst the most relevant to the discussion here are Iatridou (2000), Ogihara (2000), Condoravdi (2001), and Ippolito (2003)). In this section I will discuss aspects of the proposal presented in Ippolito (2003). Ippolito is also concerned with the contrast we observed in (1) and (2), and puts forward a detailed semantic and pragmatic account. However, in spite of intuitive appeal, it has some problematic aspects, and I present some data arguing against the proposal in Section 5.2.

5.1 Ippolito's proposal

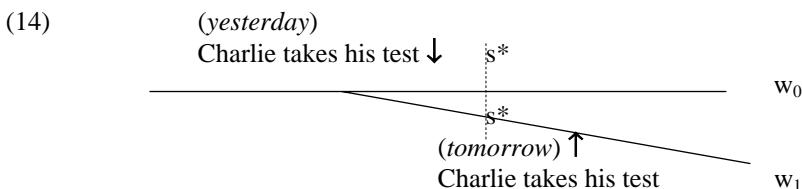
Ippolito's proposal is based on the intuition that in conditionals like (2), the modal quantifies over worlds that are like the actual world up to some moment in the past and then diverge from the history of the actual world in a way that makes the antecedent clause true. The contrast with conditionals like (1/3) arises because the latter fail to do this, the worlds quantified over do not diverge from the actual world in the past. Ippolito fleshes out this intuition in a semantics that treats modals as restricted quantifiers over possible worlds, where the restriction on the domain of quantification is obtained by intersecting the antecedent clause proposition with a set of possible worlds identified by a temporally sensitive accessibility relation. In conditionals like (2), the perfect is interpreted as a past tense outside the antecedent clause. It affects the accessibility function by pointing to a past point of divergence from the actual world history. The modal quantifies over worlds in which the antecedent proposition is true that are like the actual world up to that past time. In conditionals like (1/3), there is no perfect, tense is present, and the worlds quantified over do not diverge from the actual world in the past. The modal quantifies over worlds in which the antecedent proposition is true that are like the actual world up to the present (for reasons of space I cannot present the formal details of Ippolito's proposal here, the reader is referred to her work for important discussion).

Ippolito is interested in examples that reproduce the contrast in (1) and (2). Below, I illustrate her proposal with her own examples. In conditionals like (13), the perfect serves as the temporal argument of the accessibility relation, and the modal quantifies over worlds like the actual world up to some past time, in which Charlie took his Advanced Italian test tomorrow, instead of yesterday.

(13) *Mismatched past-counterfactual*

If Charlie had taken his Advanced Italian test tomorrow, he would have passed.

In picture terms, the worlds quantified over would be like w_1 (where s^* is the speech time):

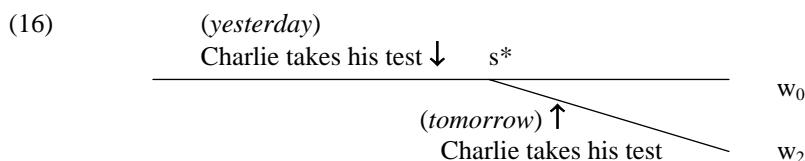


In the case of (15), the temporal argument of the accessibility relation is saturated by a present tense, and the modal quantifies over worlds that are like the actual world up to the speech time and in which Charlie took his test tomorrow.

(15) *Non-past conditional*

If Charlie took his Advanced Italian test tomorrow, he would pass.

These will be worlds like w_2 , in which Charlie also took his test yesterday:



Ippolito relates the temporal argument of the accessibility relation that fixes the domain of quantification of the modal to the felicity conditions for the utterance of the modal. She proposes the following (Ippolito 2003):

(17) a. *Felicity conditions for non-past conditionals*

$$P \cap c_{t_c} \neq \emptyset$$

b. *Felicity conditions for mis-matched past counterfactuals*

$$P \cap c_t \neq \emptyset, \text{ where } t < t_c$$

Where P is the proposition presupposed by the antecedent clause of the conditional, and, for any time t , c_t is the context set at t . T_c is the evaluation time. Thus, (17a) claims that the presuppositions of the antecedent must be compatible with the context set at the evaluation time, and (17b) claims they must be compatible with the context set at an earlier time.

Ippolito adds the pragmatic conditions on top of truth-conditional differences between non-past conditionals and mis-matched past counterfactuals. According to Ippolito, the knowledge relevant to the evaluation of the conditionals is the knowledge available at the time at which the histories of the worlds in the quantificational domain of the modal diverge from the history of the actual world. She puts forward the following hypothesis:

(18) *Hypothesis*

The time relevant for the felicity conditions of a subjunctive conditional is identical to the value of the time argument of the accessibility relation. (Ippolito 2003)

5.2 *Discussion*

Ippolito's proposal builds on the intuition that the worlds quantified over in counterfactual conditionals are worlds that are like the actual world up to some past time, and diverge from then on in such a way that the proposition corresponding to the antecedent clause is made true. This is a plausible intuition, which may or may not be the case (see Lewis 1979 and Bennett 2003 for some discussion; also Arregui 2004). My concern here is to argue that, regardless of whether this is the case or not, the perfect is not interpreted as a past tense outside the antecedent clause, affecting the temporal parameter of the accessibility relation and felicity conditions on the common ground. I will begin by discussing the pragmatic constraint.

The pragmatic dimension of Ippolito's proposal is in the spirit of literature that relates the presence of subjunctive morphology to the epistemic state of the conversational participants (a.o. Stalnaker 1975). However, Ippolito's decision to relate the point of divergence in world histories to the common ground is novel (though see Crouch 1993). There are some examples that make the proposal suspicious as a general claim (but see Ippolito 2003: 166, ft. 14 for discussion):

(19) If dinosaurs had survived, humans would face severe competition for food and shelter.

Under Ippolito's proposal, the worlds quantified over in (19) diverge from the history of the actual world at some time before dinosaurs became extinct, and develop into worlds in which dinosaurs are

currently alive and competing with humans for food and shelter. But it would be strange to say that such a conditional has felicity constraints regarding the common ground in those days. If we think about the common ground reasonably, it is unlikely that any conversation in which we could plausibly imagine (19) would have an earlier stage during which dinosaurs were still roaming. Adding a presuppositional element to the antecedent does not make things more plausible:

- (20) If dinosaurs had survived the meteor strike, humans would face severe competition for food and shelter.

We wouldn't want to say that the presuppositions of the definite description have to be satisfied by the common ground at a past time during which dinosaurs were still alive.

The pragmatic hypothesis proposed by Ippolito is also challenged by examples involving presupposition accommodation. According to Ippolito, a perfect in the antecedent clause indicates that the presuppositions of the antecedent are compatible with an earlier common ground, but need not be compatible with the common ground at the speech time. This proposal predicts that presuppositions should not be problematic if compatible with an earlier common ground. Yet examples like (21) below show that this is not the case:

- (21) a. #Nobody saw the robbery. If the witness had managed to see the thief's face, he would have been apprehended.
 b. #George did not live in California. If Sara had known that George lived in California, she would have visited him.

The sequences in (21) are odd. The presuppositions of the antecedent clauses of the *would*-conditionals are problematic, even though Ippolito's proposal predicts that they should be fine, since they need only be compatible with an earlier common ground (presumably the common ground before we found out that nobody saw the robbery and that George did not live in California). It is important to note that Ippolito's proposal only requires compatibility with an earlier common ground, and that the examples above do in principle allow for accommodation. This is illustrated by (22):

- (22) a. There was a robbery last night. If the witness had managed to see the thief's face, he would have been apprehended already.
 b. # There was a robbery last night. Nobody saw it happen. If the witness had managed to see the thief's face, he would have been apprehended already.

As (22a) shows, it is possible to accommodate the presuppositions of the definite description given the common ground as it stands when we have found out that there was a robbery. However, as (22b) shows, once we have found out that there was no witness, this is not enough. If compatibility with an earlier common ground were all that is required, the prediction would be that the presuppositions of the definite in (22b) should be felicitous.

As a last comment, I would like to turn to the idea that the perfect is interpreted as a past tense outside the antecedent clause, affecting the accessibility relation responsible for identifying the quantificational domain of the modal. As I mentioned earlier, I have nothing to say (here) against the idea that the quantificational domain of the modal is made up of worlds that are like the actual world up to some past time. But I will present some evidence that shows that, even if this were to be the case, it does not come about because the perfect is interpreted as an argument of an accessibility relation outside the antecedent clause. The relevant data comes from adverbial clauses. Consider (23) :

- (23) a. Mary (has / had/ will have) lived in Amsterdam since 1975.
 b. #Mary (lives/ lived/ will live) in Amsterdam since 1975. (Kamp & Reyle 1995)

Kamp and Reyle use the contrast above to argue that *since*-clauses are compatible with perfect constructions, but incompatible with simple tenses (past, present or future). As (24) and (25) below shows, *since*-clauses can appear in the antecedents of *would*-conditionals:

- (24) A: It's a pity the doctor didn't know her for very long?

B: Why?

A: Well, if he had known her since she was a child, for example, he would have known that she was allergic to penicillin.

(25) If you had lived in this house since 1963, you would have qualified for a rent subsidy.

Given that *since*-clauses are dependent on a perfect, and they can appear within the antecedent clause of the conditionals, the examples above indicate that the perfect is interpreted within the antecedent clause of the conditionals. It does not set the temporal parameter for an (external) accessibility relation.

6. Conclusions

In this paper I have presented an analysis of the contrast between *would*-conditionals with perfect and perfective morphology in the antecedent clause. I have derived differences in interpretation from differences in the interpretation of aspectual heads. My main claim has been that perfect and perfective aspect differ with respect to whether they quantify over events or make reference to them. Differences in aspect result in differences in the antecedent clause proposition, explaining the differences in the interpretation of conditionals. Adopting a Lewis-style view of events, I have argued that aspect that makes reference to events (*perfective*) ties the antecedent clause proposition to worlds in which events match actual world events, while aspect that quantifies over events (*perfect*) allows the antecedent clause proposition to be true in worlds where the events differ, and thus can give rise to what we intuitively think of as truly counterfactual hypothesis.

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