The Semantics of Counterfactual *wish*[*]

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This paper aims at exploring the semantic analysis of counterfactual attitudes like *wish* in English. Counterfactual *wish* is rarely discussed in the literature because it is not a main topic in the semantics of propositional attitudes, nor does the standard semantic account of the *de re* attitudes suffice to provide the semantics of counterfactual *wish* since it poses a problem when dealing with counterfactual *wish* on the grounds that the property the attitude holder ascribes to the *res* cannot be true of the *res* in the actual world. There are two significant characteristics of counterfactual *wish* we should consider for its semantic analysis; one is that it is involved in the presupposition that the proposition expressed by the complement clause does not hold in the actual world, and the other is that it is interpreted differently, depending on whether the past tense or the past perfect occurs in the complement clauses. On the basis of them, this paper proposes an alternative approach to its semantics in which the presupposition is incorporated in the ordering source, and the embedded past tense is taken to be modal preterit, along the lines of Palmer (1986) and Schulz (2014). The presupposition plays the role of constituting a set of bouletic accessible worlds that are not compatible with the attitude holder's beliefs. The modal preterit, on the other hand, functions to exclude the actual world and the speech time from the domain of quantification for counterfactual *wish*, and the perfect primarily serves to shift an interval backward from the speech time. In this way, we can capture the difference in semantic interpretation by making the possible worlds quantified over by *wish*-counterfactuals with the past tense different from those quantified over by *wish*-counterfactuals with the past perfect.

Keywords: counterfactual attitudes, de re, de se, modal base, ordering sources, propositional attitudes

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1. Introduction

By uttering a sentence like (1), I can express a wish for North Korea not to have conducted a nuclear test even though I know that it had already done:

(1) I wish that North Korea had not carried out a nuclear test.

It might make sense for me to express my desire that things would have been better if North Korea had not conducted the test. It is about a situation that is contrary to fact, and thus, it is called a counterfactual attitude (or counterfactual *wish* henceforth). It is so called in the sense that counterfactual situations are expressed in the complement clauses of propositional attitude verbs.

This paper is about how to present a semantic analysis of counterfactual attitudes induced by the attitude verb *wish*, as illustrated in (1). I will show counterfactual *wish* poses a problem with the traditional and standard approaches to propositional attitude constructions that have been proposed in the formal semantics literature (Hinttikka (1969), Kaplan (1979), Lewis (1979) and Cresswell and von Stechow (1982) among others). In order to provide more adequate semantic account, I will propose an alternative approach that is based on modal base and ordering semantics which are direct descendant of Kratzer's (1991) modal semantics.

2. *De se* and *de re* Attitudes

In this section, I will discuss the standard semantic account of the *de se* and the *de re* attitudes briefly, focusing on some major works by Lewis (1979), and Cresswell and von Stechow (1982), Perry (1979), and Quine (1956) among others. The Hintikka style of semantic treatment of attitudes[1] according to which only a world w is considered as a parameter consisting

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1) Hintikka (1962, 1969) proposes a semantic account of belief sentences according to which belief sentences are treated as being involved in universal quantification over possible worlds compatible with an agent's doxastically accessible worlds.

of a set of possible worlds is problematic, because, as was noted by Lewis (1979) and Perry (1979), it fails to deal properly with the insane Heimson case (Lewis (1979) and the case of Lingens (Perry (1979)), who suffers from amnesia.[2] In the insane Heimson case, Himeson falsely believes himself to be Hume, as in (2):

(2) Heimson believes that he is Hume.

According to the Hintikka style semantics, the proposition expressed by the complement clause is an empty proposition since there is no possible world whatsoever where Heimson is Hume. Thereby, it would have to predict that the belief sentence in (2) is necessarily false, contrary to fact.

In order to remedy this, Lewis (1979) argues that the objects of the propositional attitudes are self-ascribed properties or *de se* attitudes, rather than propositions. According to him, therefore, 'x believes p' is true just in case the agent x believes *de se* that she has a self-ascribed property in all possible worlds compatible with what she believes. As a way to denote a self-ascribed property, Lewis takes doxastic alternatives to be a set of centered worlds, rather than a set of possible worlds. A centered world is a triple that consists of a world, a time, and an individual, as illustrated in $<w, t, a>$.[3] Given this, a set of doxastically accessible centered possible worlds can be defined as follows: $<w, t, a>Dox<w', t', a'>$ iff $<w', t', a'>$ satisfies every property which an attitude holder a self-ascribes in w at t, where Dox is a doxastic relation between a world, an interval, and an individual. Once the doxastic accessibility is defined, a belief sentence *a believes p* is true in w at t iff $\{<w', t', a'>: <w, t,$

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2) I will not go into the detailed discussion of the Heimson and Lingens case here to save space because they are well-known examples in the literature on the semantics of propositional attitudes. The reader may refer to the works cited here for more discussion.

3) One anonymous reviewer pointed out that a time t is introduced in centered possible worlds out of blue which are taken to be doxastic alternatives in the present study. According to Lewis (1979), centered possible worlds are a pair of a world and a designated inhabitant. However, we need a time parameter for the semantics of counterfactual wish, since the tense embedded in the complement clause of wish plays a significant role of determining how counterfactual attitude constructions are interpreted. For this reason, I assume that the centered possible worlds are a triple of a world, a time and an individual in this paper.

a>Dox<w', t', a'>} ⊆ p. Note that p here denotes a self-ascribed proposi-
tional property, rather than a proposition, which is intended to express
properties in term of propositions.

Let us get back to (2) to see how Lewis's proposal works. According
to his proposal, the sentence (2) is interpreted to mean that Heimson
ascribes the property of being Hume to himself, as shown in its IL trans-
lation *believe'(heimson, ^λxλy[x is hume])* in which the content of the attitude
verb *believe* is of type <s, <e, <e, t>>> with the denotation of propositional
properties. (2) is true at t in w iff {<w', t', Heimson'>: <w, t,
Heimson>Dox<w', t', Heimson'>} ⊆ {<w'', t'', Heimson''>: Heimson
is Hume in w'' at t''}. Given this, Heimson's self-ascription of the property
of being Hume still makes him believe that he is Hume. Heimson's belief
and Hume's belief have the same object, i.e., the property of being Hume,
when they both believe that they are Hume. One should, however, note
that Hume has the property, while Heimson does not.

Let us move on to Lewis's analysis of *de re* attitudes. I will start with
the following example, which is inspired by Quine (1956).

(3) Ralph believes that the man wearing sunglasses is a spy.

A sentence like (3) is ambiguous between a *de dicto* reading in which
Ralph believes that the man wearing sunglasses, whoever he may be,
is a spy, and a *de re* reading in which Ralph believes of the man wearing
sunglasses that he is a spy. The *de dicto* reading is about the attitude
holder Ralph's belief. As was illustrated in Quine's Ortcutt example, Ralph
can believe that the man he saw wearing sunglasses on one occasion
is a spy, while he may not believe the man he saw wearing sunglasses
on another occasion is a spy.[4] As Quine (1956) argues, thereby, Ralph's
de dicto attitudes toward the man in question are not contradictory at
all even in the possible worlds account of the *de dicto* reading in (3).

One should, however, note that according to the possible worlds ac-
count, the attitude holder Ralph would have to be predicted to have a

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4) I will not get into the detailed discussion of the *de dicto* reading in Quine's (1956)
   Ortcutt example to save space. The reader can refer to Quine (1956).

contradictory belief in case of the *de re* reading, which is obviously unintuitive. To see this, consider the following two scenarios. Scenario #1: suppose Ralph glimpsed the man wearing a hat and sunglasses at the White House under questionable circumstances several times, and believes he is a spy. Scenario #2: suppose also that Ralph glimpsed the gray-haired man with the sunglasses on in the Woodley Park, vaguely known to him as a pillar of the community, and he does not believe he is a spy. The two men Ralph glimpsed on two different occasions are one and the same, namely, Ortcutt, but Ralph does not know this. Ralph's attitudes toward the two occasions can be expressed in terms of the following sentences:

(4) a. Ralph believes that the man wearing a hat and sunglasses is a spy.
   b. Ralph does not believe that the gray-haired man wearing sunglasses is a spy.

The semantics of the *de re* interpretation of (4a) and (4b) can be represented in terms of the scope analysis as (5a) and (5b), respectively:

(5) a. $\exists x[\forall y[y$ is a man & y is wearing a hat & y is wearing sunglasses$] \leftrightarrow x = y]$ & believe$'(R, {}^{\wedge}[x$ is a spy$])]$.
   b. $\exists x[\forall y[y$ is a gray-haired man & y is wearing sunglasses$] \leftrightarrow x = y]$ & $\neg$believe$'(R, {}^{\wedge}[x$ is a spy$])]$.

Given the above scenarios, the semantic representations for the *de re* reading in (5a-b) is not on the right track, due to the fact that they would have to predict that the attitude holder Ralph has a contradictory belief. (5a) and (5b) together are interpreted to mean that there is a unique person (i.e. Ortcutt) that Ralph does and does not believe that the man is a spy. This is definitely intuitively incorrect since Ralph has a mistaken belief that the men on the two occasions are not one and the same person.

In order to resolve the problem, Lewis (1979) offers a semantic account of *de re* belief which involves attributing some property to an object,[5]

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5) Notice that this is also an attempt to take the object of propositional attitudes to denote

more precisely the *res*, via an acquaintance relation, which is along the line of Quine (1956) and Kaplan (1979). An acquaintance relation is a relation that an attitude holder bears uniquely to the *res*. According to Lewis, *de re* belief is semantically interpreted as an attitude holder a ascribing a property to the *res* y under some acquaintance relation that a bears uniquely to y. Let us get back to (3) and see how the problem will be resolved. In scenario #1, Ralph bears an acquaintance relation R_1 to the man wearing sunglasses in which the man is the unique individual that Ralph glimpsed wearing a hat and sunglasses. Relative to this relation, Ralph believes that the man wearing sunglasses is a spy. In scenario #2, Ralph also bears an acquaintance relation R_2 to the man in which he is the unique individual that Ralph glimpsed having gray hair and wearing sunglasses. Relative to this relation, Ralph does not believe that the man wearing sunglasses is a spy.

On the basis of this idea, Lewis (1979) provides the semantics of the *de re* attitude as follows: "a believes that y is p" is true in w at t iff (i) a bears a relation R to y, and (ii) a believes *de se* that the object to which a' bears R at t' in w' has a property p in w' at t'.[6] Based on Lewis's *de se* attitudes, Cresswell and von Stechow (1982) propose a generalized semantic account of *de re* belief in conjunction with Hintikka's (1962) semantics of propositional attitudes.[7] They propose that propositional attitude verbs have an extra argument reserved for the *res* to which the attitude holder ascribes a property, with the semantic type <e, <<s, <e, <e, t>>>, <e, t>>>.[8] According to Cresswell and von Stechow,

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a property, as we saw in Lewis's semantics of the *de se* attitudes. In this case, however, the attitude holder ascribes the property not to herself but to the thing (or the *res*) to which she bears an acquaintance relation.

6) Lewis (1979) introduces the notion of an essential property of the *res* into the semantic account of the *de re* attitude. However, I will leave it out here because it is not crucial for the semantic analysis of the *de re* attitudes. As Lewis says, it is not necessary to know the essence an individual has in belief *de re*, since we might be badly misinformed. In spite of this misinformation, we still have *de re*-beliefs about the one whom we bear a relation of acquaintance to.

7) Notice that Cresswell and von Stechow (1982) criticize the possible worlds semantics of propositional attitudes proposed by Hintikka's (1962) for failing to provide an adequate semantic account of the Ortcutt example. Despite this, they incorporate Hintikka's semantics of beliefs into Lewis's *de se* account in order to define the notion of doxastic accessibility.

the semantics of *de re* attitudes can be defined as follows:

(6) *x believes of y that p* is true in w at t iff the following two conditions are met;
    (i) there is an acquaintance relation R which a bears uniquely to y in w at t, and
    (ii) in every doxastic alternative <w', t', a'> of a in w at t, y to which a' bears R at t' in w' has the property p in w' at t'.

Let us go back to (5a-b) and see how the semantics of the *de re* belief in (6) fit in. The sentences in (4a-b) can be semantically represented as follows in terms of the semantic account of the *de re* attitude put forward by Lewis (1979) and extended by Cresswell and von Stechow (1982):

(7) a. $\exists x[\forall y[y$ is a man & y is wearing a hat & y is wearing sunglasses$] \leftrightarrow x = y]$ & believe'$(R, x, ^\wedge\lambda z\lambda u[z$ is a spy$])]$.
    b. $\exists x[\forall y[y$ is a gray-haired man & y is wearing sunglasses$] \leftrightarrow x = y]$ & $\neg$believe'$(R, x, ^\wedge\lambda z\lambda u[z$ is a spy$])]$.

As in (7a), relative to R_1, Ralph believes that the man to whom he bears R_1 is a spy. In this case, the acquaintance relation R_1 is this: $R_1 = \{<w', t', a'>$: the individual that a' glimpsed wearing a hat and sunglasses at the White House in w' at t'$\}$. In case of (7b), Ralph believes, relative to R_2, that the man to whom he bears R_2 is not a spy, and the acquaintance relation R_2 is this: $R_2 = \{<w', t', a'>$: the individual that a' glimpsed wearing sunglasses in the Woodley Park in w' at t'$\}$. Given this, (7a) is true in w at t iff (i) there is a unique individual Ralph glimpses wearing a hat and sunglasses at the White House in w at t, and (ii) in every doxastic alternatives <w', t', a'> of Ralph in w at t, the unique man a' glimpses wearing a hat and sunglasses in w at t has the property of being a spy in w' at t'. In the same vein, the truth conditions for (7b) can be stated as follows: (7b) is true in w at t iff (i) there is a unique individual Ralph glimpses wearing sunglasses in the Woodley Park in w at t, and (ii) in every doxastic alternatives <w', t', a'> of Ralph in w at t, the unique man a' glimpses wearing sunglasses in w at t is not

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8) This implies that the attitude verb *believe* for *de re* interpretation has a different semantic type from *believe* for *de dicto* interpretation. I will not go into the detail of this here because this is not our main concern.

a spy in w' at t'. As we can see in the truth conditions, it's quite natural to say that Ralph believes, relative to R_1, that the man is a spy, while Ralph does not believes, relative to R_2, that the man is a spy, because the attitude holder Ralph believes that he encounters two different men on the two different occasions, even though he does not notice that the two men on the two occasions are one and the same, i.e. Ortcutt. This goes with our intuition.

3. Problems Arising from Counterfactual *wish*

In this section, I will address some limitations of the semantic accounts of propositional attitudes that have been proposed in the literature, when they deal with counterfactual attitude verbs like *wish*. One problem the standard *de re* account (cf. Lewis (1979), and Cresswell and von Stechow (1982)) is faced with is that counterfactual attitudes do not necessarily require an acquaintance relation for their truth, due to the fact that the content expressed by *wish* might exist in the speaker's (or the attitude holder's) imagination, not in the actual world. The agent (or the attitude holder) can imagine that a given *res* has the property described by the counterfactual attitude verb, even if there is no acquaintance relation R such that (i) the agent bears R uniquely to the *res* and (ii) the agent can imagine that the *res* has the property expressed by the complement clause of the counterfactual attitude verbs. The arguments which are along the line of this can be witnessed in Gennari (1999, 2003) and Ninan (2012), even though their motivation to argue against the *de re* account is somewhat different. While providing a semantic analysis of the embedded present tense in double-access sentences, Gennari (1999) rejects the account of *de re* attitudes which is based on the acquaintance relation, since acquaintance relations are not always obligatory for the *de re* interpretation.[9] In the following sentence *Betty believes that the Santa Claus lives on the North Pole*, for instance, it is improbable that the attitude holder Betty necessarily

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9) I will not go into the detail of Gennari's (1999) criticism about the de re interpretation since the semantics of the embedded tense is what she is mainly concerned with. This is the topic that is beyond the present study.

have an acquaintance relation uniquely to the Santa Claus for the *de re* interpretation. It is worth noting that the Santa Claus has no reference in the actual world, which makes it impossible for anyone to be acquainted with him in the actual world.

Ninan (2012) also makes a point against the introduction of the acquaintance relation into the semantic analysis of imaginary *de re* attitudes induced by verbs like *imagine* and *dream*. In the *de re* account of his infant Ortcutt example where the attitude holder imagines Ortcutt, who she see sneaking around on the waterfront, is an infant, rather than an adult, for one thing, she can have no acquaintance relation to the infant Ortcutt. In other words, the properties of the *res* (i.e. Ortcutt in this case) the attitude holder imagines to have in her imagination worlds cannot be true of Ortcutt in the actual world who is seen sneaking around on the waterfront. Thereby, the standard *de re* analysis fails for the infant Ortcutt example.

Imaginary attitudes have something in common with counterfactual *wish* in the sense that they allow us to think about some situations that are contrary to fact. Thus, a similar argument against the *de re* account can be made for the case of counterfactual *wish*. Let us revise the above scenario slightly. Suppose that Ralph wishes that relative to R_1 (i.e. Ortcutt, whom Ralph glimpsed wearing a hat and sunglasses at the White House), he saw Ortcutt working as a life guard at Daytona Beach. Given the revised situation, Ralph's wish about Ortcutt is that he does not glimpse Ortcutt standing at the White House with a hat and sunglasses on in the actual world. Instead, he sees him working as a life guard at Daytona Beach in the centered worlds compatible with what Ralph wishes. This implies that Ralph is imagining a situation where he does not bear the acquaintance relation R_1 to Ortcutt, and hence R_1 is not a required condition for the *de re* interpretation of Ralph's wish. This is a piece of evidence against the *de re* account put forward by Lewis (1979) and extended by Cresswell and von Stechow (1982). Thereby, the truth conditions for the *de re* interpretation in (6) above are not sufficient for the semantics of counterfactual attitudes like *wish* and *imagine*.

Another problem arising in the semantic analysis of *de re* attitudes is that, as noted by Ninan (2012) and Yanovich (2011), it would have to

assert that the imaginary (or counterfactual) property picked out by the complement clause do not hold in a set of centered worlds compatible with the attitude holder's imagination, thus predicting that imaginary attitudes cannot be true in the actual world, which is contrary to fact. To see this, suppose Ralph utters the following sentence under the above modified scenario (i.e. R_1):

(8) Ralph imagines that the man he saw at the White House is working as a life guard in Daytona Beach.

According to the semantic definition of the *de re* belief in (6), (8) is true if the two conditions are met: the acquaintance relation requirement and the universal quantification over centered worlds compatible with Ralph's imagination. The former condition is satisfied since there is really an acquaintance relation R_1 in this scenario, yet the latter condition is not. Note that what Ralph imagines about the man in question is not about the actual Ortcutt. The truth conditions for (8) requires that the property of the man to whom Ralph has a relation R_1 which is described in the complement clause in his imagination worlds include the property of being in Daytona Beach. However, that property cannot be true of the actual Ortcutt, who is seen by Ralph wearing sunglasses at the White House. Thus, the semantics of *de re* in (6) would have to predict that (8) is false in the situation under consideration, contrary to fact.

The final problem which I'd like to mention which the Lewis-style semantic approach[10] to propositional attitudes in conjunction with Hinttikka's (1962) analysis might have is that it fails to provide accessibility relations appropriate for counterfactual attitudes. Unlike other attitude verbs such as *believe* and *know* etc., counterfactual attitude verbs like *wish* should necessarily quantify over the domain consisting of a set of centered worlds where the proposition expressed by the complement clause does not hold. To be more precise, the actual world must be necessarily excluded from the domain of quantification of counterfactual *wish*, because it makes

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10) By the Lewis-style semantics of propositional attitudes, I mean the semantic analysis which is a descendent of Lewis (1979), including Cresswell and von Stechow (1982).

a counterfactual hypothesis about a state of affairs which holds in the actual world. For example, the belief sentence *John believes that he is happy* is semantically analyzed as this: for every centered world for John in w at t which is compatible with what John believes, John self-ascribes the property of being happy. If we adopt this for the semantics of counter-factual *wish*, the wish sentence *John wishes that he were happy* can be in-terpreted in the same way as this: for every centered world for John in w at t which is compatible with what John wishes, John self-ascribes the property of being happy. What is it that it means to say "centered worlds compatible with what John wishes"? In the belief attitude case, the domain of quantification might include the actual world as long as what the agent's beliefs hold in the actual world. However, this is not the case with the accessibility relation for counterfactual *wish*. Recall that counterfactual *wish* presupposes that the content expressed by the complement clause is not accepted to be true as far as the attitude holder is concerned. This implies that the actual world should be excluded from the domain of quantification of counterfactual *wish*. Thus, we need some semantic device to prevent the actual world from being included in the domain of quantification of counterfactual *wish*, which is neglected in the Lewis-style semantic (or the standard semantic) account as well as Hintikka's (1962, 1969) account.

4. The Usage of Counterfactual *wish*

In English, counterfactual *wish* occurs either with the past tense or with the past perfect in its complement clause to convey a contrary-to-fact meaning. When the past tense is used in its complement clause, it expresses either counterfactual or hypothetical future eventualities, as illustrated in (9):

(9) a. John wishes that he had a car now.
    b. I wish I lived in New York next year.

Both a speech-time-oriented adverbial like *now* and a future-time adverbial like *next year* occur with the past tense in the complement of counterfactual

wish in (9a-b). Thus, (9a) is interpreted to convey a situation contrary to present fact, while (9b) is understood to make a counterfactual hypothesis about a future situation. However, the past tense is not compatible with counterfactual situations where a past eventuality is described:

(10) a. *John wishes that he had a car last year.
     b. *I wish I lived in New York when I was young.

In order to make a counterfactual hypothesis about past situations, we should use the past perfect in the complement clause of counterfactual wish, as shown in (11):

(11) a. John wishes that he had had a car last year.
     b. I wish I had lived in New York when I was young.

It is, however, worth noting that the past perfect embedded in the complement clause of counterfactual *wish* cannot be used to express hypothetical situations about present or future events. This can be supported by the fact that the past perfect is not compatible with the speech-time-oriented adverbial like *now* and future-time adverbials like *next year*:

(12) a. *John wishes that he had had a car now.
     b. *I wish I had lived in New York next year.

Here is the summary of the distribution of the past tense and the past perfect that are embedded in the complement of counterfactual *wish*; (i) the past time in the complement clause of counterfactual *wish* makes a counterfactual hypothesis about present or future situations, and (ii) the past perfect in the complement clause of counterfactual *wish* makes a counterfactual hypothesis about past events or situations.

5. The Embedded Past Tense as Modal Preterit

As we saw in the previous section, the past tense is closely related to counterfactuality in English.[11] In this section, thus, I will address what the semantic function of the embedded past tense in counterfactual *wish* will be. The past tense in the complement clause of counterfactual *wish* does not behave like a normal past tense. The embedded past tense in counterfactual *wish* can occur with adverbials denoting the speech time, rather than with a past time adverbial:

(13) a. John wishes he were proud of his job now.
　　 b. *John wishes he were proud of his job last year.

As was discussed above, the content expressed by the complement clause is about something that is contrary to a current situation, rather than to past situations.

In the sequence of tense, the time referred to the embedded past tense precedes the time denoted by the present tense in the matrix in past-under-present sentences, as in (14):

(14) Mary believes that John raised an objection to her proposal.

In (14) where the past tense is embedded under the present tense, the time of John raising an objection is earlier than the time of Mary's belief. But this is not the case with the embedded past in counterfactual wish, as in (13). In a past-under-present sentence like (13), the time of John's pride does not precede but overlaps that of John's wish.[12] Given this, the embedded past tense in counterfactual *wish* is not a real past tense

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11) Even though they are not mentioned in this paper, would-conditional constructions also show there is a close relationship between the past tense and counterfactuality, as in the following sentence: *If I had some money now, I would eat a lobster in a fancy restaurant*.

12) As a matter of fact, the proposition that is expressed by the embedded clause in (13) is not about what is real at the utterance time (more precisely, the time of John's wish), because it does not hold in the actual world at the utterance time at all. Thus, I am not convinced whether it is right or not to say that the time of embedded past really overlaps the time of the matrix present tense. However, I will put aside this matter here, since the purpose of the discussion is to point out that the time of the embedded past does not precede that of the matrix present tense in *wish*-counterfactual constructions.

but a fake tense, which is suggested in literature on counterfactuality (see Hogeweg (2009), Iatridou (2000), Palmer (1986), Portner (1992), Schulz (2014), and M-Y Song (2014) among others).

Thus, the question arises of what grammatical status the past tense in counterfactual sentences would be. Iatridou (2000) addresses the question, calling the past tense in counterfactuals a *fake* tense. After discussing the past tense morpheme that occurs in a variety of counterfactuals cross-linguistically, she proposes the semantics of the fake tense as follows:

(15) T(x) excludes C(x).   (Iatridou (2000: 246))

T(x) stands for "Topic(x)", which means the x that we are talking about, and C(x) stands for "the x that for all we know is the x of the speaker." According to (15), the topic times exclude the utterance time and the topic worlds exclude the actual world. Given this, the past tense morpheme in the antecedent clause of counterfactuals plays the role of considering other times than the speech time (i.e. a past time) and other worlds than the actual world for the evaluation of counterfactuals. Schulz also makes a similar point. He proposes that the fake tense be treated as a modal preterit. Following Iatridou (2000) and Schulz (2014), I will take the past tense in counterfactuals to be modal preterit which functions to exclude the actual worlds and the speech time.

Following Schulz (2014), I will take the fake past tense in counterfactual *wish* to be the modal preterit (MP). The semantic function of MP is to rule out the possibility that the actual world and the speech time might be in the domain of quantification by counterfactual *wish*, as proposed by Iatridou (2000). On the basis of this, we can define MP as follows:

(16) Definition of MP

MP(p) is defined iff for any world w, any time t and any propositional property $p \in D_{<<s, <e, t>>>}$,[13] $\forall<w, t>\forall z[p(<w, t>) (z) \rightarrow \neg\exists<w_1, t_1>[<w_1, t_1> o <w_0, t_0> \& <w_1, t_1> \in p(<w, t>)]$, where w_0, t_0 and o are the actual world, the speech time, and the overlapping relation respectively.

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13) The propositional property is defined as follows: $p \in D_{<s, <e, t>>}$ is a propositional property iff $\exists\rho[\rho \in D_{<s, t>} \& \forall<w, t>\forall x[\rho<w, t> (x) \leftrightarrow \rho<w, t>]]$. Recall that propositional properties, not propositions, are the objects of the propositional attitudes. They are intended to incorporate Lewis's (1979) proposal that the object of the propositional attitudes is a self-ascribed property.

According to (16), no propositional properties under the scope of MP are true in the actual world w_0 at the speech time t_0. In this way, MP excludes the actual world and the speech time from possible centered worlds. This is illustrated in (17):

(17)
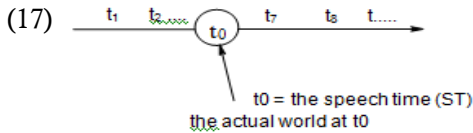
How can we define the semantics of MP when it occurs with the past perfect embedded in the complement clause of counterfactual wish, as in (18a)?

(18) a. John wishes that Mary had studied semantics.
　　　b. John wishes [$_{TP}$ Mary$_i$ [-ed have [t_i study semantics]]]].[14]

(18a) is about the situation that runs counter to what happened at a past time. As represented in (18b), the past perfect is inside of the scope of MP, as in MP(perf). As was discussed in the literature on the perfect (Smith (1991) and Stump (1985)), the perfect is characterized by priority to the reference time. Thus, we can define MP(perf) as follows, where perf stands for the perfect. Since the perfect functions to shift the interval in question backward from the reference time, MP(Perf) can be defined as follows:

(19) Definition of MP(Perf (p))
　　　MP(Perf(p)) is defined iff for any a world w, and a time t, and any propositional property $p \in D_{<<s, <e, t>>>}$, $\forall <w, t> \forall z[p(<w, t>) (z) \rightarrow \neg \exists <w_1, t_1>[<w_1, t_1> < <w_0, t_0> \&$ $<w_1, t_1> \in p(<w, t>)]$, where w_0 and t_0 are the actual world and the speech time, respectively.

According to (19), MP excludes a past time t_1 and the actual world w_1 at that time, which implies that what is expressed in the embedded clause does not hold in the actual world and at that past time. This is how

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14) The representation in (18a) is a LF for a *wish*-counterfactual construction with the past perfect in its complement clause. I will present more detailed account of the formation of LFs below in sub-section 6.1

the past time and the world at that time are not taken into consideration for the evaluation of counterfactual *wish*, when the past perfect is used in its complement clause. This is also illustrated in (20):

(20)

Shifted backward from t_0
The actual world at t_1
The white circle means 'exclusion'.
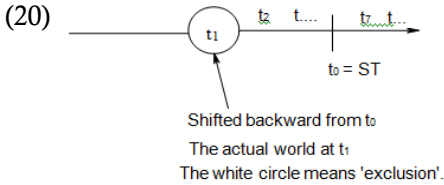
6. Semantics Analysis

6.1. LFs for Counterfactual *wish*

Before going into the semantic analysis of counterfactual *wish*, I will present their LFs which are taken to be an input for the semantic interpretation. Let us consider two different cases of counterfactual *wish*; one is that where the past tense occurs in the complement clause of wish, and the other is that where the past perfect is used in the complement clause. First, I will present the LF for the former case, which would be something like this:

(21) LF for the past-under-present counterfactual *wish*
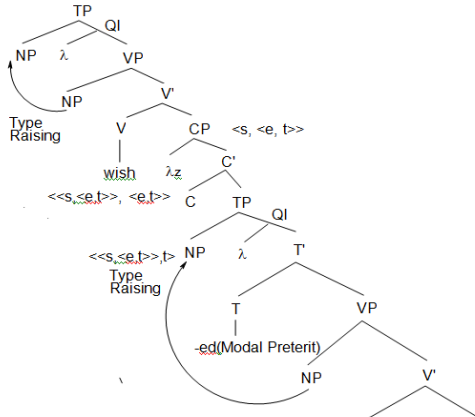
Comments on the LF in (21): Reject the *de re* analysis: We don't have to come up with two different propositional attitude verbs, as Cresswell and von Stechow (1982) propose: one is for the *de dicto* and the other for the *de re*. I will pursue the semantic analysis which is based on the *de dicto* attitudes. I adopt the VP-internal Hypothesis in the LF. The subject NP(or DP) is base-generated in [SPEC, VP] and moves to [SPEC, TP]. This amounts to QR, so the Quantifying-in (QI) rule applies here. In the above trees, the Quantifying-in applies at the embedded TP and T' and the matrix TP and VP. l-abstraction over individuals: This is intended to take the object of the propositional attitudes to be a propositional property. The counterfactual attitude verb *wish* is of type <<s, <e, t>>, <e, t>> which takes a propositional property as its argument and returns a set of individuals. This is a function from properties of individuals to sets of individuals. The modal preterit is assigned no semantic type, which means that it is treated syncategorematically.

Let us move on to the LF for counterfactual wish where the past perfect occurs in the complement clause. The LF I have in mind would be like this:

(22) LF for the Past-perfect-under-present counterfactual *wish*
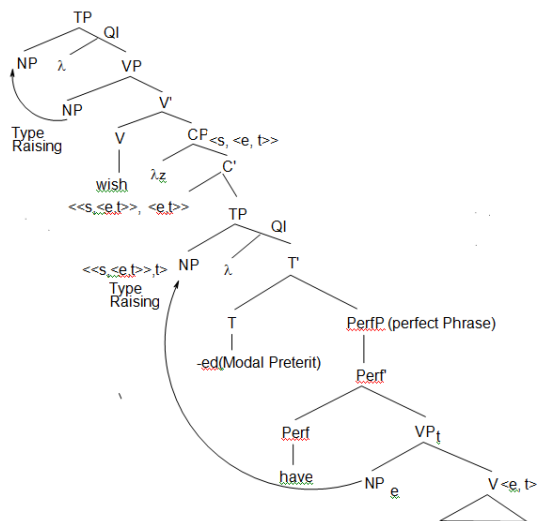
Comments on the LF in (22): Everything is exactly like (21) except that like MP, perfect *have* is assigned no semantic type, and it is an operator. A new node 'PerfP'(Perfect phrase) is introduced in (22).

6.2. Semantic Interpretation

I will pursue the semantics of counterfactual *wish* that is based on Kratzer's (1991) theory of modality characterized by that of relative modality or ordering modality. The reason why I follow her in this paper is that it won't be necessary for us to consider all accessible worlds. Instead, we only consider a set of possible worlds that are relevant to the semantic interpretation of a given expression. In other words, this is to impose a restriction upon a set of accessible (or alternative) worlds for the modal expression in question.

The modal base and the ordering source are a core of Kratzer's modality. The modal base for counterfactual *wish* would be a set of propositional properties that are compatible with what the attitude holder (or the wisher) wishes, represented as follows:

(23) The modal base MB for counterfactual *wish*
MB($<w, t, x>$) = $\lambda w \lambda t \lambda p \lambda x$[x wishes for p in w at t], where p is a propositional property of type $<s, <e, t>>$.

This is tantamount to this: MB($<w, t, x>$) = {$<w, t, x>$: x wishes for p in w at t}. The modal base in (23) for counterfactual *wish* is defined in a way similar to that of other propositional attitude verbs like *believe*. Nothing new is here.

Given (23), the accessibility relation is defined as a set of possible centered worlds where all the propositional properties in MB($<w, t, x>$) are true, which can be defined as follows:

(24) Accessibility relation for counterfactual *wish*
$<w', t', x'>$ACC$<w, t, x>$ iff $<w', t', x'> \in \cap$MB($<w, t, x>$),
where $\cap$MB($<w, t, x>$) = {$<w', t', x'>$: $\forall p[p \in$ MB($<w, t, x>$) $\rightarrow <w', t', x'> \in p$]}

Note that $<w', t', x'>$ACC$<w, t, x>$ reads as "a centered world $<w', t', x'>$ is accessible from $<w, t, x>$." According to (24), a centered world

<w', t', x'> is accessible from <w, t, x> iff it is a member of a set of centered worlds where every propositional property in MB is true (or realized).

Since both the modal base and the accessibility relations are defined, we are in a position to provide the ordering source for counterfactual *wish*. It functions to order a set of accessible worlds in (24) according to a certain ordering relation among worlds in order to determine which worlds are better than which worlds. There are two aspects we need to consider for the ordering sources for counterfactual *wish*. One aspect is that Lewis's self-ascribed property should be incorporated into the semantics of counterfactual *wish* since it is, after all, a propositional attitude construction just like a belief sentence. Thereby, I presumably assume that an attitude holder x's wish for a property p is tantamount to saying that x believes that p is true in all wished-for worlds for x. The other aspect is that counterfactual *wish* is involved in the presupposition that the proposition expressed by its complement clause does not hold in the actual world. The leading idea that I will be using, based on this, is that the first and the second aspect constitute the primary ordering source and the secondary ordering source, respectively.

Given the basic idea of the primary ordering source, as was mentioned above, it can be defined as follows, which is along the lines of Cresswell and von Stechow (1982), Lewis (1979) and Hintikka (1969):

(25) The primary ordering source (POS) for counterfactual *wish*[15]
   POS(<w, t, x>) = {<w'', t'', x''>: <w'', t'', x''>⊨ ∀p[p ∈ ∩ MB(<w, t, x>) →
   self-ascribe(p)(x)(w)(t)]}

According to (25), the primary ordering source POS is a set of centered possible worlds which satisfy every propositional property p in ∩MB(<w, t, x>) which x self-ascribes in w at t. The primary ordering source serves

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15) The definition of the primary ordering source presented here is based on that of the doxastic alternatives proposed by Cresswell and von Stechow (1982) which can be stated as follows:

   (i) <w', t', x'> is a doxastically accessible world from <w, t, x> iff <w', t', x'> satisfies every property x self-ascribes in w at t.

to restrict the domain of quantification (i.e. ∩ MB(<w, t, x>) of counter-
factual *wish* to a set of centered worlds in ∩ MB(<w, t, x>) where the
attitude holder believes a wished-for propositional property is true.

Let us get back to the secondary ordering source. Note that counter-
factual *wish* involves a proposition that the attitude holder of *wish* believes
that the proposition expressed by the complement clause is false in the
actual world at the utterance time. Consider the following sentence:

(26) John wishes Mary lived in New York.

A sentence like (26) has the presupposition that John believes that Mary
does not live in New York now. In other words, the embedded proposition
does not hold in the actual world. So the presupposition triggered by
counterfactual *wish* can be stated as follows:

(27) [wish'(x, p)]$^{w, g}$ is defined iff an individual x believes that a propositional property p
is false in w at t (i.e. Bul(<w', t', x'>) M p, where Bul(<w', t', x'>) is a set of bou-
letic centered worlds for an agent x).

If the presupposition in (27) is felicitous, the use of counterfactual *wish*
is licensed. Otherwise, it wouldn't be. The presupposition plays an im-
portant role in distinguishing counterfactual *wish* from future-hypothetical
wish expressed in terms of an infinitival clause:[16]

(28) a. John wishes that he had a luxury car. (counterfactual *wish*)
    b. John wishes to have a luxury car. (future-hypothetical *wish*)

The difference between (28a) and (28b) is that the presupposition that
he does not have a luxury car holds, while this is not the case with (28b).

It follows from what I have discussed above that the secondary ordering
source SOS for counterfactual *wish* is a set of propositional properties
that are not compatible with the attitude holder's beliefs, since counter-
factual *wish* presuppose that the proposition expressed by the embedded

16) Portner (1992) also makes a similar point to this, even though his technical terms
   are different from mine.

clause is not true in her belief worlds. Thus, the SOS can be defined as follows:

(29) The secondary ordering source (SOS) for counterfactual *wish*

SOS($<$w, t, x$>$) = {p: p $\cap$ Dox($<$w', t', x'$>$) = $\varnothing$}, where Dox($<$w', t', x'$>$) is a set of doxastic worlds for x' in w' at t'.

The ordering source generated by SOS in (29) is a set of propositional properties which do the work of determining the ideal worlds in $\cap$MB($<$w, t, x$>$), which constitutes a set of centered worlds quantified over by counterfactual *wish*. The ordering source also functions to eliminate the worlds that are not ideal from $\cap$MB($<$w, t, x$>$), consequently restricting the domain of quantification of counterfactual *wish*.

On the basis of (25) and (29), the partial ordering relation among centered worlds established by OS[17] can be defined by $]_{OS(<w, t, x>)}$ as follows:

(30) The ordering relation defined by $]_{OS(<w, t, x>)}$

For any v, u $\in$ W, for any p $\in$ OS($<$w, t, x$>$),[18] v $[_{OS(<w, t, x>)}$ u iff {p: $<$u, t, x$>$ $\in$ p} $\subseteq$ {p: $<$v, t, x$>$ $\in$ p}.

According to (30), a centered world $<$v, t, x$>$ is either more highly ranked than or ranked the same as another centered world $<$u, t, x$>$ iff every propositional properties in OS($<$w, t, x$>$) which is true in $<$u, t, x$>$ also true in $<$v, t, x$>$.

Given what I have discussed so far, we can finally define a set of centered worlds that are compatible with what the attitude holder wishes. The set is taken to be the domain of quantification for counterfactual *wish*, which is represented as *Bul*, an abbreviation for Bouletic worlds.

(31) Bouletic accessibility for counterfactual *wish* (i.e. Bul($<$w, t, x$>$)

Bul($<$w, t, x$>$) = {$<$w', t', x'$>$: $<$w', t', x'$>$ $\in$ $\cap$MB($<$w, t, x$>$)$>$ and there is no $<$u, t', x'$>$ $\in$ $\cap$MB($<$w, t, x$>$) such that $<$u, t', x'$>$ $[_{OS(<w, t, x>)}$ $<$w', t', a'$>$}.

Recall that the bouletic accessibility in (31) is defined in terms of the

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17) For convenience's sake, I use the ordering source OS when I refer to POS and SOS.
18) The mnemonic OS is a cover term for the primary and the secondary ordering source.

modal base and the ordering source, which departs from a conventional way of defining the domain of the quantification for propositional attitude verbs. (31) can be abbreviated as (32):

(32) $Bul(<w, t, x>) = \{<w', t', x'>: \text{best-ranked}(MB(<w, t, x>), OS(<w, t, x>))\}$.

Given (32), we are now in a position to define lexical meaning of counter-factual *wish*.

(33) $[\text{wish}]^{MB, \, OS, \, u}$ is that function $f \in D_{<<s, \, <e, \, t>>, \, <e, \, t>>}$ such that for any $p \in D_{<s, \, <e, \, t>>}$, for any $a \in D_e$, $f(p)(a) = 1$ iff $\{<w', t', x'>: \text{best-ranked}(MB(<w, t, a>), OS(<w, t, a>))\} \subseteq p$ (i.e. $p = \{<w'', t'', x''>: p(w'')(t'')(x'') = 1\}$).

(33) says that $[\lambda p \lambda x[\text{wish}'((p)(x))]]^{MB, \, OS, \, u}$ is true iff in every bouletically accessible world for x, x self-ascribes the property p at $<w_0, t_0>$ which x believes is false at $<w_0, t_0>$. In other words, $[\lambda p \lambda x[\text{wish}'((p)(x))]]^{MB, \, OS, \, u}$ is true in w_0 at t_0 iff every bouletic alternative of x in w_0 at t_0 is an element of $\{<w'', t'', x''>: p \text{ is true in } w'' \text{ at } t''\}$.

In what follows, I will demonstrate how the semantic analysis proposed in this paper fits in with counterfactual *wish*, by giving examples. First, let us consider a *wish*-counterfactual construction in which the past tense occurs in the embedded complement clause, as exemplified in (34):

(34) a. John wishes Mary lived in New York.

(35) a. LF for (33): [TP John₁ [VP t₁ wishes λz [TP Mary₂ -ed [VP t₂ live in New York]]]][19]
    b. IL translation: wish'(j, ^λz[MP(live-in-NY'(m))]).[20]

(35a) and (35b) are the LF and IL translation of (34) respectively. The truth conditions for (35b) can be stated as follows on the basis of the semantic framework that has been developed in this paper:

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19) I will not go into the detailed account of how the LF is derived here because the derivation of LF has already been addressed in the previous sub-section.

20) As was mentioned earlier, I take the object of the propositional attitude to be a (self-ascribed) property, following Lewis (1979). Technically speaking, the lambda expression lz, which does not bind any individual in the embedded formula, is intended to take care of this.

(36) $[wish'(j, {}^\wedge\lambda z[MP(live\text{-}in\text{-}NY'(m))])]^{MB,\ OS,\ w0,\ t0} = 1$ iff $\{<w', t', x'>:$ best-ranked$(MB(<w, t, john>), OS(<w, t, john>))\} \subseteq \{<w'', t', x''>: <w_0, t_0, x> \notin$ [lives- in- NY'(m)(w'')(t')]$^{MB,\ OS}$ and [lives-in-NY'(m)(w'')(t'')]$^{MB,\ OS,} = 1\}$.

In (36), the formula $<w_0, t_0, x> \notin$ [lives-in-NY'(m)(w'')(t'')]$^{MB,\ OS}$ (which says Mary lives in New York is false in w_0 at t_0) is intended to convey the meaning of MP that serves to exclude the actual world from the evaluation worlds. This can be rewritten as $<w_0, t_0, x> \notin \{<w'', t', x''>:$ Mary lives in New York in w'' at $t''\}$. Given this, $\{<w'', t', x''>:$ [lives-in-NY'(m)(w_0)(t_0)]$^{MB,\ OS} = 0$ and [lives-in-NY'(m)(w'')(t'')]$^{MB,\ OS,} = 1\}$ is equivalent to $\{<w'', t', x''>:$ Mary lives in New York in w'' at $t''\}$ – $\{<w_0, t_0, x''>\}$.

According to (36), (35) is true in w_0 at t_0 iff every bouletic alternative of John in w_0 at t_0 is included in $\{<w'', t', x''>:$ Mary lives in New York in w'' at t'' and it's not case that Mary lives in New York in w_0 at $t_0\}$. Recall that a set of bouletic alternatives are determined by the primary ordering source based on self-ascribed properties, and the secondary ordering source based on presupposition. If in every bouletic worlds $<w'', t'>$ besides $<w_0, t_0>$, John happens to have the property he self-ascribes in w_0 at t_0, then it follows that Mary lives in New York in w'' at t'', but not in w_0 at t_0 (this means that Mary does not lives in New York in the actual world at the utterance time, but she lives in worlds that are compatible with John's wish). Otherwise, it would be false. This is a desired result.

Let us move on to counterfactual *wish* where the past perfect is embedded in the complement clause, as in exemplified in (37):

(37) John wishes Mary had lived in New York.

(38) a. LF: [TP John$_1$ [VP t$_1$ wishes λz[CP [TP Mary$_2$ -ed [PerfP have [VP t$_2$ live in New York]]]]]].
   b. IL translation: wish'(j, ${}^\wedge\lambda z[MP(Perf(live\text{-}in\text{-}NY'(m)))]$).

The truth conditions for (38b) can be stated as follows:

(39) [wish'(j, ^λz[MP((Perf (live-in-NY'(m))))])]$^{MB, OS, W0, t0}$ = 1 iff {<w', t', x'>: best-
ranked(MB(<w, t, john>), OS(<w, t, john>))} ⊆ {<w'', t'', x''>: ∃w$_1$∃t$_1$[<w$_1$, t$_1$> <
<w$_0$, t$_0$> & <w$_1$, t$_1$> ∉ [lives-in- NY'(m)(w'')(t'')]$^{MB,\ OS}$]$^{21)}$ and [lives-in-
NY'(m)(w'')(t'')]$^{MB,\ OS}$ = 1}.

In (39), ∃w$_1$∃t$_1$[<w$_1$, t$_1$> < <w$_0$, t$_0$> & <w$_1$, t$_1$> ∉ [lives-in-
NY'(m)(w'')(t'')]$^{MB,\ OS}$] (which says there is a world-time pair <w$_1$, t$_1$>
preceding <w$_0$, t$_0$> such that Mary didn't live in New York in w$_1$ at
t$_1$) is intended to convey the meaning of MP(PerfP) that serves to exclude
a world w$_1$ at a past time t$_1$, which has been shifted backward from the
actual world and the utterance time, from the domain of quantification.
Thereby, {<w'', t'', x''>: ∃w$_1$∃t$_1$[<w$_1$, t$_1$> < <w$_0$, t$_0$> & <w$_1$, t$_1$> ∉ [lives-in-
NY'(m)(w'')(t'')]$^{MB,\ OS}$] and [lives-in- NY'(m)(w'')(t'')]$^{MB,\ OS}$ = 1} is logi-
cally equivalent to {<w'', t'', x''>: Mary lives in New York in w'' at
t''} − {<w$_1$, t$_1$, x''>}.

According to (39), (38b) is true in w$_0$ at t$_0$ iff every bouletic alternative
of John in w$_0$ at t$_0$ is included in {<w'', t'', x''>: Mary lives in New
York in w'' at t'' and it's not case that Mary lives in New York in w$_1$
at t$_1$ that is earlier than t$_0$}. If in every bouletic worlds <w'', t''> for
John besides <w$_1$, t$_1$> prior to <w$_0$, t$_0$>, John happens to have the property
he self-ascribes in w$_0$ at t$_0$, then it follows that Mary lives in New York
in w'' at t'', but not in w$_1$ at t$_1$. This means that Mary did not lives
in New York in w$_1$ at t$_1$ that precedes the actual world w$_0$ at the utterance
time t$_0$, but she lived in other worlds that are compatible with John's
wish. Otherwise, it would be false. This is a desired result.

7. Closing Remarks

This paper has been an attempt to provide a semantic analysis of counter-
factual *wish*, which are not properly treated in the literature on formal
semantics. Counterfactual *wish* is characterized by the fact that the past
tense and the past perfect are used in the embedded clauses to express
contrary-to-facts, and this leads to semantic difference. In order to account
for the difference, I have argued that a set of centered worlds the former

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21) This is equivalent to ∃w$_1$∃t$_1$[<w$_1$, t$_1$> < <w$_0$, t$_0$> & [lives-in- NY'(m)(w$_1$)(t$_1$)]$^{MB,\ OS}$ = 0].

quantifies over is different from a set of centered worlds the latter does. This can be accomplished through the treatment of the embedded past tense as Modal Preterit (MP), along the lines of Iatriou (2000) and Schulz (2014), which functions to rule out the actual world and the utterance time. The past perfect plays the role of shifting an interval backward from the utterance time. In defining the domain of quantification of counterfactual *wish*, or the bouletic accessibility, I have come up with the two ordering sources, the primary and the secondary ordering source, on the basis of ordering semantics slightly modified from Kratzer (1991). The primary ordering source is a reflection of Lewis's (1979) self-ascribed property. The secondary ordering source, on the other hand, has been implemented as a device to incorporate into presupposition triggered by counterfactual *wish*, and leads to a sharp semantic distinction between counterfactual *wish* and hypothetical *wish* to take infinitival clauses as its complements.

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