Polarity in Conditionals and Conditional-like Constructions

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University of Connecticut, 2012

This dissertation concerns the distribution of negative polarity items (henceforth, NPIs) in conditionals and conditional-like constructions. NPIs include words such as *any* and *ever* and idioms such as *give a damn* and *lift a finger*; these expressions have only a limited distribution. In this dissertation, the distribution of these expressions in the following three types of conditional and conditional-like constructions are investigated: i) conditionals with possibility modals (e.g., *If John has ever been to Paris, he will become a good chef*), ii) *because*-sentences (e.g., *John is a good chef because he went to Paris*), and iii) *if-only* constructions (e.g., *If only John had been to Paris, he would have become a good chef*).

Since Klima (1964), NPIs have received much attention in the semantic theory; one of the proposals in current semantic research, which can be traced back to Fauconnier (1975, 1979) and Ladusaw (1979), has suggested that the licensing of these items has to do with downward-entailing-ness (henceforth, DE-ness) in the environments where they occur; to license an NPI, an environment must be a DE-context, where an inference from a set to its subset is supported. In this dissertation, I will show that a naïve combination

of a DE-based approach of NPI licensing (Fauconnier 1975, 1979; Ladusaw 1979; von Fintel 1999; a.o.) and a Lewis-Kratzer-von Fintel style semantics of conditionals (Lewis 1973a, Kratzer 1981, 1986, 1991; von Fintel 1994; a.o.) fail to predict the distribution of NPIs in the three conditional and conditional-like constructions mentioned above. To solve these problems, a new semantics for each of these constructions is proposed; importantly, I will show that the proposals made in this dissertation not only capture the distribution of NPIs but also account for other syntactic and semantic properties of these constructions.

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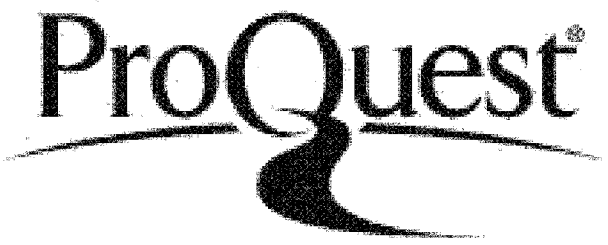

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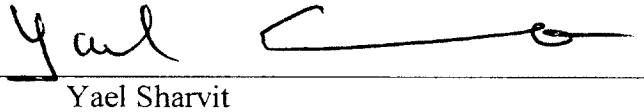
Major Advisor 
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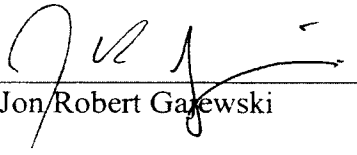
Associate Advisor 
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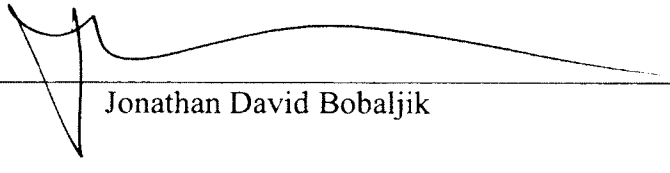
Associate Advisor 
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Chapter 1 Introduction

In this dissertation I investigate the distribution of negative polarity items (NPIs) in conditionals and other conditional-like constructions. Building on a downward-entailing-based (DE-based) approach of NPI licensing and a Lewis-Kratzer-von Fintel style semantics of conditionals, the NPI phenomenon in the following three conditional and conditional-like constructions are examined: possibility conditionals (i.e. conditionals with possibility modals such as *may* and *might*; see (1a)), *because*-sentences (see (1b)), and optative conditionals *if only p, would-q* (see (1c)).

(1) a. If Mary gets an A, she **might** ask her father for a new video game.
b. John studied hard yesterday **because** he had an exam this morning.
c. **If only** John had studied harder, he would have passed the exam.

NPIs include words such as *any* and *ever* and phrases such as *lift a finger* and *give a damn*. These items have only a limited distribution. As shown in (2), while NPIs such as *any* and *ever* are grammatical when negation is present ((2a)), the absence of negation leads to ungrammaticality ((2b)).

(2) a. *John ate <u>any</u> vegetables.
b. John didn't eat <u>any</u> vegetables.

(3) shows that these items are grammatical in the restrictor of the universal quantifier *every* (see (3a)) but ungrammatical in its scope (see (3b)). (4) shows that these items are grammatical in the antecedent (i.e. the *if*-clause) of a necessity conditional.

(3) a. Every student who read <u>any</u> books passed the exam.
b. *Every student read <u>any</u> books.

(4) a. If he has ever told a lie, he must go to confession
b. If anyone had explained the theory of relativity to me, I would have passed the exam.

The distribution of these items in the constructions listed in (1) is shown in (5)-(8), and these are the center of discussion in this dissertation. As shown in (5), just as in a necessity conditional, NPIs are licensed in possibility conditionals as well.

Possibility Conditionals
(5) If John had ever been to France, he **might** have been to the Arc de Triomphe.

(6) shows that NPIs are ungrammatical in a *because*-sentence of the form *q because p*. (7) shows that, in a negated *because*-sentence of the form *not* [*q because p*], there is an asymmetry with respect to NPI licensing: in a negated *because*-sentence, while NPIs are grammatical in the *because*-clause *p* (see (7b)), they are ungrammatical in the main clause *q* if semantically they do not scope over the *because*-clause (see(7a)).

Because-Sentences
(6) a.*John ate any apples because he was hungry.
b.*John was full because he ate any apples.

(7) a.*It is not the case that John ate any apples because he was hungry.
Intended reading: the reason why John ate some apples is not that he was hungry.

b. It is not the case that John was hungry because he ate any apples.

(8) shows that NPIs are ungrammatical in the *if*-clause of an optative conditional *if only p, would-q*, despite the morphological and semantic similarity of optative conditionals and ordinary conditionals like (4b)[1].

[1] There might exist some variations among the speakers regarding the judgments to (8), which will be mentioned in chapter 4.

If-only Constructions

(8) **If only* anyone had explained the theory of relativity to me, I would have passed the exam. (Lakoff 1969)

Since Klima (1964), NPIs have received much attention in the semantic theory; one of the proposals in current semantic research, which can be traced back to Fauconnier (1975, 1979) and Ladusaw (1979), has suggested that the licensing of these items has to do with DE-ness in the environments where they occur; to license an NPI, an environment must be a DE-context, where an inference from a set to its subset is supported. In this dissertation, I will show that a naïve combination of a DE-based approach to NPI licensing (Fauconnier 1975, 1979; Ladusaw 1979; von Fintel 1999; a.o.) and a Lewis-Kratzer-von Fintel style semantics of conditionals (Lewis 1973a, Kratzer 1981, 1986, 1991; von Fintel 1994; a.o.) fail to predict the distribution of NPIs in the three conditional and conditional-like constructions listed in (1). To solve these problems, a new semantics for each of these constructions is proposed; importantly, I will show that the proposals made in this dissertation not only capture the distribution of NPIs but also account for other syntactic and semantic properties of these constructions.

In the remainder of this chapter, I first sketch the DE-based theory of NPI licensing and von Fintel's (1999) account of NPIs in conditionals; I then list the problems the conditional and conditional-like constructions in (1) bring up for a DE-based approach for NPI licensing, the theoretical claims for each of the problems pointed out, and the key assumptions that underlie the proposed analyses.

1.1 DE-based Theory of NPI Licensing and Conditionals

1.1.1 The Condition of NPI Licensing

Ladusaw (1979), building on Fauconnier (1975, 1979), propose that NPIs such as *any* and *ever* are only grammatical in DE environments, that is, environments that support an inference from a set to its subset. The notion of DE-ness is given in (9).

(9) a. Downward Entailingness
A function f of type $<\sigma, \tau>$ is downward entailing (DE) iff for all x, y of type σ such that $x \Rightarrow y$, $f(y) \Rightarrow f(x)$

b. Cross-categorial entailment ($\Rightarrow$)
i. for any p, q of type t, $p \Rightarrow q$ iff $p=0$ or $q=1$
ii. for any f, g of type $<\sigma, t>$, $f \Rightarrow g$ iff for all x of type σ, $f(x) \Rightarrow g(x)$

For example, negation licenses NPIs in its scope, as shown in (2b) (repeated as (10a)); as (10b) shows, an inference from a set to its subset is supported in the scope of negation; hence, negation is a DE operator and the scope of negation is a DE environment.

(10) a. John didn't eat <u>any</u> vegetables.
b. broccoli$\subseteq$vegetables
John didn't eat vegetables. $\Rightarrow$ John didn't eat broccoli.

In contrast, a DE inference is invalid once negation is absent (see (11b)); hence, NPIs are ungrammatical without the presence of negation (see (11a)).

(11) a. *John ate <u>any</u> vegetables.
b. broccoli$\subseteq$vegetables
John ate vegetables. $\not\Rightarrow$ John ate broccoli.

A DE inference is supported in the restrictor of the universal quantifier *every*, as shown in (3a) (as repeated in (12b)). Hence, NPIs are grammatical in the restrictor of *every*. On the other hand, the scope of *every* does not support such an inference (see (13b)) and NPIs are thus ungrammatical in this environment (see (13a)).

(12) a. Every student who read any books passed the exam.
b. linguistics books⊆books
Every student who read a book passed the exam. ⇒
Every student who read a linguistic book passed the exam.

(13) a. ***Every** student read any books.
b. linguistics books⊆books
Every student read a book. =/⇒ Every student read a linguistics book.

However, as Linebarger (1980, 1987) has pointed out, there are contexts in which NPIs are grammatical but a DE inference is not supported, and a Fauconnier-Ladusaw analysis of NPI licensing makes the wrong prediction in these cases. One such environment is the scope of *only NP*. As (14) shows, NPIs are licensed in the scope of *only*; nevertheless, as shown in (15), the scope of *only* does not necessarily support DE inferences: it is very easy to imagine a scenario in which the premise *Only John ate vegetables* is true but the conclusion *Only John ate broccoli* is not; for instance, John ate vegetables and no one else did, and instead of broccoli, he ate kale.

(14) Only John ate any vegetables.

(15) broccoli⊆vegetables
Only John ate vegetables. =/⇒ Only John ate broccoli.

Noticing this problem, Ladusaw (1979), Heim (1984), Kadmon and Landman (1993), a.o. suggested that in (14), what matters is the presupposition (definedness condition) triggered by *only*; once the presupposition of the conclusion is taken for granted, DE inferences are supported in the scope of *only*. These proposals further suggest that for NPI licensing, the DE relation between the premise and the conclusion should be considered only on the grounds that the presupposition of the conclusion is

satisfied. Building on this idea, von Fintel (1999) suggests that instead of strict entailment, NPI licensing should be subject to a weaker notion of entailment, which he dubbed Strawson entailment; the premise Strawson-entails the conclusion iff the premise with the presuppositions of the conclusion entail the conclusion. As for NPIs, they are grammatical only in a Strawson downward entailing (SDE) context, where a DE inference is supported in the case where the presupposition of the conclusion is taken for granted. The SDE condition of NPI licensing is given in (16).

(16) a. The SDE condition of NPI licensing :
An NPI is only grammatical if it is in the scope of α such that $[\![\alpha]\!]$ is SDE.
b. Strawson Downward Entailingness:
A function f of type $<\sigma, \tau>$ is Strawson downward entailing (SDE) iff for all x, y of type σ such that $x \Rightarrow y$ and f(x) is defined: $f(y) \Rightarrow f(x)$

Based on the SDE condition in (16), the licensing of NPIs in the scope of *only* (see (14)) can be captured in the following way: with the semantics in (17) for *only*, the scope of *only* is an SDE context; as shown in (18), (18a) with the presupposition of (18b) entails (18b), though (18a) alone does not entail (18b). Given that the scope of *only* is SDE, NPIs are licensed in this environment[2].

(17) $[\![only]\!](x)(P)$ is defined only if $P(x)=1$ (from von Fintel (1999))
If defined, $[\![only]\!](x)(P)=1$ iff $\neg\exists y \neq x: P(y)=1$

(18) a. Only John ate vegetables for breakfast.
Presupposition: John ate vegetables.

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[2] See also von Fintel (1999) for discussion on NPI licensing in the complement of adversative predicates such as *regret*, *sorry* and *surprise*. As shown by Linebarger (1980, 1987) and von Fintel (1999), the complement of these adversative predicates license NPIs but do not necessarily support DE inferences. The SDE condition proposed in von Fintel (1999) aims to cover these cases as well.

(i) John regretted/is sorry/is surprised that Mary bought <u>any</u> cars.

b. Only John ate kale for breakfast.
Presupposition: John ate kale.

Note that as von Fintel (1999) notes, the SDE condition can only be seen as a necessary condition for NPI licensing. As pointed out by Progovac (1993), Lahiri (1998), Guerzoni and Sharvit (2007), a.o., crucially a licensing context can never be (Strawson) upward entailing ((S)UE). This assumption is motivated by the contrast between a definite singular and a definite plural. As shown in (19), NPIs are ungrammatical in the restrictor of a definite singular (see (19a)) but grammatical in that of a definite plural (see (19b)). Lahiri (1998) and Guerzoni and Sharvit (2007) have shown that the restrictor of a definite singular is both an SDE and SUE context; given that NPIs are ungrammatical in SUE environments, the restrictor of a definite singular fails to license these items. On the other hand, unlike a definite singular, the restrictor of a definite plural is a purely SDE context; hence, NPIs are grammatical in the restrictor of a definite plural[3].

(19) a. *The student who has any books on NPIs is selling them.
b. The students who have any books on NPIs are selling them.

The discussion in the rest of this dissertation is built on the SDE condition in von Fintel (1999) (see (16)) and the non-SUE condition suggested by Progovac (1993), Lahiri (1998), Guerzoni and Sharvit (2007), a.o.. In the next subsection, von Fintel's account of NPI licensing in conditionals, which is built on the SDE condition, is reviewed.

1.1.2 Conditionals and NPI licensing

Just like *only*, conditionals pose challenges to a strict DE condition of NPI licensing (see (9)). As shown in (20), NPIs such as *any* and *ever* are grammatical in the

[3] See Cable (2003) for the same analysis of the ungrammaticality of NPIs in *it*-clefts.

antecedent (i.e. the *if*-clause) of a conditional; based on a strict DE condition of NPI licensing, the grammaticality of these items suggests that the *if*-clause of a (necessity) conditional should be a DE context.

(20) a. If he had left <u>any</u> later, he would have missed the plane.
b. If John subscribes to <u>any</u> newspaper, he will become well-informed.
c. If he has <u>ever</u> told a lie, he must go to confession.

(21)-(22), however show that the antecedent of a conditional is not intuitively a DE context; in these examples, the strengthening of the antecedent is invalid. This suggests that the antecedent of a conditional does not always support inferences from a set to its subset and hence cannot be a DE context.

(21) a. wet matches $\subseteq$ matches
b. If I struck a match, there would be a fire. =/=>
If I struck a wet match, there would be a fire.

(22) a. newspapers John cannot read $\subseteq$ newspapers
b. If John subscribes to a newspaper, he will become well-informed. =/=>
If John subscribes a newspaper he cannot read, he will become well-informed.

The licensing of NPIs shown in (20) and the invalidity of the strengthening of the antecedent shown in (21)-(22) pose a dilemma regarding the semantic nature of conditionals and the theory of NPI licensing: while the occurrence of NPIs, based on the strict DE condition, suggests that the antecedent of a conditional is a DE environment, the failure of strengthening the antecedent is dragging us toward the opposite direction. Note that in a Lewis-Kratzer style semantics of conditionals (Lewis 1973a; Kratzer 1979, 1981, 1986; a.o.), while the failure of strengthening the antecedent is captured, the licensing of NPIs in the antecedent is not predicted if a strict DE condition ofNPI licensing is

assumed. According to a Lewis-Kratzer style semantics for conditionals, a conditional *if p, q* is true iff for all worlds w′ in the modal base such that *p* is true in w′ and w′ is the closest to an ideal R(w) (i.e 'ordering source' in terms of Kratzer (1981) and others), *q* is true in w′ (see (23) for the semantics of conditionals along this line)[4]; for any two propositions *p* and *p′* such that $p' \subseteq p$, *if p, q* only makes claims about the most highly ranked *p*-worlds and does not address at all the most highly ranked *p′*-worlds; given that there is no guarantee in the premise *if p, q* that the most highly ranked *p*-worlds contain the most highly ranked *p′*-worlds, a conditional, based on a Lewis-Kratzer style semantics, is non-monotonic and hence the failure of strengthening the antecedent is correctly predicted. As a result however, with a strict DE condition of NPI licensing, a Lewis-Kratzer style semantics of conditionals like (23) fails to predict that NPIs are grammatical in the antecedent.

(23) $[\![\textit{if p, q}]\!]^{A,R,w}=1$ iff $max_{\leq R(w)}(\cap A(w) \cap p) \subseteq q$

The discussion above shows that to resolve the dilemma posed by the case of NPIs in the antecedent of conditionals, both the licensing condition of NPIs and the semantics of conditionals need to be reconsidered. As mentioned in 1.1, von Fintel (1999) and others have suggested that instead of strict DE, NPI licensing should be subject to SDE (see (16)), a weaker notion than strict DE. In addition, a monotonic semantics that involves presuppositions on the quantificational domain of a conditional is suggested in

[4] In (24), $A_{<s,<<s,t>,t>>}$ is a function which maps the world of evaluation w to sets of propositions the conjunction of which is the set of worlds accessible from w that serves as the modal base; $R_{<s,<<s,t>,t>>}$ is a function that maps w to sets of propositions that serve as an ideal which ranks the worlds in $\cap A(w)$ into nested spheres (Lewis 1973a; Kratzer 1981, 1991; von Fintel 1994, 1999, 2001; a.o.). The function $max_{\leq R(w)}$ takes a set of worlds as its argument and serves to pick out the worlds in its argument that are the closest to the ideal R(w).

von Fintel (1999, 2001). von Fintel's (1999) semantics of conditionals is given in (24a) (see also (24b, c) for the definition of admissibility and closeness,)[5]. According to (24a), a conditional is associated with two presuppositions: the admissibility presupposition (24a, i) states that the set of worlds W′ that serves as the quantificational domain in a conditional must be an admissible sphere in the modal base $\cap$A(w) with respect to an ordering source R(w); the compatibility presupposition (24a, ii) states that the antecedent *p* must be compatible with the quantificational domain W′.

(24) a. For any $W' \subseteq W$, $[\![\text{would}]\!]^{A,R,w,W'}$(if p)(q) is defined only if
i. W′is an admissible sphere in the modal base $\cap$A(w) with respect to an ordering source R(w); (Admissibility Presupposition)
ii. $W' \cap p \neq \varnothing$ (p is compatible W′) (Compatibility Presupposition)
if defined, $[\![\text{would}]\!]^{A,R,w,W'}$(if p)(q)=1 iff $\forall w' \in W' \cap p$: $w' \in q$

b. *Admissibility of Spheres:* for any world w_s, $A_{<s,<<s,t>,t>>}$, $R_{<s,<<s,t>,t>>}$ and $W' \subseteq \cap A(w)$, W′ is an admissible sphere with respect to R(w) iff:
i. $\forall n > 0$: ($\exists w'[w' \in max_{n, \leq R(w)}(\cap A(w))$ and $w' \in W'] \rightarrow$
$\forall w' \in max_{n, \leq R(w)}(\cap A(w))$: $w' \in W'$); and
ii. $\forall n > 1$: $max_{n, \leq R(w)}(\cap A(w)) \subseteq W' \rightarrow max_{n-1, \leq R(w)}(\cap A(w)) \subseteq W'$
(where i) $max_{1, \leq R(w)}(\cap A(w)) = max_{\leq R(w)}(\cap A(w))$, and,
ii) for any $m>1$, $max_{m, \leq R(w)}(\cap A(w)) =$
$max_{\leq R(w)}(\cap A(w) - \cup \{max_{1, \leq R(w)}(\cap A(w)), \ldots, max_{m-1, \leq R(w)}(\cap A(w))\})$

c. *Closeness*:
i. For any two worlds w′ and w″, w′ is better than w″ ($w' <_{R(w)} w''$) iff all propositions in R(w) that hold in w″ also hold in w′ and there is some proposition in R(w) that holds in w′ but not in w″
(i.e. $\forall p \in R(w)[\, w'' \in p \rightarrow w' \in p]$ and $\exists p \in R(w)[\, w' \in p \;\&\; w'' \notin p]$)
ii. For any $W' \subseteq W$, $max_{\leq R(w)}(W') = \{w' \in W' : \neg \exists\, w'' \in W'\ [w'' \leq_{R(w)} w']\}$

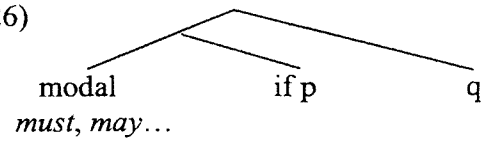
There are two hidden assumptions in the semantics in (24a). First, along the lines of Lewis (1973a), Kratzer (1986, 1991), von Fintel (1994), a.o., it is assumed in (24a) that a conditional is a modalized statement and involves quantification over worlds; the *if*-

[5] (24) is a slightly adapted version of the semantics in von Fintel (1999) by Gajewski and Sharvit (2009).

clause of a conditional is treated as the restrictor of the modal that provides a quantificational force in the conditional. For instance, the *if*-clause in (25) serves as the restrictor of the modals *must* and *may*, which provide universal and existential quantificational force in (25a, b) respectively. According to this assumption, both (25a, b) have the LF in (26).

(25) a. If John has told a lie, he **must** go to confession.
b. If Mary has passed the exam, she **may** enroll in this class.

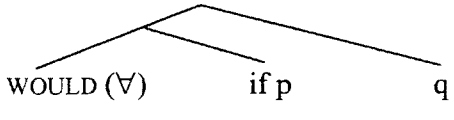
(26)



Second, following Kratzer (1979, 1981, 1986, a.o.), if a conditional lacks an overt modal element, a covert necessity modal operator (let's called it WOULD), which carries universal quantificational force over worlds, is by default introduced; in this case, the *if*-clause serves to restrict this covert necessity modal operator WOULD. Along with this assumption, 'bare' conditionals such as (27a, b) have the LF in (28).

(27) a. If John subscribes to newspapers, he is well-informed.
b. If you invited John to the party, Mary would be upset.

(28)



With the SDE condition of NPI licensing given in (16) and the semantics of conditionals given in (24a), the dilemma between NPI licensing and the failure of strengthening the antecedent can be explained as follows. Based on the semantics of conditionals given in (24a), the antecedent of a conditional, which serves as the restrictor

of the covert necessity modal WOULD, is an SDE context; given that according to the licensing condition in (16), NPIs are grammatical in SDE contexts, these items are grammatical in the antecedent of conditionals. On the other hand, unlike NPI licensing, the validity of strengthening the antecedent is checked with respect to strict entailments rather than Strawson entailments; according to the semantics in (24a), while the antecedent of a conditional is SDE, it is not strict DE, for the premise alone does not guarantee the compatibility presupposition of the conclusion. Hence, strengthening the antecedent is not always valid in a conditional.

In summary, von Fintel (1999, 2001) has proposed an elegant solution to the distribution NPIs in conditionals. First, this solution provides a straightforward account for an important grammatical property of conditionals, the licensing of NPIs in the antecedent; secondly, the suggestion of the Compatibility Presupposition on a quantificational domain of a conditional explains the failure of strengthening the antecedent in a conditional. However, this is far from the end of the story for NPI licensing in conditionals and conditional-like constructions. In the literature, the semantics of conditionals has been considered an important ingredient in the semantics of possibility conditionals, *because*-sentences, and optative conditionals *if only p, would-q* (see (1)); however, as I will show in the following, von Fintel's proposal either cannot be extended to these cases or leads to the wrong predictions regarding the distribution of NPIs in these constructions.

1.2 The Problems and the Outline of the Proposals

In the following, I will discuss the distribution of NPIs in possibility conditionals (see (5)), *because*-sentences (see (6)-(7)), and optative conditional *if only p, q* (see (8)) and sketch the solution proposed in this dissertation.

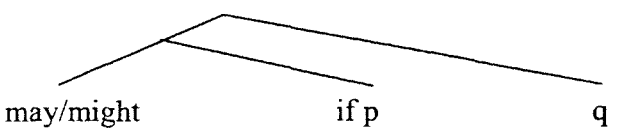
1.2.1 Possibility Conditionals

The first problem concerns possibility conditionals (conditionals with possibility modals). Modals expressing possibilities, such as *may/might/can*..., occur in conditionals as well (see (29)). In (29), the possibility modals *may* and *might* in the conditionals express the compatibility between the antecedent and the consequent.

(29) a. If John subscribes to newspapers, he **may** be well-informed.
b. If John had read the book, he **might** have passed the exam.

Following Lewis (1973a), Kratzer (1979, 1981, 1986), a.o., these modal elements are treated as existential quantifiers over possible worlds; furthermore, along the lines of Lewis (1973a), Kratzer (1979, 1986), a.o., according to which the antecedent of conditionals serves as the restrictor of modals, the possibility modals in (29) are restricted by the *if*-clause. Based on these assumptions, both (29a, b) have the LF in (30); the semantic representations derived from this LF for (29a, b) are given in (31a, b) respectively.

(30)



(31) a. $\exists w'[w' \in W'$ and John subscribes to newspapers in w' and is well-informed in $w']$
b. $\exists w'[w' \in W'$ and John read the book in w' and passed the exam in $w']$
(where W' is admissible in the modal base and compatible with the antecedent)

The assumption that possibility modals are existential quantifiers over worlds has its own merits; for instance, this assumption gives rise the a welcome prediction that a necessity statement like *must p* entails its possibility counterpart *may/might p*; furthermore, this assumption also correctly predicts that a possibility statement *may/might p* is consistent with the negation of its necessity counterpart (i.e. *not* [*must p*]). Nevertheless, taking possibility modals to be existential quantifiers, together with a Lewis-Kratzer-style semantics of conditionals and the SDE condition of NPI licensing, leads to an unwanted prediction about the distribution of NPIs in possibility conditionals.

NPIs such as *any* and *ever* are grammatical in the antecedent of a conditional with possibility modals (see (32)), just as they are in that of a necessity conditional.

(32) a. If John had ever been to France, he **might** have been to the Arc de Triomphe.
b. If John had studied any harder, he **might** have passed the exam.

NPIs are only grammatical in SDE contexts, according to the SDE condition in (16)). Assuming the semantics in (24a), the antecedent of a necessity conditional is an SDE context because it serves to restrict a necessity modal operator that carries universal quantificational force. In a possibility conditional, the *if*-clause serves to restrict the possibility modal. Under the assumption that possibility modals are existential quantifiers over worlds, a semantics of possibility conditionals that is built on von Fintel's (1999) proposal (see (24a)) can be stated as in **(33)**.

(33) For any $W' \subseteq W$, $[\![\text{may/might}]\!]^{A,R,w,W'}(\text{if p})(q)$ is defined only if
i. W′is an admissible sphere in the modal base $\cap A(w)$ with respect to an ordering source R(w); (Admissibility Presupposition)
ii. $W' \cap p \neq \varnothing$ (p is compatible W′) (Compatibility Presupposition)
if defined, $[\![\text{may/might}]\!]^{A,R,w,W'}(\text{if p})(q)=1$ iff $\exists w' \in W' \cap p$: $w' \in q$

Note that in (33), instead of restricting a universal quantifier, the *if*-clause serves to restrict an existential quantifier and hence is no longer an SDE context. In fact, (33) renders the *if*-clause of a possibility conditional an (S)UE context; based on (33), (34) with the presuppositions of (35) enatails (35), but (35) with the presuppositions of (34) does not entail (34).

(34) If Johnny eats vegetables, his mom may give him a cookie.
Presupposition: W′ is admissible and Johnny eats vegetables in some world w′ in W′.
Truth Condition: There is some world w″ in W′ s.t. John eats vegetables and gets a cookie from his mom in w″.

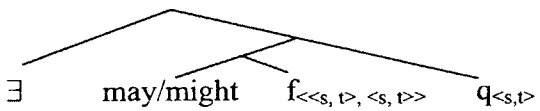
(35) If Johnny eats broccoli, his mom may give him a cookie.
Presupposition: W′ is admissible and Johnny eats borccolis in some world w′ in W′.
Truth Condition: There is some world w″ in W′ s.t. John eats broccoli and gets a cookie from his mom in w″.

Since NPIs are only licensed in SDE contexts and are never grammatical if a licensing context is (S)UE, the assumption that possibility modals are existential quantifiers, with the SDE condition, leads to the prediction that NPIs are ungrammatical in the antecedent of a possibility conditional. As we have seen in (32), this prediction is incorrect.

I propose in this dissertation that this problem can be solved if possibility modals such as *may* and *might*, instead of being taken to be existential quantifiers, are treated as universal quantifiers over worlds, just like necessity modals such as *must*. Unlike necessity modals however, which universally quantify over all the worlds in the quantificational domain, possibility modals quantify over only a subset of worlds in the quantificational domain. Following the idea in Rullman, Matthewson, and Davis (2008), I suggest that a possibility modal takes as an extra argument a modal choice function $f_{<<s,}$

$_{t>, <s, t>>}$, which selects a non-empty subset of worlds from the quantificational domain, and universally quantifies over the worlds in the selected subset. I further assume that the modal choice function f is obligatorily bound immediately by existential closure (Reinhart 1997; Winter 1999; a.o.). According to this proposal, the LF of a possibility statement and the semantics of a possibility modal are given in (36).

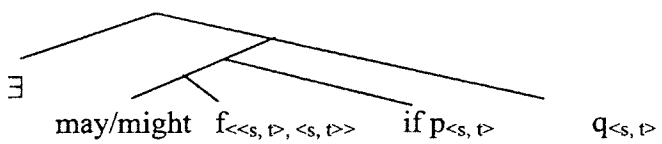
(36) a.



b. $[\![\text{may/might}]\!]^{w,A,R,W'} = \lambda f_{<<s,t>,<s,t>>}: f(W')\neq\varnothing.\ \lambda q_{<s,t>}.\ \forall w' \in f(W'): w' \in q$
(where W′ is admissible in $\cap A(w)$ w.r.t. the ordering source R(w))

With this idea, the LF and the semantics of a possibility conditional, based on von Fintel (1999), is revised as in (37). Based on (37b), the *if*-clause that restricts the possibility modal is an SDE context. Hence the licensing of NPIs in the antecedent of a possibility conditional follows from the SDE condition.

(37) a.



b. For any $W' \subseteq W$, $[\![\text{may/might}]\!]^{A,R,w,W'}(f)(\text{if p})(q)$ is defined only if
i. W′is an admissible sphere in the modal base $\cap A(w)$ with respect to an ordering source R(w); (Admissibility Presupposition)
ii. $f(W')\cap p\neq\varnothing$ (Compatibility Presupposition)
if defined, $[\![\text{may/might}]\!]^{A,R,w,W'}(f)(\text{if p})(q)=1$ iff $\forall w' \in f(W')\cap p: w' \in q$

In this dissertation, I further show that the merits of the assumption that possibility modals are existential quantifiers are preserved in this new treatment for

possibility modals. In addition, I will further show that under this new semantics, the so called free choice disjunction (see (38)) still follows from the analysis in Fox (2007).

(38) You may pick an apple **or** an orange.
Inferences: You may pick an apple and you may pick an orange but not both.

1.2.2 *Because*-sentences

The second conditional-like construction discussed in this dissertation is *because*-sentences. The distribution of NPIs in *because*-sentences was shown in (6)-(7) (repeated as (39)-(40) respectively). As shown in (39), NPIs are ungrammatical in a *because*-sentence of the form *q because p*.

(39) a.*John ate any apples because he was hungry.
b.*John was full because he ate any apples.

On the other hand, in a negated *because*-sentence of the form *¬[q because p]*, there is an asymmetry between the *because*-clause *p* and the main clause *q*: in the scope of negation, NPIs are grammatical in the *because*-clause *p*, but they are ungrammatical in the main clause *q* if they scope underneath the *because*-clause.

(40) a.*It is not the case that John ate any apples because he was hungry.
Intended reading: the reason why John ate apples is not that he was hungry.
LF: [not [[because John was hungry][John ate any apples]]]

b. It is not the case that John was full because he ate any apples.

Since Linebarger (1980) observed the asymmetry shown in (40), this has been a puzzle in the research on NPIs: why does *because* block the licensing of NPIs in the main clause but not in the *because*-clause? In order to solve this puzzle, an adequate semantics

of *because* is required. What should such a semantics of *because* look like? Notice that the NPI phenomenon in *because*-sentences is reminiscent of the dilemma we have seen in conditionals: while the occurrence of NPIs in the *because*-clause in the scope of negation indicates that the *because*-clause should carry UE-ness of some sort and hence carry DE-ness of some sort in the scope of negation, a strict UE inference is not supported in the *because*-clause of a *because*-sentence, as (41) shows. The occurrence of NPIs and the failure of weakening the *because*-clause suggest that an adequate semantics of a *because*-sentence should be SUE (and hence SDE in the scope of negation) but not strictly UE (and hence not strictly DE in the scope of negation) so that the NPI licensing facts and the failure of weakening the *because*-clause can both be captured.

(41) a. John was drinking and driving. => John was drinking/John was driving.
b. John was arrested because he was drinking and driving. =/=>
John was arrested because he was drinking/John was arrested because he was driving.

In the literature, various proposals for the semantics of *because* that are inspired by Lewis's (1973b) theory on causal dependency have been suggested; according to Lewis's (1973b) idea of causal dependency, for two actual events *a* and *b*, *a* causally depends on *b* iff it is the case that if *b* did not occur, *a* would not occur. One of the proposals suggested in the literature simply follows Lewis's idea and suggests the semantics given in (42) for *because* (Sæbø 1991; a.o.).

(42) A *because*-sentence *q because p* is true iff *p* is true and *q* is true and the counterfactual conditional *if* $\neg p$, *then* $\neg q$ is true.

Nevertheless, this semantics renders a *because*-sentence non-monotonic; with the SDE condition in (16), this non-monotonic semantics for *because* wrongly predicts that NPIs are ungrammatical in the *because*-clause in a negated *because*-sentence; as shown in (40b), NPIs such as *any* and *ever* are licensed in the *because*-clause in a negated *because*-sentence.

Another proposal that is built on Lewis's idea of causal dependency is to separate the truth of *p* and *q* from the truth conditions of a *because*-sentence *q because p* and keep only the counterfactual ingredient in the assertion of a *because*-sentence: in this line of analysis, the truth of *p* and *q* are treated as presuppositions and only the counterfactual-conditional ingredient *if* $\neg p$, *then* $\neg q$ is kept in the truth conditions for *q because p* (see Kadmon and Landman (1993) for this move). A semantics for *because*-sentences based on this idea is given in (43)[6].

(43) $[\![q \textit{ because } p]\!]^{w}$ is defined only if q(w)=1 and p(w)=1, and
If defined, $[\![q \textit{ because } p]\!]^{A,R,w,W'}$ =1 iff $\forall w' \in max_{\leq R'(w)}(\neg p)$: $w' \in \neg q$, where R′is a unique function such that $\cap R'(w)=\{w\}$

Sadly, this semantics leads to an even more undesirable consequence: based on (43), the main clause *q* and the reasoning adverbial clause *p* in a *because*-sentence *q because p* is a purely SDE context; hence, (43) predicts that weak NPIs such as *any* and *ever* are licensed in the main and the reasoning adverbial clause of a *because*-sentence. (39a) has shown that this prediction is incorrect.

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[6] Here, for the sake of simplicity, I adopt Lewis's (1973a, 1986) semantics for counterfactual conditionals, according to which a counterfactual conditional *if* $\neg p$, *then* $\neg q$ is true iff all the $\neg p$-worlds that are the most similar to the actual world are $\neg q$-worlds. In (44), the ordering source function R′ is a totally realistic conversational background function, which maps a world w to all the true propositions in w; hence, the ordering source R′(w) is the set of propositions that uniquely characterizes the world w.

In this dissertation I suggest a semantics given in (44) for *because*-sentences which, together with the SDE condition, accounts for the NPI phenomenon in *because*-sentences and the asymmetry between the main clause and the *because*-clause.

(44) $[\![\text{because}]\!]^{w, A}(R_{<s,<<s, t>, t>>>})(p_{<s, t>})(q_{<s, t>})$ is defined only if
i) $q \in A(w)$;
ii) $w \in max_{\leq R(w)}(\cap A(w))$;
iii) $\cap R(w) \subseteq \{w': max_{\leq R'(w')}(\neg p) \subseteq \neg q\}$, where R' is a unique function such that $\cap R'(w') = \{w'\}$
if defined, $[\![\text{because}]\!]^{w, A}(R)(p)(q)=1$ iff $max_{\leq R(w)}(\cap A(w)) \subseteq p$

According to (44), the *because*-clause is SUE and purely SDE in the scope of negation; hence NPIs are licensed in the *because*-clause of a negated *because*-sentence. On the other hand, the main clause is both SUE and SDE; in the scope of negation, such a monotonicity property is retained due to the presupposition (of the main clause) in (44ii); therefore, NPIs can never be licensed in the main clause.

Apart from the distribution of weak NPIs such as *any* and *ever*, the semantics in (44) with the scope theory of *even* (Karttunen and Peters 1979; Wilkinson 1996; Lahiri 1998; Guerzoni 2003, 2004) also accounts for the distribution of minimizers (such as *lift a finger* and *give a damn*) with an overt *even* in *because*-sentences. As shown in (45), unlike the case of *any* and *ever*, minimizers with an overt *even* are ungrammatical both in the main and the *because*-clause of a negated *because*-sentence. (46) shows that minimizers with an overt *even* in *because*-sentences are not licensed in a *yes-no* question context either.

(45) a. *John didn't **even** lift a finger to help Mary because he loved her, (but because he was intimidated by her).
b. *John didn't marry Sue because she **even** lifted a finger to help him, (but because he loved her).

(46) a. *Did John **even** lift a finger to help Mary because he loved her?
b. *Did John marry Mary because she **even** lifted a finger to help her?

Furthermore, I will show that the proposal made here for *because* not only captures other syntactic and semantic properties of *because*-sentences but also avoids the problems encountered by a counterfactual analysis for *because* based on Lewis's (1973b) theory of causal dependency, such as preemptions and causal selection (Menzie 2008; Abott 1974; Kim 1973; a.o.).

1.2.3 Optative Conditionals *if only p, would-q*

The third conditional-like construction discussed in this dissertation is optative conditionals *if only p, would-q*, an example of which is given in (1c) (repeated as (47)). By using an optative conditional *if only p, would-q*, the speaker not only expresses the necessity relation between *p* and *q* but also conveys his wish toward *p* or *q* or both.

(47) **If only** John had studied harder, he would have passed the exam.

Morphologically, an optative conditional *if only p, would-q* differs from an ordinary conditional merely in the presence of *only* in the *if*-clause; putting aside the presence of *only*, the optative conditional in (47) is morphologically identical to the ordinary conditional in (48).

(48) If John had studied harder, he would have passed the exam.

Another similarity between an optative conditional *if only p, would-q* and an ordinary conditional *if p, would-q* is shown in (49): the subject-auxiliary inversion in the

antecedent is allowed in both optative and ordinary conditionals (see Rifkin 2000). The subject-auxiliary inversion in optative conditionals *if only p, would-q* shown in (49b) indicates that the combination of *if* and *only* in this construction cannot be totally idiomatic.

(49) a. Had John **only** studied harder, he would have passed the exam.
b. Had John studied harder, he would have passed the exam.

Despite these similarities, optative conditionals differ from ordinary counterfactual conditionals in one important aspect: while NPIs are licensed in the antecedent of an ordinary conditional *if p, would-q* (see (50a)), they are ungrammatical in the antecedent of an optative conditional *if only p, would-q* (see (50b)). The ungrammaticality of NPIs in optative conditionals, as far as I know, was first observed by Lakoff (1969).

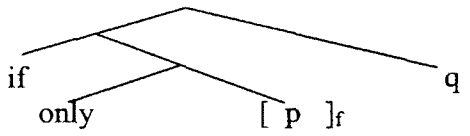
(50) a. If John had ever explained the theory of relativity to me, I would have passed the exam easily.
b.***If only** John had ever explained the theory of relativity to me, I would have passed the exam easily.

Note that the ungrammaticality of NPIs in the optative conditional *if only p, would-q*, as we have seen in (50b), cannot be simply explained by combining the semantics of conditionals and that of *only* in (17); as shown in (51), the occurrence of *only* in the *if*-clause does not always block the licensing of NPIs in the antecedent of a conditional.

(51) If anyone had explained ***only*** [the theory of relativity]$_F$ to me, I would have passed the exam easily.

The solution to this puzzle lies in an adequate composition of optative conditionals *if only p, would-q*. In this dissertation, assuming that the occurrence of *only* in *if only p, would-q* is an instance of the exclusive focus particle *only*, I suggest that the whole proposition *p* in the *if*-clause is in focus associated with *only* , as shown in (52).

(52)



Along this line, the ungrammaticality of NPIs in the *if*-clause of an optative conditional *if only p,would- q* can be paralleled with that in (53b); as observed in previous work on *only* (Jacobsson 1951; Jacobson 1964; Visser 1969; Horn 1969, 1996, 2002; Wagner 2006; a.o.), while NPIs are licensed in the scope of the focus associated with *only* (see (53a)), they are ungrammatical within the focus (see (53b)).

(53) a. Only $[\text{John}]_f$ ate <u>any</u> vegetables.
b. *John only $[\text{drove through any park}]_f$.

In addition to accounting for the ungrammaticality of NPIs in the *if*-clause, a semantic composition of optative conditionals on the basis of the idea proposed in (52) is provided in this dissertation. As I will show in the following, deriving an accurate semantic composition of optative conditionals requires a reconsideration of the presuppositions triggered by the exclusive focus particle *only* due the projection problem of the presuppositions triggered by *only*; this problem can be avoided by assuming the semantics of *only* provided in Ippolito (2007).

1.3 Conclusion

In this chapter, I have summarized the SDE theory of NPI licensing, the empirical generalization of NPIs in possibility conditionals, *because*-sentences, and optative conditionals *if only p, would-q*, and some of the theoretical claims. To solve the problems addressed above, a new semantics for these conditional and conditional-like constructions is proposed which not only accounts for the NPI phenomenon with the SDE condition of NPI licensing but also captures other semantic properties of these constructions.

The following is a short outline of this dissertation. Chapter 2 discusses NPI licensing in the antecedent of possibility conditionals and other theoretical implications from the proposed semantics for possibility modals; Chapter 3 discusses the NPI phenomenon of *because*-sentences; Chapter 4 focuses on the ungrammaticality of NPIs in the *if*-clause of optative conditionals *if only p,would-q* and the semantic composition of this construction. The analyses proposed in this dissertation are within the framework of Heim and Kratzer (1998) and von Fintel and Heim (2005). In this framework, the input for the semantic interpretation of a linguistic expression is its syntactic representation at LF; the meaning of a linguistic expression is assigned by the interpretation function [[ ]]relative to a world w and an assignment function g (i.e. $[\![\ ]\!]^{w,g}$); the semantic composition of a complex linguistic expression follows from the compositional rules in (54).

(54) a. Functional Application (FA)
If α is a branching node and $\{\beta, \gamma\}$ the set of its daughters, then, for any world w and assignment g: if $[\![\beta]\!]^{w,g}$ is a function whose domain contains $[\![\gamma]\!]^{w,g}$, then $[\![\alpha]\!]^{w,g} = [\![\beta]\!]^{w,g}([\![\gamma]\!]^{w,g})$

b. Intensional Functional Application (IFA)
If α is a branching node and $\{\beta, \gamma\}$ the set of its daughters, then, for any world w

and assignment g: if $[\![\beta]\!]^{w, g}$ is a function whose domain contains $[\lambda w'. [\![\gamma]\!]^{w', g}]$, then $[\![\alpha]\!]^{w, g} = [\![\beta]\!]^{w, g}(\lambda w'. [\![\gamma]\!]^{w', g})$

c. Truth of an Utterance
For any world w and any assignment function g, an utterance of a sentence ϕ in a possible world w is true with respect to g iff $[\![\phi]\!]^{w, g} = 1$.

Before closing this chapter, there is one thing that needs to be mentioned. While in this dissertation I have simply assumed that the licensing of NPIs is subject to the SDE condition (Ladusaw 1979; Heim 1984; Lahiri 1998; von Fintel 1999; a.o.), according to which NPIs are grammatical only in SDE contexts, various alternatives have been suggested in the past thirty years to capture the distribution of these items. For instance, Linebarger (1980, 1987) suggested that the licensing of NPIs requires these items to be in a context which is either in the immediate scope of a negative operator in the same proposition or gives rise to a negative implicature; Giannakidou (1998, 1999, 2006, a.o.), following Zwarts (1995), has suggested that the licensing of NPIs is subject to non-veridicality of a context rather than DE-ness. The comparison of these approaches has been addressed in various works in the literature; for instance, Cable 2003; Guerzoni 2006, Wagner 2006, Levinson 2008, a.o.. In the following discussion, I will not compare different theories of NPI licensing as to how well they fare with the data discussed but simply refer to the research mentioned above and the references cited therein[7]. On the other hand, building on a DE-based theory, various analyses on NPI licensing that appeal to domain widening and the strengthening of the assertion have been proposed to capture the behavior of NPIs (e.g., Kadmon and Landman 1993; Chierchia 2004, 2006, 2010;

[7] Linebarger's (1980, 1987) approach on NPI licensing will be discussed when the NPI phenomenon in *because*-sentences is addressed (Chapter 3).

a.o.). I will not discuss these analyses either, but simply note that the proposals made in this dissertation would be compatible with these analyses.

Chapter 2 Possibility Modals, Conditionals, and NPI Licensing

In the literature, modals are taken to be quantifiers over worlds. A necessity modal such as *must* and *have to* is treated as a universal quantifier over worlds; the meaning of a sentence *must-p* is thus expressed as a universal quantificational statement over worlds (see examples in (1)). On the other hand, possibility modals such as *may/might/can/chould/be allowed to...* have been taken to be existential quantifiers (Lewis 1973a, 1986b; Kratzer 1986; a.o.); based on this assumption, the meaning of a sentence with a possibility modal such as *might/may-p* is expressed as an existential quantificational statement (see examples in (2)).

(1) a. John **must** have parked here yesterday.
a′. $\forall w'$ [w′ is epistemically accessible to w→ John parked here yesterday in w′]

b. John **must** have ice cream for dessert. (Otherwise, he cannot leave the table.)
b′. $\forall w'$ [w′ is accessible to w→ John has ice cream for dessert in w′]

(2) a. John **might** have parked here yesterday.
a′. $\exists w'$ [w′ is epistemically accessible to w $\wedge$ John parked here yesterday in w′]

b. John **may** have ice cream for dessert. (That's his reward for finishing his work today...)
b′. $\exists w'$ [w′ is accessible to w $\wedge$ John has ice cream for dessert in w′]

Just like necessity modals (see examples in (3)), possibility modals occur in conditionals as well (see (4)). In (4), the possibility modals *may* and *might* signal the compatibility of the antecedent and the consequent. Assuming a Lewis-Kratzer-von Fintel style semantics of conditionals, according to which the *if*-clause in a conditional *if p, MODAL-q* is the restrictor of the modal quantifier, the meaning of the possibility conditionals (4a, b) are expressed as (4a′, b′).

(3) a. If John had had ice cream for dessert yesterday, he **must** have had port for a nightcap.
a′. ∀w′ [w′ is epistemically accessible to w and John had ice cream yesterday in w′ → John had port for nightcap in w′]

b. If John has lied, he **must** go to confession.
b′. ∀w′ [w′ is deontically accessible to w and John has lied in w′ → John goes to confession in w′]

(4) a. If John had had ice cream for dessert yesterday, he **might** have had port for a nightcap.
a′. ∃w′ [w′ is epistemically accessible to w and John had ice cream for dessert yesterday in w′∧ John had port for a nightcap in w′]

b. If John has finished his assignment, he **may** have a piece of candy.
b′. ∃w′ [w′ is accessible to w and John has finished his homework in w′ ∧ John has a piece of candy in w′]

The focus of this chapter is on the distribution of NPIs in possibility conditionals. Just like in the antecedent of necessity conditionals (see (5)), weak NPIs such as *any* and *ever* are grammatical in the antecedent of possibility conditionals as well (see (6)).

(5) a. If John had ever been to France, he must have been to the Arc de Triomphe.
b. If John had ever been to France, he might have been to the Arc de Triomphe.

(6) a. If John subscribes to any newspaper, he will become well-informed.
b. If John subscribes to any newspaper, he might be well-informed.

While the license of NPIs in the antecedent of necessity conditionals have been frequently discussed in the literature (Barker 1970; Heim 1984; Kadmon and Landman 1993; von Fintel 1999, 2001; a.o.), little attention has been paid to the case of possibility conditionals (see (6)). Although examples of this kind have not drawn much attention, they pose non-trivial problems for current theories of possibility modals and NPI licensing; as I will show in the following, with a Lewis-Kratzer-von Fintel style

semantics of conditionals and the assumption that possibility modals are existential quantifiers, the SDE condition of NPI licensing (Fauconnier 1975, 1979; Ladusaw 1979; von Fintel 1999; a.o.) fails to predict the grammaticality of NPIs in the *if*-clause of possibility conditionals. To solve this problem, I suggest a new semantics for possibility modals, which is built on the idea of modal choice functions in Rullmann, Matthewson, and Davis (2008). In the proposed solution, possibility modals, just like necessity modals, are treated as universal quantifiers over worlds; however, unlike necessity modals, which quantify over all the worlds in the quantificational domain, possibility modals only quantify over a subset of worlds from the quantificational domain selected by a modal choice function.

This chapter is structured as follows: in 2.1 I sketch von Fintel's (1999) analysis of NPI licensing in conditionals and further show that taking possibility modals to be existential quantifiers, a Lewis-Kratzer-von-Fintel style semantics of conditionals with the SDE condition of NPI licensing fails to explain the grammaticality of NPIs in the *if*-clause of a possibility conditional. In 2.2, a solution that is built on Rullmann, Matthewson and Davis's (2008) analysis of the modal elements in St'át'imcets is proposed; I first sketch the main claims in Rullmann et al. (2008) and then show how their idea can be extended to English in a way that accounts for the problem pointed out with the SDE analysis of NPI licensing. Importantly, I will show that under the proposal made in this chapter, the merits of the traditional assumption about possibility modals are still preserved. In 2.3, some alternative analyses are reviewed and examined. 2.4 concerns the so called free choice disjunction; in this section, I show that with the

proposed semantics of possibility modals, the so called free choice inference can still be captured. The conclusion is in 2.5.

2.1 NPIs in Conditionals

2.1.1 NPIs in Conditionals and SDE

Weak NPIs, such as *any* and *ever*, have only a limited distribution. As shown in (7a-b), they are grammatical when negation is present but ungrammatical when negation is absent. (8a-b) show that while they are grammatical in the restrictor of the universal quantifier *every*, they are ungrammatical in that of the existential quantifier *some*.

(7) a. John didn't eat <u>any</u> potatoes.
b. *John ate <u>any</u> vegetables.

(8) a. Every student who had <u>ever</u> been to Paris became a good chef.
b. *Some student who had <u>ever</u> been to Paris became a good chef.

The distribution of NPIs follows from Fauconnier's (1975, 1979) and Ladusaw's (1979) analyses, according to which NPIs are only grammatical in DE contexts. As shown in (9), a downward entailing inference is supported when negation is present but invalid when it is absent; (10) shows that the restrictor of *every*, but not that of *some*, supports a DE inference[1].

(9) a. kale$\subseteq$vegetables
b. John did not eat vegetables. => John did not eat kale.
c. John ate vegetables. =/=> John ate kale.

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[1] A notion of cross-categorial entailment ($\Rightarrow$) is defined as in (i).

(i) Cross-categorial entailment ($\Rightarrow$)
a. for any p, q of type t, $p \Rightarrow q$ iff $p=0$ or $q=1$
b. for any f, g of type $<\sigma, t>$, $f \Rightarrow g$ iff for all x of type σ, $f(x) \Rightarrow g(x)$

(10) a. linguistics students⊆students
b. Every student passed the exam. => Every linguistics student passed the exam.
c. Some student passed the exam. =/=> Some linguistics student passed the exam.

The antecedent of a (necessity) conditional licenses NPIs (see (5), repeated in (11)). Nevertheless, the failure of strengthening the antecedent in (12)-(13) shows that the antecedent of a conditional does not necessarily support a DE inference. Hence, a DE account of NPI licensing makes the wrong prediction in the case of the antecedent of a conditional.

(11) a. If John had ever been to France, he must have been to the Arc de Triomphe.
b. If John subscribes to any newspaper, he will become well-informed.

(12) wet matches ⊆ matches
a. If I stroke a match, there would be a fire. =/=>
b. If I stroke a wet match, there would be a fire.

(13) newspapers John cannot read ⊆ newspapers
a. If John subscribes to a newspaper, he will become well-informed. =/=>
b. If John subscribes to a newspaper he cannot read, he will become well-informed.

To solve this problem, von Fintel (1999) first suggests that the condition of NPI licensing should be defined based on Strawson entailment, according to which the presuppositions of the conclusion are taken for granted when assessing entailments. Building on this weaker notion of entailment, the condition of NPI licensing is formulated in term of Strawson downward entailment rather than downward entailment. The SDE condition of NPI licensing is given in (14).

(14) a. The SDE condition of NPI licensing :
An NPI is only grammatical if it is in the scope of α such that $[\![\alpha]\!]$ is SDE.
b. Strawson Downward Entailingness:
A function f of type $<\sigma, \tau>$ is Strawson downward entailing (SDE) iff for all x, y

of type σ such that x⇒y and f(x) is defined: f(y)⇒f(x)

Furthermore, a monotonic semantics of conditionals is proposed in von Fintel (1999, 2001) (see (15)). According to (15), a necessity conditional carries two presuppositions: the admissibility presupposition states that the set of worlds that are quantified over must be an admissible sphere in the modal base; the compatibility presupposition states that the set of worlds quantified over must be compatible with the antecedent[2]. As mentioned in 1.1.2, this semantics relies on two essential assumptions. First, along with a Lewis-Kratzer-von-Fintel style semantics (Lewis 1973a, 1986; Kratzer 1981, 1986;von Fintel 1994; a.o.), it is assumed in (15) that a conditional is a modalized statement and the *if*-clause in a conditional serves as the restrictor of the modal; second, following Kratzer (1986) and others, if there is no overt modal element in a conditional, then the *if*-clause serves to restrict a covert necessity modal operator (call it WOULD) in the conditional.

(15) For any $W' \subseteq W$, $[\![\text{WOULD}]\!]^{A,R,w,W'}$(if p)(q) is defined only if
  i. W′is an admissible sphere in the modal base ∩A(w) with respect to the ordering source R(w); (Admissibility Presupposition)
  ii. $W' \cap p \neq \varnothing$ (p is compatible W′) (Compatibility Presupposition)
  if defined, $[\![\text{WOULD}]\!]^{A,R,w,W'}$(if p)(q)=1 iff $\forall w' \in W' \cap p$: $w' \in q$

According to the semantics in (15), the *if*-clause of a necessity conditional is the restrictor of the universal modal operator WOULD and hence is an SDE context: for any two propositions *p* and *p′* such that *p′⊆p*, *if p, WOULD-q*, with the presupposition taken for granted that *p′* is compatible with the quantificational domain W′, entails *if p′, WOULD-q*.

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[2] (15) is a slightly adopted version of von Fintel (1999)'s semantics for conditionals in Gajewski and Sharvit (2009). For the definition of admissibility, see 1.1.2.

Given that NPI licensing is subject to Strawson downward entailment rather than strict downward entailment, they are grammatical in the antecedent of *will/would* conditionals. On the other hand, the strengthening of the antecedent is not valid in a conditional because the premise alone does not guarantee the compatibility presupposition of the conclusion.

2.1.2 The Problem with Possibility Modals

While the SDE condition with a Lewis-Kratzer-von-Fintel style semantics like (15) captures the licensing of NPIs in a necessity conditional, this analysis leads to the wrong prediction in the case of possibility conditionals. In a Lewis-Kratzer style semantics (Lewis 1973a, 1986b; Kratzer 1986; a.o.), possibility modals like *may* and *might* have been taken to be existential quantifiers over worlds. With this assumption, a semantics of possibility conditionals that is built on (15) is given in (16).

(16) For any $W' \subseteq W$, $[\![\text{may/might}]\!]^{A,R,w,W'}$(if p)(q) is defined only if
  i. $W'$is an admissible sphere in the modal base $\cap A(w)$ with respect to the ordering source $R(w)$; (Admissibility Presupposition)
  ii. $W' \cap p \neq \varnothing$ (p is compatible W') (Compatibility Presupposition)
  if defined, $[\![\text{may/might}]\!]^{A,R,w,W'}$(if p)(q)=1 iff $\exists w' \in W' \cap p$: $w' \in q$

According to (16), possibility conditionals carry the same presuppositions as necessity conditionals do; the only difference between a necessity and a possibility conditional is that while necessity conditionals are statements of universal quantification over worlds, possibility conditionals are statements of existential quantification.

Nevertheless, the semantics in (16), with the SDE condition of NPI licensing (see (14)), leads to the wrong prediction regarding the distribution of NPIs in possibility conditionals. According to (16), the *if*-clause of a possibility conditional is not an SDE

context; in fact, the semantics in (16) renders the *if*-clause of a possibility conditional an (S)UE context; for instance, based on the semantics given in (16), (17c) (with the presuppositions of (17b)) entails (17b), but (17b) with the presuppositions of (17c) does not entail (17c).

(17) a. kale$\sqsubseteq$vegetables
b. If Johnny ate vegetables, his mom *might* give him a piece of candy.
Presupposition: W′ is admissible in the modal base and there is some world w in W′ such that Johnny eats vegetables in w.
Truth conditions: $\exists w'[w' \in W' \cap \{w$: Johnny eats vegetables in w$\}$ and $w' \in \{w$: Johnny's mom gives him a piece of candy in w$\}]$

c. If Johnny ate kale, his mom *might* give him a piece of candy.
Presupposition: W′ is admissible in the modal base and there is some world w in W′ such that Johnny eats kale in w.
Truth Conditions: $\exists w'[w' \in W' \cap \{w$: Johnny eats kale in w$\}$ and $w' \in \{w$: Johnny's mom gives him a piece of candy in w$\}]$

Given that according to the SDE condition, NPIs are licensed only in SDE contexts, a prediction follows from (16) that NPIs are ungrammatical in the *if*-clause. As we have seen in (6) (repeated in (18)) however, this prediction is clearly incorrect.

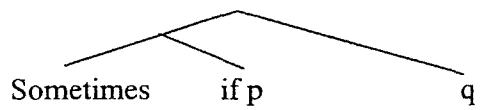
(18) a. If John had <u>ever</u> been to France, he **might** have been to the Arc de Triomphe.
b. If John subscribes to <u>any</u> newspaper, he **may** be well-informed.

The problem pointed out above only arises in the case of possibility modals and is not found with other elements that are taken to be existential quantifiers restricted by an *if*-clause. For instance, the quantificational adverbial *sometimes* can be restricted by an *if*-clause (Lewis 1975; Kamp 1981; Heim 1982; a.o.); as shown in (19), when an *if*-clause

restricts the quantificational adverb *sometimes*, it fails to license NPIs[3]. The contrast between (18) and (19) shows that with the SDE condition, assuming that possibility modals are existential quantifiers leads to the failure to capture the contrast between possibility modals and the quantificational adverb *sometimes* with respect to NPI licensing.

(19) a. ***Sometimes***, if a man gives a dog ***any*** bones, it bites him. (Partee 1993)
Intended reading: $\exists x \exists y[man'(x) \wedge dog'(y) \wedge \exists z\,[bones'(z) \wedge x \text{ gives } z \text{ to } y]] \wedge y \text{ bites } x]$

b. LF:



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[3] (19) is grammatical if the reading in (i) is assumed. With the reading in (i) however, the quantificational adverbial *sometimes* scopes over the conditional and the *if*-clause restricts the covert necessity operator WOULD and hence is an SDE context (see the LF in (ii)). Therefore, the licensing of NPIs in the *if*-clause follows from the SDE condition.

(i) $\exists t$ [it is true at t that if a man gives a dog bones, it bites him]

(ii) LF: sometimes [[would [if a man_i gives a dog_j bones]] [it_i bites him_j]]

As suggested by Edwin Williams and Elena Guerzoni (p.c.), that the quantificational adverb *sometimes* can be interpreted as being the restricted by the *if*-clause or as scoping over the whole conditional proposition is evidenced by the ambiguity between the universal and existential reading of the donkey anaphora. In (iv), if *sometimes* is interpreted as being restricted by the *if*-clause, the donkey anaphora *it* is bound by the existential quantificational adverb sometimes and hence carries an existential flavor (see (iii, a); on the other hand, if sometimes is interpreted as scoping over the whole conditional proposition, the donkey anaphora is bound by the covert necessity operator and hence carries a universal flavor (see (iii, b)) (eg. Heim 1982).

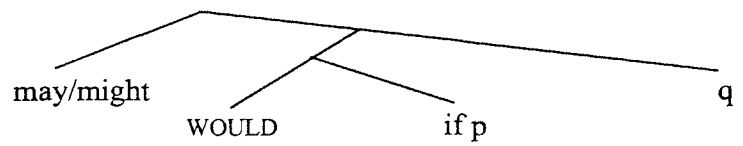
(iii) Sometimes, if a farmer owns a donkey, he beats it.
a. LF 1: $\text{Sometimes}_{x, y}$ [farmer'(x) $\wedge$ donkey'(y) $\wedge$ own'(y)(x)][beat'(y)(x)]
b. LF 2: Sometimes[$\forall_{x, y}$ [farmer'(x) $\wedge$ donkey'(y) $\wedge$ own'(y)(x)][beat'(y)(x)]]

The point Partee (1993) makes in (19) is that when an *if*-clause restricts the existential quantificational adverbial *sometimes*, it fails to license NPIs. This point is further confirmed by (iii), where the *if*-clause in (19) is replaced with a *when*-clause. Unlike an *if*-clause, a *when*-clause only restricts temporal adverbials but not modal operators. As shown in (iii), the occurrence of NPIs are ungrammatical.

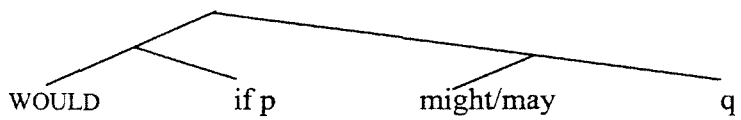
(iii) *Sometimes, when a man gives a dog any bones, it bites him.

Before closing this section, there is one thing that needs to be mentioned: the problem pointed out regarding NPI licensing in the *if-clause* of possibility conditionals (see (18)) stands only if it is assumed that the *if*-clause serves to restrict the possibility modal in the conditional. Alternatively, one can assume either of the LF structures in (20) for a possibility conditional; according to (20), a conditional like those in (18) is analyzed as a doubly modalized statement; the possibility modal can be either inside or outside the scope of a necessity conditional. With either of the LF's in (20), the licensing of NPIs in the *if*-clause simply follows from the SDE condition since in both structures, the *if*-clause serves to restrict the covert necessity modal WOULD and hence is an SDE context.

(20) a.



b.



These alternative LF structures will be discussed in 2.3; I will show that the LFs in (20) are problematic in that they generate a reading that is non-existent or too weak, and that this line of analyses is inadequate to account for the NPI licensing in cases like (18).

In the next section, I suggest that the problem pointed out above can be solved if we integrate the idea of modal choice functions in Rullmann, Matthewson and Davis (2008) into the semantics of possibility modals. Based on this idea, I propose that a possibility modal is a universal quantifier over a subset of worlds selected from the quantificational domain by a modal choice function. I will first sketch the proposal by

Rullmann, Matthewson and Davis (2008) and then show how the SDE condition and a Lewis-Kratzer-von-Fintel semantics of conditionals implemented with the idea of modal choice functions account for the licensing of NPIs in possibility conditionals.

2.2 The Proposal

2.2.1 Modal Choice Functions and Variability of Modal Quantificational Force

Rullmann, Matthewson and Davis (2008) observe that modal elements in St'át'imcets, while requiring a particular conversational background, are ambiguous between the necessity and possibility interpretations. An example provided by Rullmann et al. is shown in (21)[4]; in St'át'imcets, the epistemic modal *k'a* exhibits different quantificational strength in different contexts: in (21a, b), *k'a* carries a universal quantificational force over worlds and behaves as the counterpart of the English necessity modal *must*; in (21c-d), *k'a* carries an existential quantificational force and behaves as the counterpart of the English possibility modal *may/might*[5,6].

(21) a. Context: Speaker is talking about her first-grade teacher.

plan k'a wi7 qelhmɪ́n
already INFER EMPH old.person
'She was already old.'
(cited by Rullmann et al. (2008) from Matthewson 2005, pp. 127)

b. Context: Jim Hoffmann thought he saw a sasquatch and came running

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[4] Following Rullmann et al. (2008), the abbreviations in (21) are used as the following: COUNTER = 'counter to expectation', DEIC = deictic, DEON = deontic, DET = determiner, DIR= directive transitivizer, FOC = focus, IMPF = imperfective, INFER = epistemic-inferential, MID = middle intransitivizer, NEG = negation, OOC = out of control.

[5] See Rullmann et al. (2008) for the discussion on the cases of the deontic modal *ka* and the future modal *kelh*.

[6] Note that in the examples (21a, b), the speaker perceives abundant evidence; hence, it is more appropriate to translate these two examples with the English necessity modal *must*. On the other hand, the examples (21c, d) suggest that only the possibility modal *may/might* is possible; otherwise, contradiction would result. These examples together indicate that *ka'* in St'át'imcets is variable in its quantificational force.

back with huge terrified eyes.

ka-q'us-tum'-a' k'a wi7
CIRC-frighten(CAUS)-PASS-CIRC INFER EMPH
(cited by Rullmann et al. (2008) from Matthewson 2005, pp. 418)

c. **k'a** lh-zu'qw-as tu7 ni7 na nu'kw-a qelhmı'n smu'lhats **k'a**
INFER COMP-die-3CONJ then DEMON DET other-DET old.person woman INFER

lh-mı'm'c-as tu7 nka7
COMP-move-3CONJ then where
'Maybe the other old woman died or maybe she moved somewhere.'
(cited by Rullmann et al. (2008) from Matthewson 2005, pp. 61)

d. la'kw7a **k'a** ca'cl'ep-a lt7u' k'a sek'wel'wa's-a
DEIC INFER fountain-DET INFER DEIC Cayoose.Creek-DET
'Maybe somewhere over at Fountain, or maybe over at Cayoose Creek.'

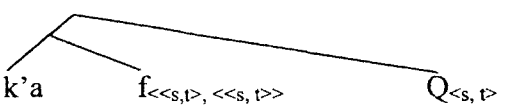
To account for the quantificational variability of the modal elements in St'át'imcets, Rullmann et al., inspired by Klinedinst (2006, 2007), proposed that modals in St'át'imcets are universal quantifiers over a subset of worlds that is selected from the quantificational domain by a modal choice function, a notion of which is stated in (22).

(22) A function $f_{\langle\langle s,t\rangle,\langle s,t\rangle\rangle}$ is a modal choice function iff, for any set of worlds W, $f(W)\subseteq W$ and $f(W)\neq\emptyset$.

For the sake of simplicity I will temporarily assume that the quantificational domain of a modalized statement is the modal base MB and ignore the ordering source. Based on Rullmann et al. (2008), a modal statement in St'át'imcets has an LF as in (23a) and the semantics in (23b). In (23a), the St'át'imcets epistemic modal *k'a* syntactically takes as an extra argument a contextually provided modal choice function f, which can, but does not have to, be existentially closed. The modal choice function f selects a subset

of worlds from the modal base MB; the modal element *k'a* universally quantifies over the set of worlds selected by f from MB.

(23) a.



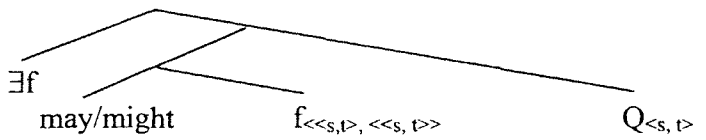
b. $[\![(23a)]\!]^{MB}=1$ iff $\forall w' \in f(MB)$: Q(w')

With the LF and the semantics in (23), the quantificational variability of modal elements in St'át'imcets is captured as follows: if f selects a subset of worlds from the modal base MB (i.e. $f(MB) \subseteq MB$), then the modal *k'a* expresses a possibility interpretation, as in (21c, d); if the modal choice function f is an identity function and maps MB to itself (i.e. $f(MB)= MB$), then the modal *k'a* expresses a necessity interpretation (see (21a, b)). In brief, in St'át'imcets, whether a modal expresses necessity or possibility depends on the nature of the modal choice function f that serves as the first argument of the modal element; in a modal statement, if f is an identity function, then the necessity interpretation arises; on the other hand, if f merely selects a subset of worlds from the quantificational domain (i.e. the modal base MB in (23)), a possibility interpretation arises.

2.2.2 Modal Choice Functions and Possibility Modals

English possibility modals such as *may/might*, unlike modal elements in St'át'imcets, show variability on conversational backgrounds; however, Rullmann et al. (2008) hint that their analysis of modal elements in St'át'imcets can also be extended to at least to possibility modals in English. Building on their idea, I suggest the LF structure and the semantics in (24) for English possibility modals.

(24) a.



b. $[\![\text{may/might}]\!]^{MB}(f)(Q)=1$ iff $\forall w' \in f(MB)$: $Q(w')$

I suggest that just like modal elements in St'át'imcets, the English possibility modal *may/might* takes a modal choice function f as its first argument; this function selects a set of worlds from the quantificational domain (i.e. the modal base MB), and the modal universally quantifies over the set of worlds selected from MB. Departing from Rullmann et al. (2008) however, I assume that in English, the modal choice function variable f is obligatorily existentially closed immediately at syntax, as shown in (24a)[7]. Based on (24), the meaning of possibility statements like (25a) and (26a) are given in (25b) and (26b) respectively.

(25) a. John might go to the party tonight.
b. $[\![(25a)]\!]^{MB} = 1$ iff $\exists f[\forall w' \in f(MB)$: John goes to the party tonight in $w']$
c. $\exists w'[\ w' \in MB$ and John goes to the party tonight in $w']$

(26) a. John may go the movies tonight. (He has done a good job at work and needs a reward.)
b. $[\![(26a)]\!]^{MB} = 1$ iff $\exists f[\forall w' \in f(MB)$: John goes to the movie tonight in $w']$
c. $\exists w'[\ w' \in MB$ and John goes to the movie tonight in $w']$

In (25) and (26), the modal choice function f, which is existentially bound, selects a subset of worlds from the quantificational domain MB, and the possibility modal *may/might* universally quantifies over the set of worlds selected by the modal choice

[7] Here I simply assume that existential closure on the modal choice function variable applies immediately on top of the LF structure of a modal statement. The constraint of the application of existential closure in the case of indefinite NPs has been discussed in Reinhart 1997, Winter 1997, Kratzer 1998, Matthewson 1999, Chierchia 2001, a.o.. Here I leave it for future work whether the existential closure of the modal choice function variable is subject to the same constraints as that of an indefinite NP is.

function f. As shown in (25b) and (26b), the truth condition derived from the proposal made above and those derived from the traditional assumption that possibility modals are existential quantifiers (see (25c) and (26c)) amount to the same thing: both of the b-examples and c-examples in (25)-(26) express that the modal base MB is compatible with the complement proposition[8]. Note that the existential force on the modal choice function variable f in the suggested truth conditions in (25b) and (26b) comes from existential closure (see (24)); the possibility modal *may/might* itself carries only a universal quantificational force over the set of worlds selected by the modal choice function that the modal selects.

The reason for assuming an obligatory immediate existential closure on the modal choice function f is the following: without obligatory immediate existential closure on f, we might derive truth conditions of the negation of a possibility modal statement that are too weak. Take (27a) for instance; in (27a), the possibility modal *be-allowed-to* scopes beneath negation. Intuitively, (27a) expresses that there is no such permissibility for John to go to the movies tonight, and this intuition is accurately captured by the traditionally assumed truth conditions (27d). According to the proposal for possibility modals above, the truth conditions of (27a) are expressed as (27c); in (27c), the existential closure on the modal choice function variable f is in the scope of negation, and these truth conditions amount to the same thing as (27d): saying that there is no way to pick out a set from MB that contains only worlds in which John goes to the movies tonight is equivalent to saying that there is no such world in MB. On the other hand, (27b), where the modal choice function variable f is left open, is too weak, compared to (27d): (27b) merely says that not

[8] These teo truth conditions, however, might differ in the case of negation. See the appendix for a detailed discussion.

all worlds selected by a particular modal choice function f are worlds in which John goes to the movies but remains agnostic as to whether there are other worlds in which John goes to the movies in MB.

(27) a. John is not allowed to go to the movies tonight. (Otherwise, he would not be able to finish his homework.)

b. $\neg$[$\forall$w′$\in$ f(MB): John goes to the movie tonight in w′]

c. $\neg\exists$f[$\forall$w′$\in$ f(MB): John goes to the movie tonight in w′]

d. $\neg\exists$w′[w′$\in$ f(MB) and John goes to the movie tonight in w′]

That the truth conditions in (27b), in which the modal choice function variable f is left open, are too weak, is further supported by (28); leaving the modal choice function variable f open (see (28b)), we fail to predict that (28a) is a contradiction since, as shown in (28b), the two free variables in the fist conjunct and the second conjunct do not have to be the same. On the other hand, as shown in (28c), this problem does not arise if it is assumed that the modal choice function variable f is immediately closed.

(28) a. John is allowed to go to the movies tonight, and he is not allowed to go to the movies tonight.

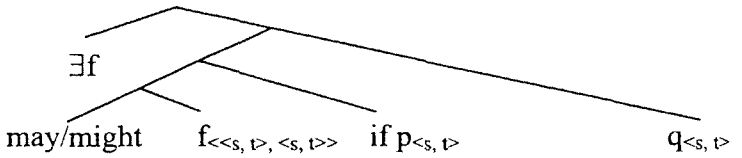
b. [$\forall$w′$\in$ **f**(MB): John goes to the movies tonight in w′] $\wedge$
$\neg$[$\forall$w′$\in$ **f**(MB): John goes to the movies tonight in w′]

c. $\exists$f[$\forall$w′$\in$ f(MB): John goes to the movies tonight in w′] $\wedge$
$\neg\exists$f[$\forall$w′$\in$ f(MB): John goes to the movies tonight in w′]

2.2.3 Possibility Conditionals and NPI licensing

With the implementation of modal choice functions, I suggest that building on von Fintel (1999), a possibility conditional has the LF in (29a) and the semantics in (29b).

(29) a.



b. For any $W' \subseteq W$, $[\![\text{may/might}]\!]^{A,R,w,W'}(f)(\text{if } p)(q)$ is defined only if
  i. W' is an admissible sphere in the modal base $\cap A(w)$ with respect to the ordering source $R(w)$; (Admissibility Presupposition)
  ii. $f(W') \cap p \neq \varnothing$ (p is compatible W') (Compatibility Presupposition)
  if defined, $[\![\text{may/might}]\!]^{A,R,w,W'}(f)(\text{if } p)(q)=1$ iff $\forall w' \in f(W') \cap p$: $w' \in q$

In (29), along with a Lewis-Kratzer-von-Fintel style semantics of conditionals, the *if*-clause is taken to be the restrictor of the modal in the conditional; more specifically, the *if*-clause further restricts the quantificational domain of the possibility modal, namely the set of worlds that is selected by the modal choice function f from the quantificational domain W′. According to (29b), a conditional with a possibility modal carries two presuppositions as well: the Admissibility Presupposition ((29b, i)) says that the quantificational domain W′ must be an admissible sphere; the Compatibility Presupposition ((29b, ii)) says that the set of worlds selected by a modal choice function f from W′ must be compatible with the *if*-clause and hence W′ has to be compatible with the *if*-clause as well; if defined, a possibility conditional *if p, may/might-q* is true iff all the *p*-worlds selected by the modal choice function f from the quantificational domain W′ are *q*-worlds. Just like in (24), I depart from Rullmann et al. and assume that the modal choice function f is immediately bound by an existential closure; being embedded, the presuppositions in (29b, i-ii) are projected through the existential closure. Here I follow Beaver's (1994) generalization (see (30)) and assume that if the restrictor of a quantifier

carries a presupposition, the quantificational statement as a whole presupposes that some element in the domain satisfies that presupposition[9].

(30) Existential Projection from quantified contexts: If ϕ presupposes ψ, then (for Q a quantifier and T any tautology): $Q(x; \phi; \chi)$ presupposes some$(x; T; \psi)$.

The semantics in (29) and the assumption in (30) give us the meaning of the possibility conditionals in (3b) and (4b) (repeated as (31a) and (32a), respectively) as in (31b) and (32b), respectively.

(31) a. If John had had ice cream for dessert yesterday, he might have had port for a night cap.

b. $[\![(31a)]\!]^{A,R,w,W'}$ is defined only if:
i. W′is an admissible sphere in $\cap$A(w) with respect to R(w);
ii. $\exists f\,[f(W')\cap\{w'': \text{John had ice cream for dessert yesterday in } w''\}\neq\varnothing]$
If defined, $\exists f\,[\forall w'\in f(W')\cap\{w'': \text{John had ice cream for dessert yesterday in } w''\}:$
$w'\in\{w'': \text{John had port for nightcap in } w''\}]$

(32) a. If John has finished his assignment, he may have a piece of candy.
b. $[\![(32a)]\!]^{A,R,w,W'}$ is defined only if:
i. W′is an admissible sphere in $\cap$A(w) with respect to R(w);
ii. $\exists f\,[f(W')\cap\{w'': \text{John finished his assignment in } w''\}]$
If defined, $\exists f[\forall w'\in f(W')\cap\{w'': \text{John finished his assignment in } w''\}:$
$w'\in\{w'': \text{John has a piece of candy in } w''\}]$

In (31b) and (32), the existential quantificational force on the modal choice function variable f comes from existential closure immediately at top of the structure in (29a) rather than from the possibility modal itself; the possibility modal carries only a universal quantificational force over the set of worlds selected by the modal choice function.

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[9] While I simply assume Beaver's (1994) proposal for presupposition projection in quantified sentences, the result will not change if other analyses of presupposition projection in quantified sentences (e.g., Heim 1983) are adopted.

Under the semantics in (29), the licensing of NPIs in the antecedent of possibility conditionals can be captured as follows. Recall that NPIs are grammatical in possibility conditionals, as shown in (18a, b) (repeated as (33a, b)), and that the assumption that possibility modals are existential quantifiers coupled with a Lewis-Kratzer-von-Fintel style semantics and the SDE condition fails to predict the grammaticality of NPIs in possibility conditionals.

(33) a. If John had ever been to France, he **might** have been to the Arc de Triomphe.
b. If John subscribes to any newspapers, he **may** be well-informed.

Now with the proposal in (29), the licensing of NPIs in possibility conditionals, based on the proposal above, simply follows from the SDE condition. In (29), a possibility modal carries a universal but not existential quantificational force; the *if*-clause that restricts the possibility modal is a purely SDE context before existential closure applies; therefore, NPIs are grammatical in the *if*-clause of possibility conditionals.

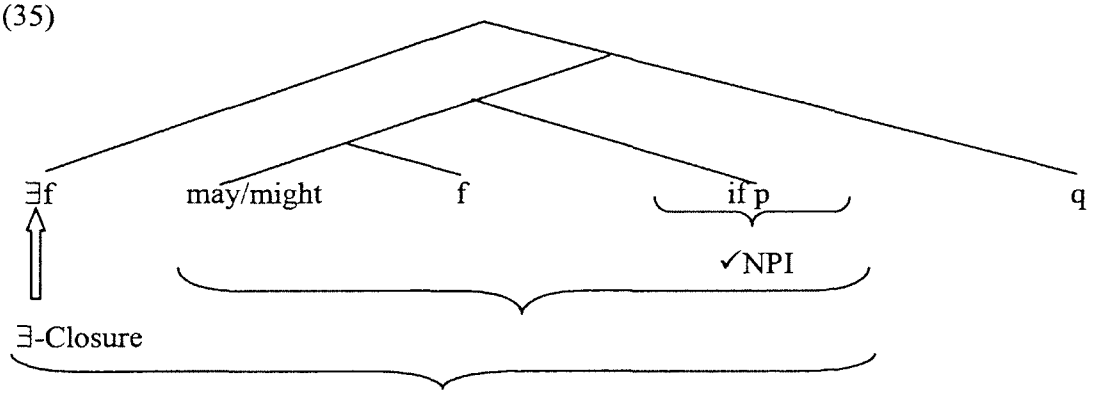
Note that based on (29), the *if*-clause of a possibility conditional is purely SDE only before existential closure applies; after the application of existential closure and the projection of the presuppositions (29b, i-ii), downward inferences are no longer Strawson valid in the *if*-clause of a possibility conditional. The destruction of the SDE-ness in the *if*-clause by an existential closure however does not have any affect on the licensing of NPIs because NPIs are subject to local licensing; once an NPI is licensed in the scope of an SDE operator, the licensing relation can never be undone even if the monotonicity of the environment where it occurs is flip-flopped by other higher operators. For instance, in (34), while the embedded clause is (S)DE with respect to the low negation, the matrix negation turns the embedded clause into an (S)UE environment; nevertheless, since the

NPI *anything* is already licensed in the embedded clause by the lower negation, the flip-flop of the monotonicity by the high negation does not affect the licensing of the NPI *anything* in the embedded clause.

(34) John does**n't** think that Bill did**n't** come up with anything.

In a possibility conditional, since the NPIs are already licensed in the *if*-clause that restricts the possibility modal before an existential closure applies, the flip-flop of the monotonicity by an existential closure on the modal choice function variable f will not do any harm. (35) illustrates the idea that the licensing of NPIs in the *if*-clause of a possibility conditional is subject to cyclicity and is not influenced by a existential closure at the top of the structure.[10]

(35)



2.2.4 *May/Might* vs. *Must*

In the proposal made above, I have suggested an extension of the idea of modal choice functions proposed by Rullmann et al. (2008) to the semantics of English possibility modals in order to account for the puzzle of NPI licensing in possibility

[10] See Gajewski (2010) for the analysis with the spirit on the license of NPIs in the restrictor of the quantifier *most*.

conditionals. While the proposal made in this chapter for possibility modals is drastically different from the traditional assumption that possibility modals are existential quantifiers, I would like to show in this subsection that this proposal still retains the merits of the traditional assumption that possibility modals are existential quantifiers. Here, for the sake of simplicity, I will (temporarily) follow the traditional assumption that necessity modals such as *must* are universal quantifiers over all the worlds in the quantificational domain; for instance, the meaning of the necessity statement (36a) is expressed as the universal quantificational statement in (36a′).

Possibility statements such as *may/might-p* are entailed by their necessity counterpart *must-p*, and this is captured by the truth condition based on the traditional assumption that possibility modals are existential quantifiers. (36b″) shows that the proposal made here leads to the same prediction; for any quantificational domain W′, given that f(W′) is a non-empty subset of W′ (i.e. f(W′)⊆W′; see (23) for the definition of modal choice functions), it follows that (36a′) entails (36b″) as well.

(36) a. You must stay.
a′. ∀w′∈ W′: you stay in w′

b. You may stay.
b′. ∃w′∈ W′: you stay in w′
b″. ∃f[∀w′∈ f(W′): you stay in w′]

A possibility statement of the form *may/might-p* is consistent with the negation of its necessity counterpart (i.e. *not*-[*must-p*]) (see (37a)); this is captured as well by the traditional assumption that possibility modals are existential quantifiers over worlds (see (37c)); (37b) shows that this prediction follows straightforwardly from the proposal made here as well: since the set of worlds selected by the modal choice function variable

f from the quantificational domain W′ only has to be a subset of W′, the consistency in (37a) is predicted.

(37) a. You may stay, but it is not the case that you must/have to stay.
b. $\exists f[\forall w' \in f(W')$: you stay in $w'] \wedge \neg[\forall w' \in W'$: you stay in $w']]$
c. $[\exists w' \in W'$: you stay in $w'] \wedge \neg[\forall w' \in W'$: you stay in $w']]$

Possibility statements of the form *may/might-p* show consistency in the case of inner negation, as shown in (38a); this is predicted by the traditional assumption because the worlds that are existentially bound in two conjuncts do have to be the same (see (38c)). The proposal in this chapter for possibility modals leads to the same prediction as well. In (38b), the existentially bound modal choice function f in the first and the second conjunct do not have to be the same and hence the sets of worlds selected in each conjunct do not have to be the same; the consistency in (38a) is hence predicted.

(38) a. You may stay, but also, you may leave. (assuming *leave=not stay*)
b. $\exists f[\forall w' \in f(W')$: you stay in $w'] \wedge \exists f[\forall w' \in f(W')$: you do not stay in $w']$
c. $[\exists w' \in W'$: you stay in $w'] \wedge [\exists w' \in W')$: you do not stay in $w']$

In the discussion above, I have suggested that possibility modals in English, just like modal elements in St'át'imcets, can be analyzed as universal quantifiers over worlds that are selected from the quantificational domain by a modal choice function f; I further showed that under this proposal, the merits of the traditional assumption that possibility modals are existential quantifiers are still preserved. Nevertheless, there is a remarkable difference between English possibility modals and modal elements in St'át'imcets, and the proposal above has not yet addressed this difference: unlike modal elements in St'át'imcets, English possibility modals such as *may/might/can* never show

quantificational variability. A modal statement with *may/might/can* is never understood as a necessity statement; instead, a necessity reading is expressed by 'necessity modals' such as *must/have-to*. When a possibility statement of the form *may/might-p* such as (39a) is used by a speaker, he/she usually implies that it is not certain that the corresponding necessity statement (i.e. *must-p*) is true. Note that such an inference can be cancelled (see (39b)).

(39) a. John might have been in this room.
b. John might have been in this room; in fact, he must have. (Otherwise, his wallet would not be lying on the table.)

The inference from a possibility statement that it is not certain that the necessity counterpart is true has been treated as a (Gricean) scalar implicature; assuming that possibility modals such as *may/might* form a so called Horn scale with necessity modals such as *must*, this inference can be captured by the Maxim of Quantity; assuming that the speaker is being cooperative, when a possibility statement *may/might-p* is uttered, it must be that the speaker is not epistemically certain that *must-p* is true.

How can the relation between English possibility modals and necessity modals, as described above, be captured by the proposal in this chapter? In addition, can the idea of modal choice functions be extended to the case of necessity modals as well? As briefly discussed in Rullmann et al., there are two possibilities for necessity modals in English: on the one hand, it could be the case that just like possibility modals, English necessity modals involve modal choice functions with an additional lexical restriction that the modal choice function they select can only be an identity function; alternatively, it could also be the case that they are simply universal quantifiers over the whole quantificational

domain and do not involve modal choice functions at all. Under either option, the inference of *not-must-p* from *may/might-p* can be captured as a Gricean implicature. Rullmann et al. have chosen the first option; however, as they noted, the choice between these two options seems not to make any empirical difference.

Here I will remain agnostic as to whether the semantics of English necessity modals such as *must* involves modal choice functions but simply assume that English necessity modals such as *must* are lexically specified as universal quantifiers over the whole quantificational domain W', given that as noted by Rullmann et. al., assuming modal choice functions for necessity modals does not seem to lead to different empirical predictions. I further suggest that the lack of the necessity interpretation in English possibility modals can be captured by the neo-Gricean reasoning proposed by Dowty (1980), which is given in (40). (40) states that for two equally simple expressions A and B such that B entails A but not vice versa, the use of A is blocked by B in a context where both expressions are true.

(40) A neo-Gricean conversational principle: If a language has two (equally simple) types of syntactic structures A and B, such that A is ambiguous between meanings X and Y while B has only meaning X, speakers of the language should reserve structure A for communicating meaning Y since B would have been available for communicating X unambiguously and would have been chosen if X is what was intended.

The application of the conversational principle in (40) can be found in Cirpria and Roberts (2000), Deo (2009) and others. For instance, Cirpria and Roberts (2000) has employed this principle to account for the difference of *imperfecto* and *pretérito* in Spanish regarding telicity; Deo (2009) employs this principle to account for the

difference between the use of progressive and simple tenses in stative predicates regarding the contingency of the predicate (see (41)).

(41) a. New Orleans lies at the mouth of the Mississippi River.
b. New Orleans is lying at the mouth of the Mississippi River.

Regarding modal elements in English, as mentioned above, possibility modals universally quantify over the set of worlds selected from the quantificational domain W′ by a modal choice function, and the set of worlds selected can either be a proper subset of W′ or W′ itself (when f is an identity function); hence, a possibility statement such as *may/might-p* is compatible with both the universal and existential meaning. On the other hand, due to the lexical specification, a necessity statement such as *must-p* is unambiguous and carries only a universal reading. Therefore, in a context where a necessity meaning is intended, *may/might-p* is blocked by *must-p*. Based on this principle and the Maxim of Quantity, when *may/might-p* is uttered, it must be the case that the speaker is not in a position to assert *must-p*; the rise of the implicature *not-[must-p]* hence follows from the Gricean reasoning.

2.2.5 Interim Conclusion

In the discussion above, I have shown that with a Lewis-Kratzer-von-Fintel style semantics of conditionals and the SDE condition of NPI licensing, the traditional assumption that possibility modals are existential quantifiers over worlds wrongly predicts the ungrammaticality of NPIs in the antecedent of a possibility conditional. To solve this problem, I have suggested an analysis inspired by Rullmann et al. (2008) which

treats possibility modals such as *may/might/can* as universal quantifiers over a subset of worlds selected from the quantificational domain by a modal choice function.

In 2.1.2, I have employed an example from Partee (1993) (see (19)) and showed that unlike possibility modals, the *if*-clause that restricts the quantificational adverb *sometimes* does not license NPIs. Here I maintain the assumption that the quantificational adverb *sometimes*, unlike possibility modals, is a genuine existential quantifier; hence the *if*-clause that restricts *sometimes* cannot be SDE and, as a result, fails to license NPIs. While there is no direct evidence at this moment to support this claim, the separate treatments of possibility modals and the quantificational adverb *sometimes* are indirectly motivated by the empirical fact that in St'át'imcets, while there is no lexical distinction between modal necessity/possibility, there is a lexical distinction between existential/universal quantificational adverbial elements (p.c. Lisa Matthewson; see also (42), from Matthewson (2005)).

(42) Wa7 **lhnúkwas** t'cúmwit t'u7cw7aoz **kw-spapt** wa7
IMPF COMP-other-3CONJ win(mid)-3PL just-NEG DEt-NOM-always IMPF

t'cúmwit
win(mid)-3PL
'Sometimes they won, but they didn't always win.'

Such a claim also raises further questions: why do worlds and times behave differently? Why do languages choose to lexically distinguish universal and existential quantification over times but not over worlds? Answering these questions requires a further cross-linguistic investigation that is beyond the scope of this chapter. Hence I leave this for future research.

2.3 Alternative Analyses

In the discussion above, I have shown that taking possibility modals to be existential quantifiers over worlds, the SDE condition of NPI licensing and a Lewis-Kratzer-von Fintel-style semantics of conditionals together lead to the wrong prediction for the licensing of NPIs in the *if*-clause of a possibility conditional. The proposal made in this chapter suggests that this problem can be solved if we assume that a possibility modal, rather than being an existential quantifier, is treated as a universal quantifier over a subset of worlds selected by a modal choice function from the quantification domain. According to the proposal made above, the meaning of the possibility conditional (43a) is expressed as (43b) (see (43b′) for the paraphrase of (43b)); as discussed above, (43b) and the traditionally assumed truth conditions (43c) amount to the same thing in expressing the compatibility between the antecedent and the consequent of (43a).

(43) a. If John has <u>ever</u> been to France, he may have seen the Arc de Triomphe.

b. $\exists f[\forall w' \in f(W')$ and there is a time t such that John has been to France at t in w: John has seen the Arc de Triomphe in w′]

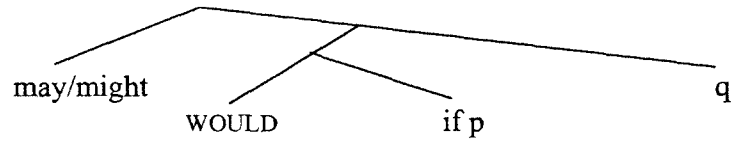
b′. According to what the speaker knows, the proposition that John has seen the Arc de Triomphe is compatible with (but maybe not necessarily follows from) the proposition that John has been to Paris.

c. $\exists w'[w' \in W'$ and there is a time t such that John has been to France at t in w and John has seen the Arc de Triomphe in w′]

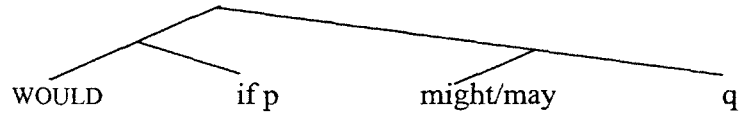
As noted in 2.1 , the licensing of NPIs in (43a) is a challenge to the SDE condition and the assumption of possibility modals being existential quantifiers only if it is assumed that the *if*-clause in (43) serves as the restrictor of the possibility modal (Lewis 1973a; Kratzer 1986; a.o.); if the *if*-clause does not restrict the possibility modal

in (43a), the problem observed above may no longer stand. For instance, one can assume either of the LFs in (44) for a conditional like (43a); according to both LFs in (44), the conditional in (43) is a doubly modalized statement; in both LF representations, the *if*-clause serves to restrict the covert necessity modal WOULD; the possibility modal *may/might* could scope over WOULD (see (44a)) or underneath it (see (44b)). In both LFs, the licensing of NPIs in the *if*-clause simply follows from the SDE condition because the *if*-clause, which restricts the covert universal modal WOULD, is an SDE context. This way the assumption that possibility modals such as *may* and *might* are existential quantifiers would be maintained.

(44) a.



b.



As I will show in the following however, although successful in accounting for the licensing of NPIs with the SDE condition, analyses along these lines generate a wrong interpretation for (43a)[11]. In the following discussion, I assume an epistemic flavor for both modals in (44) and employ the context given in (45) to show the inadequacy of (44a, b). In (45), the conditional (43a) is felicitously uttered; in this

[11] The discussion here is along the lines of Heim and von Fintel 2005. Heim and von Fintel (2005) provide arguments against an operator-analysis of possibility conditionals (e.g., *if we are on Route 80, we might be in Lockhart*). Similar arguments are employed here to argue against a solution based on the LF's in (44).

context, B neither knows whether John has been to Paris or not nor has any evidence to draw a conclusion about John's travelling experience; since she does not know whether John has been to Paris or not, to her there exists a possibility that John has seen the Arc de Triomphe.

(45) A and B are both Americans who have been living in Paris for years. B's friend John is coming to Paris from the US to visit her in two days. She isn't sure whether John has been to Paris before and she wants to take him somewhere that he's never been. B asks A for suggestions.

A: Has John ever seen the Arc de Triomphe?
B: I don't know; if he has <u>ever</u> been to Paris, he may have seen it.

2.3.1 *might/may* over WOULD

Consider first the LF (44a), where the possibility modal *may/might* scopes over the covert necessity modal WOULD, which is restricted by the *if*-clause. Assuming an epistemic flavor for the modals in (44a), the meaning of (43a) from (44a) is given in (46a), which can be paraphrased as (46b).

(46) a. $\exists w'$ [w' is compatible with the knowledge the speaker has in w and, for all worlds w'' such that w'' is compatible with the speaker's knowledge in w' and there was a time t such that John has been in France at t in w'', John has seen the Arc de Triomphe in w'']

b. It is compatible with what the speaker knows that from John's having been to Paris it follows (according to what the speaker knows) that John has seen the Arc de Triomphe.
(In other words, the speaker considers it possible that if he knows that John has been to Paris, he knows that he has seen the Arc de Triomphe).

According to (46), (43a) is true as long as B considers it possible that once he knows that John has been to Paris, he knows that he has seen the Arc de Triomphe. Apparently this is not the meaning (43a) carries; in the context given in (45), it is very clear to B that

from John's having been to Paris it does not necessarily follow that John has seen the Arc de Triomphe; the LF (44a) generates the wrong interpretation for (43a).

In Stalnaker (1984), an LF like (44a) is assumed for a *might-* counterfactual conditional; as opposed to Lewis's assumption that *might-* and *would*-counterfactual conditionals are dual, Stalnaker (1984) suggests that a *might-* counterfactual conditional should be treated as a *would-* counterfactual conditional in a use of epistemic possibility. The contrast in (47) is used by Stalnaker (1984) to motivate this claim; in (47b), the oddness, according to this analysis, results from the conflict between the assertion of negation of a *would-* counterfactual conditional and the assertion of the possibility of this *would-* counterfactual conditional being true.

(47) a. X: Does President Carter have to appoint a woman to the Supreme court?
Y: No, certainly not, although he might appoint a woman.

#b. X: Would President Carter have appointed a woman to the Supreme Court last year if a vacancy had occurred?
Y: No, certainly not, although he might have appointed a woman.
(Stalnaker 1984)

Based on Stalnaker's (1984) analysis for *might-* counterfactual conditionals, the LF of a *might-* counterfactual conditional like (48) would be as in (44a); If this analysis were correct, the licensing of NPIs in the *if*-clause in a *might-* counterfactual conditional like (48a) would not be a problem at all for the SDE condition[12]. However, much research (Stalnaker 1981; von Fintel 1997; a.o.) has suggested that a *would-* conditional carries a

[12] Note that the Stalnaker-style LF for *might-* counterfactual conditionals (see (44a)) works for NPI licensing only if we assume a von Fintel-style semantics of *would-* counterfactual conditionals (see (15)). An LF like (44a) with Stalnaker's theory on conditionals still fails to account for the licensing of NPIs in the *if*-clause of *might*-counterfactual conditional; according to Stalnaker's theory of conditionals, a conditional *if p, would q* is not treated as a universal quantificational statement but as a definite singular description. Hence, the *if*-clause in a conditional *if p, would q* cannot be a purely SDE context.

presupposition of Conditional Excluded Middle, which requires that for *if p, would-q*, it is either *if p, would-q* or *if p, would-not-q*; along with this suggestion, the oddity shown in (47) can be attributed to the conflict between the Conditional Excluded Middle and the assertion of a possibility statement; this way the assumptions that a *might-* and a *would-* counterfactual conditional are dual and the *if*-clause in a *might-* counterfactual conditional serves to restrict the possibility modal *might* can still be maintained. Hence, examples like (47) are not conclusive in motivating an LF structure like (44a). Moreover, as mentioned above, assuming the LF (44a) for (48) generates the non-existent meaning that the speakers considers it possible that having seen the Arc de Triomphe necessarily follows from having *been* to Paris and hence cannot be an adequate analysis to account for the licensing of NPIs in (48).

(48) If John had ever been to France, he might have seen to the Arc de Triomphe.

2.3.2 WOULD over *might/may*

Now consider (44b), in which the *if*-clause serves to restrict the covert universal modal WOULD, which scopes over the possibility modal *may/might*. With the LF (44b), the meaning of (43a) is given in (49a), which can be paraphrased as (49b).

(49) a. For all w′ such that w′ is compatible with the speaker's knowledge in w and there is a time t such that John has been to Paris at t in w′, there is a world w″ such that w″ is compatible with the speaker's knowledge in w′ and John has been to the Arc de Triomphe in w″.

b. According to what the speaker knows, it follows from John's having been to Paris that it is compatible with what the speaker knows that he has been to the Arc de Triomphe.

The problem is that the meaning given in (49) is too weak; in the context in (45), according to B's epistemic state, it is possible that John has seen the Arc de Triomphe given that she cannot be sure whether he has been to Paris or not; whether John has been to Paris or not would not affect B's epistemic state, since she wouldn't know anyway. Hence, (43a) with the meaning given in (49) is true in (45) as long as B considers it possible that John has seen the Arc de Triomphe. This however also predicts that (43a) should not be distinct from (50) in its truth value with respect to the context in (45). This is not quite right; while B has no problem asserting (43a) as a true proposition in the given context, he could be hesitant to judge (50) as true.

(50) If John has ever had a croissant, he may have seen the Arc de Triomphe.

There might be one complication with this argument: when a speaker uses the conditional of the form *if p, q*, he sometimes infers *if not p, not q*[13]. Hence, one can say that in the dialogue in (45), B can be implying that if John has not been to Paris, it is not possible that he has seen the Arc de Triomphe, and this inference, which might be taken to be a conversational implicature, may be made even more salient with the fact that one can only see the Arc de Triomphe in Paris and not anywhere else. While (43a) with the truth conditions in (49) alone leads to a meaning that is too weak, this derived meaning is strengthened if such an inference is taken into consideration. The inference *if not p, not q* taken into consideration, (43a) and (50) might not have the same truth value. To show that the truth conditions derived from the LF in (44b) are too weak, we hence need a context that forces such an implication not to arise. The examples in (51) are created for this purpose. With the context in (45), the implicature cannot arise in the dialogue in

[13] Thanks Jonathan David Bobaljik for pointing this out.

(51c) that if John has not been to Paris, it is not possible that he has seen a glass pyramid. With the absence of this implicature, the LF in (44b) leads to truth conditions that are so weak that the conditionals in (51a, b) have the same truth value in the context in (45).

(51) a. If John has ever been to Paris, he may have seen a glass pyramid.

b. If John has ever had a croissant, he may have seen a glass pyramid.

c. A: Has John ever seen a glass pyramid? If not, we can take him to the Louvre.
B: I don't know; if he has ever been to Paris, he may have seen one; and he might have seen one in DC already.

Summarizing the discussion above, while the licensing of NPIs in possibility conditionals can be accounted for by assuming that the *if*-clause restricts the covert necessity modal instead of the possibility modal, analyses along this line predict an interpretation that is either non-existent or too weak. The discussion above also justifies the assumption that in the case of NPIs in the *if*-clause of a conditional *if p, may/might-q*, the *if*-clause still serves to restrict the possibility modal *may/might* and hence further justifies the move of revising the semantics of possibility modals to account for the licensing of NPIs in possibility conditionals.

2.4 On Free Choice Disjunction

In the discussion above, I have suggested that to account for the licensing of NPIs in possibility conditionals, possibility modals should be treated as a universal quantifier of some sort rather than as an existential quantifier. I have also shown that assuming that possibility modals are universal quantifiers over a set of worlds selected by an existentially closed modal choice function, the merits of taking possibility modals to be

existential quantifiers are still preserved; for instance, as I have shown in 2.2.4, the proposal in this chapter also predicts the entailment from a necessity statement to its possibility counterpart (see (36)), the consistency of a possibility statement with the negation of its necessity counterpart (see (37)), and the consistency between possibility statements in the case of inner negation (see (38)). In this section, I will further show that the proposed treatment of possibility modals coupled with current analyses (e.g., Fox 2007) can also account for the so called free choice disjunction, a phenomenon that has been explained based on the assumption of possibility modals being existential quantifiers.

An example of free choice disjunction is given in (52a). When (52a) is uttered, (52b) is an immediate inference; however, such an inference, sometimes referred to as an inference of free choice permission, is stronger than expected. According to the formalization in modal logic, only (53b) but not (53c) would be inferred from (53a). Note that the free choice inference only arises when a possibility modal is present.[14] (54a) shows that the case of a simple disjunction simply follows from the formalization of logic. (54b) shows that a disjunctive statement under necessity modals $(p \vee q)$ does not give rise to the inference $p \wedge q$.

(52) a. You may/are allowed to pick an apple *or* an orange. ~>
b. You may/are allowed to pick an apple ***and*** you may/are allowed to pick an orange.
c. You may/are allowed to pick an apple **or** you may/are allowed to pick an orange.

(53) a. $\Diamond(p \vee q)$

[14] Note that such a free choice inference is not only limited to the case of deontic modals. As shown in (i), disjunction in the scope of the epistemic possibility modal *might* (see (ia)) also gives rise to this kind of inference (see (ib)).

(i) a. John might have eaten an apple or an orange.
b. John might have eaten an apple and John might have eaten an orange.

b. $\Diamond p \vee \Diamond q$
c. $\Diamond p \wedge \Diamond q$

(54) a. John picked an apple *or* an orange. ~>John picked an apple ***or*** John picked an orange.
~/~> John picked an apple ***and*** John picked an orange.

b. John is required to pick an apple or an orange. ~/~>John is required to pick an apple ***and*** John is required to pick an orange.

In the past ten years, a lot of discussion has been devoted to deriving such a free choice inference; one of the current views is that this kind of inference should be derived as a scalar implicature (Sauerland 2004; Klinedinst 2006; Fox 2007; a.o.). While analyses of this issue technically differ from each other, all the analyses are built on the assumption that possibility modals such as *may/might/be allowed to* are existential quantifiers. In this section, I will show that with the proposed semantics for possibility modals, the free choice inference can still be derived from current theories as an implicature. Specifically, I will show in the following that the proposed semantics for possibility modals is compatible with Fox's (2007) analysis of free choice disjunction, which I review in the following section.

2.4.1 Fox 2007

Fox (2007) is concerned with implicatures associated with disjunctive statements. A disjunctive statement *p or q* gives rise to the scalar implicature that *it is not the case that* $p \wedge q$ and the ignorance inference that the speaker does not know which one of *p* and *q* is true, though such inferences may be cancelled in the discourse (see (55)).

(55) a. John drank beer or wine.
b. Scalar Implicature: It is not the case that John drank beer and wine.
c. Ignorance Inference: The speaker is not certain that John drank beer.
The speaker is not certain that John drank wine.

Building on the basic version of the Maxiam of Quantity in (56) and the assumption that the computation of implicatures is within the linguistic system (Chierchia 2004; a.o.), Fox (2007) presents a syntactic analysis and argues for a covert exhaustivity operator with a meaning somewhat akin to that of *only* which is responsible for the rise of the implicatures that arise from disjunctions as well as other Gricean implicatures. The mechanism of this syntactic approach is sketched in (57)[15]. In this mechanism, an exhaustification operator EXH appends to a sentence S to generate the strengthened meaning of S; the strengthened meaning of S generated by EXH is the conjunction of the truth conditions of S and the conjunction of the negation of all the stronger alternatives to S on a pragmatic scale (i.e. Horn's scale). The appending of EXH is recursive but constrained by economy: to avoid ignorance inferences, a sentence S can go through the exhaustification process more than once; however, if an application of exhuastification cannot eliminate the ignorance, no further exhaustification can apply.

(56) Maxim of Quantity (basic version): If S_1 and S_2 are both relevant to the topic of conversation and S1 is more informative than S_2, if the speaker believes that both are true, the speaker should utter S_1 rather than S_2.

(57) a. $[\![\text{EXH}]\!]^w(A_{<<s,t>,t>})(p_{<s,t>}) = 1$ iff $p(w) = 1$ and $\forall q \in \text{I.E}(p, A)$: $\neg q(w)$
b. I.E.(p, A): $= \cap\{A' \subseteq A$: A' is a maximal set in A s.t. $A'^{\neg} \cup \{P\}$ is consistent$\}$
c. $A'^{\neg}$: $= \{\neg p: p \in A\}$;
A proposition q is innocently excludable given *A* if $q \in$ I.E(p, A)

[15] In limiting the scope of this chapter, here I simply sketch the analysis in Fox (2007) regarding the issue of free choice inference. In Fox (2007), the problems of the basic Gricean and the neo-Gricean accounts encountered by this issue are discussed in detail; here I simply refer the readers to Fox (2007) and the references cited therein.

As stated in (57), the exhaustification operation triggered by the operator EXH is subject to innocent exclusion; an alternative S′ to a sentence S that is excluded through an exhaustification process has to be innocently excludable given an alternative set A (i.e. S′∈ I.E(S, A)). The set of innocent excludable alternatives given a set A and an asserted proposition *p* (the prejacent of EXH) is the intersection of the maximal subsets A′ of A such that the conjunction of the negation of all the members in the intersection of A′ is consistent with *p*.[16]

The application of this mechanism in the case of simple disjunction is illustrated in (58). In the first exhaustification of the simple disjunctive statement p∨q (i.e. EXH(p∨q); see (58b)), while we get the strengthened meaning of p∨q (i.e. (p∨q)∧ (¬(p∧q))), we still cannot get rid of the ignorance inference that the speaker is not certain as to which of *p* and *q* is true; the second exhaustification (i.e. EXH(EXH(p∨q)); see (58c)) hence applies to get rid of this ignorance inference; however, as shown in (58c), the second exhaustification does not result in a stronger meaning than the result from the first exhaustification and the ignorance inference still exists. Given that the second exhaustification cannot strengthen the result after the first exhaustification, further application of exhaustification are suspended.

(58) a. Assertion: p∨q
Implicature: ¬(p∧q)
Ignorance Inferences: The speaker is not certain that p
The speaker is not certain that q

b. First exhaustification: EXH(p∨q)
C={p∨q, p, q, p∧q}
I.E. (p∨q, C)={p, p∧q}∩{q, p∧q}={p∧q}

[16] Following Sauerland (2004), Fox (2007) assumes that *p*∨*q* forms a Horn-scale with *p*, *q*, and *p*∧*q*.

(The set that contains p, q, and $p \wedge q$ (i.e.{p, q, p∧q}) cannot be the set of innocent excludable alternatives, for the conjunction of negation of all the members in this set (i.e. ¬p∧¬q∧¬(p∧q)) contradicts to the prejacent of EXH, namelyp∨q)
EXH(p∨q)= (p∨q)∧ (¬(p∧q))= (p∧¬q)∨(¬p∧q)
(In other words, EXH(p∨q)= EXH(p)∨EXH(q))

c. Second Exhaustification: EXH′(EXH(p∨q))
C′={EXH(p∨q), EXH(p), EXH(q), EXH(p∧q)}
I.E. (EXH(p∨q), C′)= {EXH(p∧q)}={p∧q}
(the set that conatins EXH(p), EXH(q) and EXH(p∧q)(i.e. {EXH(p), EXH(q), EXH(p∧q)}) cannot be the set of the innocent excludable alternatives, given that the conjunction of negation of all the members in this set contradicts the prejacent of EXH′)
EXH′(EXH(p∨q))= EXH(p∨q)∧(¬ EXH(p∧q)=(p∨q)∧ (¬(p∧q))

The case of a disjunctive statement under possibility modals, where the free choice inference arises, is illustrated in (59). The first exhaustification on the statement ◊(p∨q) (i.e. EXH(◊(p∨q)); see (59b)) gives rise to a stronger meaning ◊(p∨q) ∧ ¬◊(p∨q). Unlike the case of simple disjunction, the second application of exhaustification successfully eliminates the ignorance inferences and generates a stronger meaning ◊p ∧ ◊q ∧ ¬◊(p∧q) (see (59c)); the free choice effect of disjunctions in the scope of possibility modals is thus derived.

(59) a. Assertion: ◊(p∨q)
Free choice inference: ◊p and ◊q and ¬◊(p∧q)

b. First exhaustification (EXH(◊(p∨q))):
C={◊(p∨q); ◊p; ◊q; ◊(p∧q)}
I.E. ((◊(p∨q), C)={◊p; ◊(p∧q)}∩{◊q; ◊(p∧q)}={◊(p∧q)}
(the set that contains all the members in C but ◊(p∨q) (i.e. {◊p; ◊q; ◊(p∧q)}) cannot be the set of innocently excludable alternatives, given that the conjunction of negation of all the members in this set contradicts ◊(p∨q))
EXH(◊(p∨q)= ◊(p∨q) ∧ ¬◊(p∧q)

c. Second Exhaustification (EXH′(EXH(◊(p∨q)))
C′={EXH(◊(p∨q)), EXH(◊p), EXH(◊q), EXH(◊(p∧q)))}, where
EXH(◊(p∨q))= ◊(p∨q)∧¬◊(p∧q);

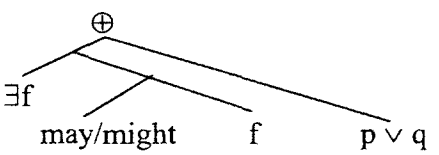
EXH($\Diamond$p)= $\Diamond p \wedge \neg\Diamond q$;
EXH($\Diamond$q)= $\Diamond q \wedge \neg\Diamond p$;
EXH($\Diamond(p\wedge q)$)= $\Diamond(p\wedge q)$ (can be ignored since already excluded by the prejacent of EXH′)
I.E.(EXH($\Diamond(p\vee q)$), C′)={EXH($\Diamond$p), EXH($\Diamond$q)}={$\Diamond p\wedge\neg\Diamond q$; $\Diamond q\wedge\neg\Diamond p$}
EXH′(EXH($\Diamond(p\vee q)$)= $\Diamond(p\vee q) \wedge\neg\Diamond(p\wedge q) \wedge \neg(\Diamond p \wedge \neg\Diamond q) \wedge \neg(\Diamond q \wedge \neg\Diamond p)$
$=\Diamond(p\vee q) \wedge \Diamond p \wedge \Diamond q \wedge\neg\Diamond(p\wedge q)$

2.4.2 Recast Free Choice Inference

Fox's (2007) analysis of the free choice effect in disjunctive statements under possibility modals relies on the assumption that possibility modals are existential quantifiers. What I would like to show in the following is that with the newly proposed semantics of possibility modals in this chapter, Fox's (2007) mechanism derives the same result as well.

Based on the proposal made in this chapter, a possibility statement has the LF (60a) and the semantics in (60b); according to (60b), a disjunctive statement under the possibility modal (i.e. *may/might (p or q)*) is true iff there is a function f such that for all worlds w′ selected by f from the quantificational domain W′, *p* is true in w′ or *q* is true in w′.

(60) a.



b. [[⊕]]= $\exists f[\forall w' \in f(W'): w' \in p \cup q]$ (where W′is the quantificational domain)

With Fox's (2007) mechanism, the application of the exhaustive operator EXH on (60b) is illustrated in (61). The first exhaustification is shown in (61a); there is only one innocent excludable alternative, namely $\Diamond(p\wedge q)$. The first exhaustification gives rise to a

strengthened meaning $\Diamond(p \vee q)$ and $\neg\Diamond(p \wedge q)$ but does not eliminate the ignorance inference that the speaker is not certain $\Diamond p$ or $\Diamond q$. To eliminate the ignorance inference, the second exhaustification applies; as shown in (61b), the second exhaustification generates a stronger meaning than the result of the first exhaustification (see (61a)); specifically, the second exhaustification eliminates the ignorance inferences and derives the free choice inference that it is true that $\Diamond p$ and $\Diamond q$ but not $\Diamond(p \wedge q)$.

(61) a. First exhaustification (EXH($[\![\oplus]\!]$)

$C=\{\Diamond(p \vee q); \Diamond p; \Diamond q; \Diamond(p \wedge q)\}$, where

$\Diamond(p \vee q) = ([\![\oplus]\!]) = \exists f[\forall w' \in f(W'): w' \in p \cup q]$;

$\Diamond p = \exists f[\forall w' \in f(W'): w' \in p]$;

$\Diamond q = \exists f[\forall w' \in f(W'): w' \in q]$;

$\Diamond(p \wedge q) = \exists f[\forall w' \in f(W'): w' \in p \cap q]\}$

I.E.(©, C)= $\{\Diamond p; \Diamond(p \wedge q)\} \cap \{\Diamond q; \Diamond(p \wedge q)\} = \{\Diamond(p \wedge q)\}$

(the set of innocent excludable alternatives cannot be $\{\Diamond p; \Diamond q; \Diamond(p \wedge q)\}$, for the conjunction of negation of all the members in this set contradicts the prejacent, namely $\Diamond(p \vee q)$)

EXH($[\![\oplus]\!]^{W'}$) $= \exists f[\forall w' \in f(W'): w' \in p \cup q] \wedge \neg\exists f[\forall w' \in f(W'): w' \in p \cap q]$

b. Second Exhaustification (EXH(EXH($[\![\oplus]\!]$)))

$C'=\{$EXH($\Diamond(p \vee q)$), EXH($\Diamond p$), EXH($\Diamond q$), EXH($\Diamond(p \wedge q)$)$\}$, where

EXH($\Diamond(p \vee q)$)= EXH($[\![\oplus]\!]$)$=\Diamond(p \vee q) \wedge \neg\Diamond(p \wedge q)$

$= \exists f[\forall w' \in f(W'): w' \in p \cup q] \wedge \neg\exists f[\forall w' \in f(W'): w' \in p \cap q]$

EXH($\Diamond p$)= $\Diamond p \wedge \neg\Diamond q = \exists f[\forall w' \in f(W'): w' \in p] \wedge \neg\exists f[\forall w' \in f(W'): w' \in q]$

EXH($\Diamond q$)= $\Diamond q \wedge \neg\Diamond p = \exists f[\forall w' \in f(W'): w' \in q] \wedge \neg\exists f[\forall w' \in f(W'): w' \in p]$

EXH($\Diamond(p \wedge q)$)= $\Diamond(p \wedge q) = \exists f[\forall w' \in f(W'): w' \in p \cap q]$ (can be ignored since already excluded by the prejacent of the second EXH, namely EXH($[\![\oplus]\!]$))

I.E.(EXH($[\![\oplus]\!]$, C')=$\{$EXH($\Diamond p$), EXH($\Diamond q$)$\}$

EXH(EXH($[\![\oplus]\!]$))= EXH($\Diamond(p \vee q)$) $\wedge$ EXH($\Diamond p$) $\wedge$ EXH($\Diamond q$)

$= [\exists f[\forall w' \in f(W'): w' \in p \cup q] \wedge \neg\exists f[\forall w' \in f(W'): w' \in p \cap q]] \wedge$

$[\neg\exists f[\forall w' \in f(W'): w' \in p] \vee \exists f[\forall w' \in f(W'): w' \in q]] \quad \wedge$

$[\neg\exists f[\forall w' \in f(W'): w' \in q] \vee \exists f[\forall w' \in f(W'): w' \in p]]$ (Line 1)

The Conjunction of the second and third conjunct in Line 1 equals to:

$\exists f[\forall w' \in f(W'): w' \in p] \wedge \exists f[\forall w' \in f(W'): w' \in q]$

Hence, EXH(EXH($[\![\oplus]\!]$))= $\exists f[\forall w' \in f(W'): w' \in p \cup q] \wedge$

$\neg\exists f[\forall w' \in f(W'): w' \in p \cap q] \wedge$

$$\exists f[\forall w' \in f(W'): w' \in p] \wedge \exists f[\forall w' \in f(W'): w' \in q]$$

The discussion above shows another merit of the traditional assumption that is reserved with the new semantics of possibility modals proposed above; as shown in (61), with the proposed semantics of possibility modals, the free choice inference in disjunctive statements under possibility modals can still be derived by the mechanism proposed by Fox (2007) without any additional assumptions.

2.5 Concluding Remarks

This chapter discusses the licensing of NPIs in the antecedent of conditionals with possibility modals. First I have shown that the traditional assumption that possibility modals are existential quantifiers over worlds, with a Lewis-Kratzer-von-Fintel style semantics for conditionals (von Fintel 1999) and the SDE condition on NPI licensing, leads to the wrong prediction that NPIs are ungrammatical in the antecedent of possibility conditionals. To solve this problem, building on the idea of modal choice functions (Rullmann et al. 2008), I have suggested that possibility modals should be treated as universal quantifiers over a subset of worlds selected from the quantificational domain by a modal choice function. The proposed semantics not only accounts for the licensing of NPIs in the antecedent of a possibility conditional but also preserves the merits from the assumption of possibility modals being existential quantifiers, for instance, the entailment from *must p* to *may/might p*, the consistency of a possibility statement with the negation of its necessity counterpart and the free choice inference of disjunctive statements under possibility modals. I have also examined the alternative analyses of the observed problem; as I have discussed in 2.3, while the observed problem can be solved by

assuming that in the relevant examples (eg. (18a, b)) the *if*-clause restricts a covert necessity modal operator rather than the possibility modal, analyses along this line generate an interpretation that is either nonexistent or two weak and hence are inadequate.

As mentioned above, while NPIs are licensed in the *if*-clause that restricts possibility modals, they are ungrammatical when the *if*-clause restricts the quantificational adverbial *sometimes*. In 2.2.5, I have simply assumed that the quantificational adverbial *sometimes* is a genuine existential quantifier and hence cannot license NPIs in its restrictor. This claim further raises the question of why times and worlds behave differently in distinguishing universal and quantificational force. Answering this question requires an extensive cross-linguistic investigation into the modal and quantificational adverbial system; I therefore leave this for future research.

Appendix:

In the discussion above, I have claimed that the two possible truth conditions of a possibility modal statement *may/might-p*, as shown in (62a, b), amount to the same thing. The proof is given (63).

(62) a. $\exists w'[w' \in MB(w) \text{ and } p(w')]$
b. $\exists f[\forall w' \in f(MB(w)): p(w')]$, where f is a modal choice function (i.e. for any $S' \subseteq W$, $f(S') \subseteq W$ and $f(S') \neq \varnothing$)

(63) *Proof*: I first show that when (62b) is true, (62a) is true as well. Take an arbitrary set of words S such that $\exists f[\forall w' \in f(S): p(w')]$, where f is a modal choice function (i.e., $f(S) \subseteq S$ and $f(S) \neq \varnothing$). Then we define a modal choice function g such that $[\forall w' \in g(S): p(w')]$. Given that g is a modal choice function, $g(S) \subseteq S$ and $g(S) \neq \varnothing$. Since $g(S) \subseteq S$ and $g(S) \neq \varnothing$ and p is true of all the worlds w' in g(S), it follows that $\exists w'[w' \in S \text{ and } p(w')]$. Since S is arbitrarily picked, we can conclude that when (62b') is true, (62a') is true.

I now do the other half of the proof, namely that when (62a) is true, (62b) is true. Take an arbitrary set of words S such that $\exists w'[w' \in S \text{ and } p(w')]$; it then follows that $\{w' \in S: p(w')\} \neq \varnothing$. We then define a modal choice function g (i.e. for any $S' \subseteq W$, $f(S') \subseteq W$ and $f(S') \neq \varnothing$) such that $[\forall w' \in g(S): p(w')]$. It hence follows that there is $\exists f[\forall w' \in f(S): p(w')]$, where f is a modal choice function. Given that S is arbitrarily picked, we can conclude that when (62a') is true, (62b') is true.

End of Proof

There is however one complication: while (62a) is true whenever (62b) is and *vice versa*, it is not the case that one is false whenever the other one is and *vice versa*. In the case in which the quantificational domain S is an empty set, the statement $\exists w'[w' \in S \text{ and } p(w')]$ is false. Nevertheless, since a modal choice function f only maps a set of words to its non-empty subset (see (22)), the statement $\exists f[\forall w' \in f(S): p(w')]$ is undefined. These two different predictions from (62a, b) can be tested only if we can find a case in which the quantificational domain of a possibility statement is an empty set; in such a case, (62a) predicts that a possibility statement is (trivially) false but (62b) predicts that a

possibility statement is undefined. Such a case, however, cannot be found under the doubly-relative system (Kratzer 1981, 1991)[17]. In the doubly-relative system of modals, the quantificational domain of a modal quantifier is composed of a modal base and an ordering source; a modal base is a set of true propositions relevant to the context or the speaker's knowledge, and ordering source is a set of propositions based on which the words in the intersection of the modal base are ranked. Given that the modal base contains only propositions that are consistent with the context or the speaker's knowledge and there are no inconsistent propositions in a circumstantial context or a person's epistemic state, the intersection of a modal base can never be an empty set. Hence, it is unclear how this difference between (62a, b) can be tested.

[17] In fact, the doubly-relative system is designated to prevent a quantificational domain of a modal quantifier from being an empty set. In the case of deontic modals, a deontic conversational background may contain propositions that contradict to each other, and evaluating a deontic modal statement with only such a conversational background leads to the undesirable prediction that a deontic necessity is trivially true and a deontic possibility is trivially false. Assuming the doubly-relative system (Kratzer 1981, 1991), on the other hand, does not lead to such a problem; in the doubly-relative system, the modal base of a deontic modal is a set of propositions that are relevant to the context, and a deontic conversational background serves as the ordering source in ranking the worlds in the intersection of the modal base. Here I refer the reader to Hacquard (2011) for a detailed discussion with respect to this issue.

Chapter 3 NPIs and the Semantics of *Because*-sentences

This chapter concerns the NPI phenomenon in *because*-sentences. As shown in (1)-(2), NPIs are ungrammatical in a *because*-sentence.

(1) a. *John ate any apples because he was hungry.
b. *John ever went to Paris because he wanted to see the Arc de Triomphe.

(2) a. *John was full because he ate any apples.
b. *John went to Paris because he ever wanted to see the Arc de Triomphe.

In a negated *because*-sentence, there is an asymmetry with respect to NPI licensing: while NPIs are grammatical in the *because*-clause (see (4)), they are ungrammatical in the main clause of a negated *because*-sentence if their scope is limited to the main clause (as shown in (3)).

(3) a. *It is not the case that John ate any apples because he was hungry.
Intended reading: the reason why John ate some apples is not his hunger.

b. *It is not the case that John ever went to Paris because he wanted to see the Arc de Triomphe.
Intended reading: the reason why John went to Paris is not his desire to see the Arc de Triomphe.

(4) a. It is not the case that John was full because he ate any apples.
b. It is not the case that went to Paris because he ever wanted to see the Arc de Triomphe.

The contrast shown in (3)-(4) was observed by Linebarger (1980, 1987) through a thorough examination on the syntactic and semantic properties of (negated) *because*-sentences. In the following, the NPI phenomenon in *because*-sentences and Linebarger's (1980, 1987) observation will be reviewed, and more examples will be provided to support the generalization she has reached.

After Linebarger's observation, several attempts (e.g., Linebarger 1980, 1987; Kadmon and Landman 1993; Cheirchia 2004) have been made in the literature to account for the intervention of *because* in the licensing of NPIs in the main clause of a negated *because*-sentence and the contrast between the main and the *because*-clause illustrated in (3)-(4). In these analyses, various stipulations have been posed just to account for Linebarger's observation. As I will discuss in section 5 however, these stipulations lead the wrong empirical predictions regarding the distribution of NPIs. The goal of this paper is to seek a solution to Linebarger's observation based on a DE-based (downward-entailing based) approach of NPI licensing (e.g., Fauconnier 1975, 1979; Ladusaw 1979; von Fintel 1999; a.o.), in particular, the SDE (Strawson Downward Entailment) theory in von Fintel 1999. To achieve this goal, the key is an adequate semantics of *because* that can be coupled with the SDE condition to account for the NPI phenomenon in a *because*-sentence. Therefore, a new semantics of *because* is suggested in this paper which together with the SDE condition of NPI licensing provide a solution to Linebarger's observation.

In the literature, Lewis's (1973b) idea of *causal dependency* has been adopted for the semantics of *because* (e.g., Sæbø 1991; Büring 1995; Meier 2001; Chierchia 2004; a.o; cf. Kratzer 1998). Simply speaking, Lewis (1973b) suggests that for any two actual events *a* and *b*, *a* causally depends on *b* iff if *b* had not had happened, *a* would not have happened. Although details vary from one to another, analyses that are based on this idea all relate the meaning of a *because*-sentence *q because p* to that of the counterfactual conditional *if* $\neg p$, *then* $\neg q$. Such counterfactual analyses of *because*, as I will show in the following however, together with the SDE condition, lead to the wrong prediction on the

distribution of NPIs in a *because*-sentence. A new semantics of *because* hence is needed that on the one hand captures the syntactic and semantic properties of a *because*-sentence and on the other hand together with the SDE condition of NPI licensing accounts for the NPI phenomenon in this construction.

In addition to the licensing of weak NPIs, I will show as well in the second part of this chapter that the proposed semantics of *because* together with the scope theory of *even* (Karttunen and Peters 1979; Wilkinson 1996; Lahiri 1998; Guerzoni 2003, 2004) accounts for the licensing of minimizers in *because*-sentences (e.g., *to lift a finger*, *to give a damn*, a.o.). As shown in (5), unlike weak NPIs, minimizers with overt *even* are ungrammatical in a negated *because*-sentence. (6) further shows that minimizers are also ungrammatical in the *yes-no* question variant of a *because*-sentence.

(5) a. *John didn't **even** lift a finger to help Mary because he loved her, (but because he was intimidated by her).
b. *John didn't marry Sue because she **even** lifted a finger to help him, (but because he loved her).

(6) a. *Did John **even** lift a finger to help Mary because he loved her?
b. *Did John marry Mary because she **even** lifted a finger to help him?

Minimizers such as *lift a finger* and *give a damn*, at first glance, have a similar distribution to that of weak NPIs. As shown in (7), just like weak NPIs, minimizers are grammatical in questions and the scope of negation; unlike weak NPIs however, the occurrence of minimizers in a question gives rise to a negative bias. In the *yes-no* question in (8a), only the negative answer is felicitous and expected by the speaker. Moreover, as shown in (5b), unlike weak NPIs, minimizers with an overt *even* are ungrammatical in a negated *because*-sentence. These two differences indicate that a

different analysis from that of weak NPIs is called for to account for the distribution of minimizers.

(7) a. John didn't (even) lift a finger to help Mary.
b. Did John offer May any help?

(8) a. S: Did John (**even**) lift a finger to help Mary?
#A: Yes. A: No.

b. S: Did John offer Mary any help?
A: Yes. A: No.

This chapter is structured as follows. The NPI phenomenon in *because*-sentences and Linbarger's (1980, 1987) observation are reviewed in 3.1. 3.2 is devoted to the semantics of *because*; in this section, various versions of counterfactual analyses for *because*-sentences that are inspired by Lewis's (1973b) idea of causal dependency are examined, and I will show that these analyses are inadequate in that they lead to the wrong prediction for the NPI phenomenon in *because*-sentences. A new semantics of *because* is then proposed to account for the NPI phenomenon, as well as other properties of *because*-sentences. After presenting the proposal, previous analyses of the licensing of weak NPIs in a *because*-sentence are discussed in 3.3. In 3.4, an analysis of the licensing of minimizers in *because*-sentences based on the new semantics of *because* suggested in 3.2 is proposed. The conclusion and some open questions are in 3.5.

3.1 NPIs in *Because*-sentences and Linebarger's (1980, 1987) Observation

This section provides an overview of the NPI phenomenon in *because*-sentences. I first review the observation of the distribution of NPIs by Linebarger (1980, 1987) and then provide more examples in favor of her conclusion, which states that in a negated

because-sentence, NPIs such as *any* and *ever* are grammatical in the *because*-clause but not in the main clause.

NPIs such as *any* and *ever* have a limited distribution, and the scope of negation is one of the environments that license these items (see (9)-(10)). As shown in (11)-(12), weak NPIs such as *any* and *ever* are ungrammatical in a *because*-sentence, no matter whether they occur in the main clause or in the *because*-clause.

(9) a. *John ate any potatoes.
b. John didn't eat any potatoes.

(10) a. *John thinks that Mary was ever in Paris.
b. John doesn't think that Mary was ever in Paris.

(11) a. *John ate any apples because he was hungry.
b. *John was very full because he ate any apples.

(12) a. *John *ever* went to Paris because he wanted to see the Arc de Triomphe.
b. *John went to Paris because he ever wanted to see the Arc de Triomphe.

(13)-(14) show that when a *because*-sentence is negated, the weak NPIs *any* and *ever* are grammatical in the *because*-clause.

(13) It is not the case that John was full because he ate any apples.

(14) It is not the case that John went to Paris because he ever wanted to see the Arc de Triomphe.

In (13)-(14), the negation phrase *it is not the case that* serves to negate the causal connection between the main clause and the *because*-clause[1]. Here I intentionally use *it is not the case* to avoid the ambiguity that arises from the scope interaction between the *because*-clause and the negation words such as *not* and *n't*. As pointed out in Linebarger

[1] Here I use the term 'causal connection' in a very informal way. One should not mix it with the concept 'causation', which has been widely discussed in the philosophy literature (i.e. Lewis 1973b; a.o.)

(1980, 1987), a *because*-sentence with negation like (15) is ambiguous. In one reading, negation scopes over the *because*-clause and serves to deny the causal connection between the main clause and the *because*-clause (see (15a)); on the other reading (see (15b)), negation is part of the main clause and hence is embedded in the scope of *because*.

(15) He didn't move because he was pushed. (Linebarger 1987)

a. NEG>$_{\text{scope-over}}$ *because*:
Paraphrase: 'The reason why he moved is **not** that he was pushed.'

b. *because*>NEG:
Paraphrase: 'The reason why he **didn't** move is that he was pushed.'

As observed by Linebarger (1980, 1987), (15) can be disambiguated by the continuation with a positive tag question and *but because*; as shown in (16), with the continuation with a positive tag question and *but because*, only the reading (15a), where negation scopes over *because*, is available.

(16) a. He didn't move because he was pushed, did he?
(✓NEG>*because*, **because*>NEG)

b. He didn't move because he was pushed, *but because*....
(✓NEG>*because*, **because*>NEG)

The occurrence of NPIs in the *because*-clause is only grammatical when negation scopes over *because*; for instance, (17) only carries the reading where negation scopes over *because*.

(17) He didn't move because anyone pushed him.
(✓NEG>*because*, **because*>NEG)

That the occurrence of NPIs in the *because*-clause is only compatible with wide-scope negation is supported by (19). The licensing of the punctual *until* requires a clausal-mate negation, as shown in (18)[2].

(18) a. John didn't leave until yesterday./*John left until yesterday.
b. *Bill didn't claim that John left until yesterday.

In (19), while the licensing of the occurrence of *anyone* in the *because*-clause requires negation to scope over *because*, the occurrence of the punctual *until* forces the scope of negation to be limited to only the main clause. Given that there is no way to satisfy the licensing conditions of both *anyone* and the punctual *until*, (19) is ungrammatical.

(19) *John didn't leave until yesterday because he met anyone.

As mentioned in (13)-(14), the negation phrase *it is not the case* is employed to avoid the ambiguity due the scope interaction between *because* and the negation words such *not* and *n't*. (20)-(23) show that just like wide scope negation or the negation phrase *it is not the case*, negative attitude predicates like *not think* and *doubt* license NPIs in the *because*-clause as well. In the b.- examples in (20)-(23), the continuation *he thinks it is rather because* is added to force the reading in which the *because*-clause is embedded under *not think* and *doubt*.

(20) a. Bill doesn't think that John ate any apples.
b. Bill doesn't think that John was full because he ate any apples; he thinks it is rather because...

(21) a. Bill doesn't think that John ever wanted to see the Arc de Triomphe.
b. Bill doesn't think that John went to Paris because he ever wanted to see the Arc

[2] The punctual *until* in the complement of neg-raising predicates like *think* can be licensed by negation in the matrix clause. I refer the reader to Gajewski (2007) for the details.

de Triomphe; he thinks it is rather because....

(22) a. Bill doubts that John ate any apples.
b. Bill doubts that John was full because he ate any apples; he thinks that it is rather because...

(23) a. Bill doubts that John ever wanted to see the Arc de Triomphe.
b. Bill doubts that John went to Paris because he ever wanted to see the Arc de Triomphe; he thinks it is rather because...

As for the case of the occurrence of NPIs in the main clause of a negated *because*-sentence *¬[q because p]*, things become more complicated due to the scope interaction between *because* and the weak NPIs *any* and *ever*. Consider (24), an example from Linebarger (1987). There are three possible interpretations in (24); however, only two of them, namely (24a, c), are available. As shown in (24a, c), if the NPI *any* is interpreted within the main clause, the scope of negation must be limited to the main clause; on the other hand, if the NPI *any* is interpreted outside the main clause and scopes over the whole *because*-sentence, then negation must take a wide scope over the whole *because*-sentence as well. An ungrammaticality arises in the case where the NPI *any* is interpreted within the main clause but negation takes a wide scope over the whole *because*-sentence, as shown in (24b). In other words, under the reading in (24b), the licensing of *any* by negation is blocked by *because*.

(24) He didn't commit any of those crimes because he was drunk. (Linebarger 1987)
a. *because*>NEG>*any*:
Paraphrase: 'The reason why he **didn't** commit crimes is his drunkness.'

b. *NEG>*because*>*any*:
Paraphrase: 'The reason why he committed some crimes is **not** his drunkenss.'

c. NEG>*any*>*because*:
Paraphrase: 'There is **no** crime x such that he committed x due to his drunkness.'

The concern of this chapter is only the availability of the reading like (24c) and the unavailability of the reading like (24b); cases like (24a) are not in the interest of this paper because the grammaticality of NPIs in the main clause under the reading like (24a) is expected under any current theories of NPIs. In order to avoid the scope interaction like that in (24a), we can employ the negation phrase *it is not the case* and the negative attitude predicates like *not think* or *doubt*. Examples of this kind are given in (25)-(26); (25)-(26) are unambiguous and only carries the reading in which *any* scopes over *because* but underneath negation; as these examples show, embedded under *it is not the case* and *not think*, the occurrence of the NPI *any* is grammatical only under the scope configuration NEG>*any*>*because*.

(25) It is not the case that [he committed <u>any</u> of those crimes because he was drunk].
(*NEG>*because*>*any*; ✓NEG>*any*>*because*)

(26) Mary doesn't think that [he committed <u>any</u> of those crimes because he was drunk].
a. *NEG>*because*>*any*:
Paraphrase: 'In Mary's belief, the reason why he committed some of those crimes is **not** his drunkness.'

b. NEG>*any*>*because*:
Paraphrase: 'In Mary's belief, there is no crime x among those such that he committed x due to his drunkness.'

(27)-(28) show that the licensing of the NPI *ever* in the main clause of a negated *because*-sentence is subject to the same constraint on the scope configuration of negation, *because* and the NPI *ever*. As shown in these two examples, for the occurrence of *ever* in the main clause to be grammatical, *ever* must be interpreted outside the *because*-sentence but embedded in the scope of negation.

(27) It is not the case that [John <u>ever</u> went to Paris because he wanted to see the Arc de

Triomphe].

a. *NEG>*because*>*ever*:
Paraphrase: 'The reason why John went to Paris at some time point is his desire to see the Arc de Triomphe.'

b. NEG>*ever*>*because*:
Paraphrase: 'There is no time point t such that John went to Paris at t due to his desire to see the Arc de Triomphe.'

(28) Mary doesn't think that [John ever went to Paris because he wanted to see the Arc de Triomphe].

a. *NEG>*because*>*ever*:
Paraphrase: 'In Mary's belief, the reason why John went to Paris at some time point t is his desire to see the Arc de Triomphe.'

b. NEG>*ever*>*because*:
Paraphrase: 'In Mary's belief, there is no time t such that John went to Paris at t due to his desire to see the Arc de Triomphe.'

The wide-scope reading of *any* over *because* (e.g., (25), (26b)) can be explained by assuming that the NPI *any* is an existential quantifier and hence may undergo QR across *because* at LF, and the wide-scope reading of the NPI *ever* over *because* can be explained by assuming that the sentential time adverbial *ever* syntactically adjoins above the *because*-clause. The examples in (24)-(28) have suggested that the occurrence of the weak NPIs such as *any* and *ever* cannot be licensed in a negated *because*-sentence if they are interpreted within the main clause at LF, as claimed in Linebarger (1980, 1987). The examples given in the following provide further supports to this claim. The first piece of evidence comes from VP-ellipsis in the *because*-clause. Consider (29), an example from Guerzoni (2006).

(29) I didn't eat anything because you asked me to [$_{VP}$ e], *but because* ...

a. *NEG>*because*>*any*:

Paraphrase: 'The reason why I ate something is not that you asked me to eat something.'
LF: [not [[because [[anything]$_i$ [you asked me to eat x_i]][[anything]$_j$ [I ate x_j]]

b. NEG>*any*>*because*:
Paraphrase: 'There is nothing x such that the reason I ate x is that you asked me to eat x.'
LF: [[not [[anything]$_i$ [[because you asked me to eat x_i][I ate x_i]]]]

In (29), the *because*-clause contains an elided VP, whose antecedent can only be the VP in the main clause. There are two possible readings for (29): in one reading ((29a)), the variable x in the elided VP is existentially bound locally within the *because*-clause, and the NPI *anything* is interpreted within the main clause and scopes underneath *because*; in the other reading ((29b)), the variable x in the elided VP in the *because*-clause is bound by the NPI *anything* in the main clause, and the NPI *anything* is interpreted outside the *because*-sentence and scopes over *because*[3]. Nevertheless, only one reading, (29b), is available. Note that if the NPI *anything* could be interpreted within the main clause at LF, the reading (29a) should be available. That the reading (29a) is unavailable suggests that the occurrence of the NPI *anything* in the main clause can only be grammatical when it scopes over *because* at LF.

The second piece of evidence comes from *there*-constructions. As observed in Milsark (1974), NPs that occur at the nuclear position in a *there*-sentence cannot scope over other sentential operators in the same clause; for instance, in (30), *some* can only be interpreted in the scope of *must*.

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[3] The LF presentation given in (i) and the reading derived from this LF, as pointed out in Guerzoni (2006), is excluded due to a violation of the constraint of parallel binding governing the ellipsis of VP containing variables (see Fox 1999; Rooth 1985).

(i) LF: [not [[anything]$_i$ [because [[anything]$_j$ [you asked me to [eat x_j]] [[I ate x_i]]
Intended reading: 'there is nothing x such that the reason I ate x is that you asked to eat something.'

(30) There must be some apples on the table. (*∃>□, ✓□>∃)

In (31b) and (32b), given that the main clause is a *there*-construction, the NPI *any* is forced to take a narrow scope with respect to *because* and can only be interpreted within the main clause. The ungrammaticality of (31b) and (32b) hence provides another argument for the claim that the *because*-clause blocks the licensing of NPIs that are interpreted within the main clause.

(31) a. It is not the case that [there were some crimes because the economy was bad].
LF: [not [[because the economy was bad][there are some crimes]]]

b. *It is not the case that [there were any crimes because the economy was bad].
LF: [not [[because the economy was bad][there are any crimes]]]

(32) a. John doesn't think that [there were some crimes because the economy was bad].
LF: [not [[because the economy was bad][there are some crimes]]]

b. *John doesn't think that [there were any crimes because the economy was bad].
LF: [not [[because the economy was bad][there are any crimes]]]

The third piece of evidence comes from the intensional predicates like *look for*. Assuming that the kind *unicorn* does not exist in the actual world and hence cannot be individuated, the NP *some unicorns* can only be interpreted in the scope of the intensional predicate *look for*, as shown in (33). Along the same reasoning, in (34b) and (35b), the NPI *any* is forced to be interpreted in the scope of *look for* and hence can only scope underneath *because*. The ungrammaticality of (34b) and (35b) confirms the claim that *because* blocks the licensing of NPIs that are interpreted within the main clause.

(under the assumption that the kind 'unicorn' does not exist in the actual world hence cannot be individuated)
(33) John was looking for *some unicorns*.
a. Paraphrase: John was seeking some x such that x is a unicorn. (*look-for>some*)

b. Paraphrase: #'There is some particular x such that x is a unicorn and John was seeking x.' (*some>look-for*)

(34) a. It is not the case that [John was looking for some unicorns because he was obsessed with fairy tales].
LF: [not [[because John was obsessed with fairy tales][John was looking for some unicorns]]]

b. *It is not the case that [John was looking for any unicorns because he was obsessed with fairy tales.]
Paraphrase: 'The reason that John was seeking some unicorns is not his obsession with fairy tales.'
LF: [not [[because John was obsessed with fairy tales][John was looking for some unicorns]]]

(35) a. Bill doesn't think that [John was looking for some unicorns because he was obsessed with fairy tales].
LF: [not [[because John was obsessed with fairy tales][John was looking for some unicorns]]]

b. *Bill doesn't think that [John was looking for any unicorns because he was obsessed with fairy tales.]
Paraphrase: 'In Bill's belief, the reason that John was seeking some unicorns is not his obsession with fairy tales.'
LF: [not [[because John was obsessed with fairy tales][John was looking for some unicorns]]]

Examples provided in the following show that just like the NPI *any*, another weak NPI *ever* is ungrammatical in the main clause of a negated *because*-sentence if it is interpreted in the scope of *because*. Unlike the NPI existential quantifier *any*, which may scope over *because* via quantifier-raising at LF, the sentential adverbial *ever* doesn't move at LF; its scope is determined by its adjunction cite at syntax and is clausal-bound[4]. For instance, in (36), the scope of *ever* is only limited to the innermost embedded clause. The grammaticality in (36) further suggests that the long distance licensing of *ever* by matrix negation is available.

[4] This is based on the assumption that a sentential time adverbial like *ever* does not undergo LF movement.

(36) John doesn't think that Bill said that Mary was ever in Paris.

In (37), *ever* is embedded in the sentential complement of the verb *say* in the matrix clause and hence cannot scope over *because* at LF. The ungrammaticality of (37) suggests that *because* blocks the licensing of the NPI *ever* that is interpreted within the main clause.

(37) *John doesn't think that [[Bill said that Mary was ever in Paris] because she told Bill so]; he it is rather because...

Another example that shows that the licensing of the NPI *ever* in the main clause is subject to its scope is given in (38) and (39). The predicate *be executed* is an once-in-lifetime predicate; a person, according to the world knowledge, can only be executed once if he has to be. In (38), the reading that results from *ever* scoping over *because* ((38a)) is pragmatically odd and hence unavailable because this gives rise to an implication that Anne Boleyn was executed more than once, which is inconsistent with the world knowledge. Therefore, the only plausible reading is the one based on which the NPI *ever* is interpreted in the scope of *because* ((38b)). The ungrammaticality of (38a) further confirms the claim that *because* blocks the licensing of the NPI *ever* whose scope is limited to only the main clause. The same point is made by (39).

(38) *It is not the case that [Anne Boleyn was ever executed because she committed treason and adultery].

a. #NEG>*ever*>*because*:
'There is no time point t such that Anne Boleyn was executed at t due to treason and adultery.' (unavailable due to pragmatic oddity)

b. *NEG> *because*>*ever*:
'The reason why Anne Boelyn was executed at some time point is not that she

committed treason and adultery.'

(39) *John doesn't think that [Anne Boleyn was ever executed because she committed treason and adultery].

a. #NEG>*ever*>*because*:
'to John, there is no time point t such that Anne Boleyn was executed at t due to treason and adultery.' (unavailable due to pragmatic oddity)

b. *NEG> *because*>*ever*:
'To John, the reason why Anne Boelyn was executed at some time point is not that she committed treason and adultery.'

Concluding the discussion above, the distribution of the NPIs *any* and *ever* can be summarized as in (40). As mentioned above, (40b, c) have been observed by Linebarger (1980, 1987) and are further strengthened by the examples provided in (29)-(39).

(40) a. The weak NPIs *any* and *ever* are ungrammatical in a *because*-sentence *q because p*.

b. In a negated *because*-sentence ¬[*q because p*], the weak NPIs *any* and *ever* are grammatical in the *because*-clause.

c. In a negated *because*-sentence ¬[*q because p*], the NPIs *any* and *ever* are grammatical only if they scope over *because* at LF; scoping underneath *because*, *any* and *ever* are ungrammatical in the main clause.

(40b, c) further leads to the following question: why does *because* block the licensing of NPIs in the main clause at LF but not the licensing of those in the *because*-clause? This issue concerns the licensing condition of NPIs and the semantics of *because*. Given that the goal of this chapter is to seek a solution to these puzzles on the basis of the SDE condition of NPI licensing (see (41); von Fintel 1999; a.o.), the key ingredient is an adequate semantics of *because*, which is the center of the discussion in the next section.

(41) a. The SDE condition on NPI licensing:
An NPI is only grammatical if it is in the scope of α such that $[\![\alpha]\!]$ is SDE.
b. Strawson Downward Entailingness:
A function f of type $<\sigma, \tau>$ is Strawson downward entailing (SDE) iff for all x, y of type σ such that $x \Rightarrow y$ and f(x) is defined: $f(y) \Rightarrow f(x)$

3.2 The Semantics of *Because*

Lewis (1973b) presented a counterfactual analysis of causation; according to Lewis's (1973b) idea, for any two distinct actual events *a* and *b*, *a* causally depends on *b* iff, if *b* had not occurred, *a* would not have occurred[5]. In his formalism, for two distinct actual events *a* and *b* and their corresponding propositions *O(a)* and *O(b)*, *a* causally depends on *b* iff *O(a)* counterfactually depends on *O(b)* (i.e. $\sim O(b) \rightarrow \sim O(a)$, where for any two propositions *A* and *B*, $A \rightarrow B$ iff *B* is true in all the worlds that are the closest to the actual world where *A* is true). While Lewis (1973b) did not address the meaning of *because*-sentences, his counterfactual analysis for causal dependency has been widely adopted when a semantics of *because* is needed (e.g., Sæbø 1991; Büring 1995; Meier 2001; Chierchia 2004; a.o; cf. Kratzer 1998), though the interpretation of his idea varies among these discussions.

In this section, I will show that with the SDE condition of NPI licensing (von Fintel 1999; see (41)), a semantics that is built on Lewis's (1973b) counterfactual analysis of causation leads to the wrong prediction for the distribution of NPIs. Furthermore, I will discuss two problems of Lewis's (1973b) counterfactual analysis of

[5]To be more precise, this is the notion of 'causal dependency' in Lewis's (1973b) discussion; the notion of 'causation' is further defined based on causal dependency. The notion of causation defined in Lewis (1973b) says that *b* is a cause of *a* iff there exists a causal chain leading from *b* to *a*; a causal chain is defined as a finite sequence where *a* causally depends on *b*, *b* on c, *c* on *d* and so on. Notice that in Lewis's original discussion, none of these notions are intended for the semantics of *because*-sentences. Dowty (1979) refined Lewis's (1973b) idea of causal dependency and causation; however, his discussion did not directly address *because*-sentences either. In addition, as I will show in 3.2.3, other types of causal statements behave semantically different from *because*-sentences, though they, at first glance, carry a similar interpretation. Hence, a non-unified treatment of causal constructions is required.

causation that have been widely discussed in the philosophy literature. Given that these two problems result from the counterfactual ingredient in Lewis's (1973b) theory, a semantics that is built on Lewis's counterfactual analysis inherits these two problems as well.

3.2.1 The Inadequacy of a Counterfactual Semantics of *Because*

3.2.1.1 A Counterfactual Semantics of *Because* and NPI licensing

As mentioned above, while Lewis's (1973b) idea of causal dependency has been widely adopted for *because*-sentences, the interpretation of this idea varies from one analysis to another. One way to apply Lewis's idea in terms of propositions (instead of events) is to take a *because*-sentence *q because p* to be the conjunction of the truth of *p* and *q* and the counterfactual conditional *if* $\neg p$ *then* $\neg q$ (see (42)). According to (42), a *because*-sentence *John was taken by the police because he was drinking and driving* is true iff it is true that John was taken by the police and he was drinking and driving and he would not have been taken if he had not been drinking and driving.

(42) A *because*-sentence *q because p* is true iff *q* is true and *p* is true and *if* $\neg p$ *then* $\neg q$.

The semantics in (42) renders a *because*-sentence non-monotonic. With the SDE condition of NPI licensing, this further leads to the prediction that NPIs are ungrammatical in a (negated) *because*-sentence, for according to the SDE condition, NPIs are only grammatical in SDE contexts. This prediction is incorrect; as we have seen in (4a) (repeated in (43b)), NPIs are grammatical in the *because*-clause of a negated *because*-sentence. In addition, this semantics fails to capture the asymmetry between the

because-clause and the main clause with respect to NPI licensing; as shown in (43), in a negated *because*-sentence, while NPIs are grammatical in the *because*-clause, they are ungrammatical in the main clause.

(43) a. *It is not the case that John married any women because he had money.
b. It is not the case that John married Sue because he had any money.

Another way to adopt Lewis's idea is to separate the truth of *p* and *q* from the truth conditions and treat them as presuppositions (i.e. definedness conditions) of a *because*-sentence[6]. Under this move, *q because p* is defined only if *p* is true and *q* is true; if defined, *q because p* is true iff the counterfactual conditional *if* $\neg p$ *then* $\neg q$ is true. Following a Lewis-Kratzer style semantics of counterfactual conditionals, according to which a counterfactual conditional carries a totally realistic ordering source and the modal base W, the semantics of *because* can be stated as in (44)[7].

(44) $[\![\text{because}]\!]^{w, R'}(p_{<s, t>})(q_{<s, t>})$ is defined only if q(w)=1 and p(w)=1;
If defined, $[\![\text{because}]\!]^{w}(p)(q) = 1$ iff $\forall w' \in max_{\leq R'(w)}(\neg p)$: $w' \in \neg q$, where $R'_{<s, <<s, t>, t>>}$ is the unique function such that, for any world w″, $\cap R'(w'') = \{w''\}$

In (44), the ordering source function R′ is a unique totally realistic conversational background function that maps a world w to all the true propositions in w; R′(w) hence is the set of propositions that characterizes w uniquely (i.e. $\cap R'(w) = \{w\}$); the function $max_{\leq R'(w)}$ picks out from $\neg p$-worlds the worlds that are the closest (i.e. the most similar)

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[6] See Kadmon and Landman (1993) for treating the truth of *p* and *q* as presuppositions, though they did not spell out a detailed semantics for *because*.

[7] In (44), $\neg p$ is the set of worlds where the proposition *p* is false (i.e. {w: p(w)=0}). In addition, I adopt a Lewis-style semantics for a counterfactual conditional *if p then q*, according to which a counterfactual conditional *if p then q* is true iff all the *p*-worlds that are the closest to the actual world w are *q*-worlds. On the other hand, I follow Kratzer (1981), a.o. by assuming that the modal base for a counterfactual conditional is the set of all the worlds W. Since the intersection of W with $\neg$p equals $\neg$p, in (44) I simply have the function $max_{\leq R'(w)}$ apply to $\neg p$ in the notation.

to w (see Kratzer (1981), a.o.). The definitions of the ordering source and the function *max* are given in (45), according to which the ordering among worlds with respect to an ideal R(w) is partial rather than total.

(45) a. For any two worlds w′ and w″, w′ is better than w″ ($w' <_{R(w)} w''$) iff all propositions in R(w) that hold in w″ also hold in w′ and there is some proposition in R(w) that holds in w′ but not in w″.
(i.e. $\forall p \in R(w)[\ w'' \in p \rightarrow w' \in p]$ and $\exists p \in R(w)[\ w' \in p \ \&\ w'' \notin p]$).
b. For any $W' \subseteq W$, $max_{\leq R(w)}(W') = \{w' \in W' : \neg\exists\ w'' \in W'\ [w'' <_{R(w)} w']\}$

One advantage of this semantics is that it captures speakers' intuition regarding the truth of *q* in a *because*-sentence *q because p*; the intuition is that for a *because*-sentence to be felicitously uttered, the main clause must be true; falsifying the truth of the main clause leads to an oddity. This is evidenced in (46); as shown in (46), asserting that the main clause is false after a negated *because*-sentence gives rise to an inconsistency, and this is captured if we assume that a (negated) *because*-sentence *q because p* is defined only if the main clause *q* is true.

(46) #It is not the case that John went to the hospital because Mary was sick; but it is the case that Peter did because Mary was sick; and everyone regretted/was surprised that John didn't go to the hospital.
(From Meier 2001, with a slight modification)

The semantics in (44) however, leads to an undesirable consequence. According to (44), the main clause *q* in a *because*-sentence *q because p* is a purely SDE context; hence, with the SDE condition of NPI licensing, (44) leads to the prediction that NPIs are

grammatical in the main clause of a *because*-sentence. As we have seen in (1) (repeated as (47)) however, this prediction is apparently incorrect[8].

(47) a. *John married any women because he had money.
b. *John had ever got married because he had money

What should be the right monotonicity of a *because*-sentence? Note that the NPI phenomenon in a *because*-sentence is reminiscent of that in a conditional. As discussed in von Fintel (1999) (see 1.1.2), while strengthening the antecedent of a conditional is not always valid (as shown in (48)), the occurrence of NPIs (see (49)), following the DE-based theory (Fauconnier 1975, 1979; Ladusaw 1979), indicates that the antecedent of a conditional should support a DE inference.

(48) If John subscribes to newspapers, he is well-informed. =/=>
If John subscribes to newspapers he cannot read, he is well-informed.

(49) If John subscribes to any newspapers, he is well-informed.

To solve this dilemma, von Fintel (1999) suggests that NPI licensing is subject to the SDE condition; given that the antecedent of a conditional is SDE, NPIs are grammatical in this context. On the other hand, the strengthening of the antecedent is checked with respect to strict DE; since the antecedent of a conditional, based on the semantics in von Fintel (1999), is not strictly DE, strengthening of the antecedent fails. In the case of a *because*-sentence, while based on the DE theory, the grammaticality of NPIs in the *because*-clause of a negated *because*-sentence (see (4), repeated as (50)) suggests that this environment is DE in the scope of negation and hence is UE when negation is absent,

[8] Note that this criticism will not change if a monotonic semantics of counterfactual conditionals (e.g., von Fintel 1999, 2001) is adopted.

the failure of weakening the *because*-clause (see (51)-(52)) shows that the *because*-clause of a *because*-sentence cannot be strictly UE[9].

(50) a. It is not the case that John married Sue because he had any money.
b. It is not the case that John married Sue because she had ever helped him.

(51) a. John was drinking and driving. => John was drinking/John was driving.
b. John was arrested because he was drinking and driving. =/=>
John was arrested because he was drinking/John was arrested because he was driving.

(52) a. Sue likes Fred. => Sue is sentient.
b. Bill is upset because Sue likes Fred. =/=> Bill is upset because Sue is sentient.

Based on the SDE theory of NPI licensing (von Fintel 1999; a.o.), the grammaticality of the occurrence of NPIs in the *because*-clause of a negated *because*-sentence and the failure of weakening the *because*-clause together indicate that an adequate semantics of *because* should render the *because*-clause purely SUE and hence purely SDE under negation; furthermore, the *because*-clause cannot be strictly UE. Achieving to a semantics of *because* with such monotonicity properties will be the task of the rest of this chapter.

3.2.1.2 Other problems of Counterfactual Analyses of *Because*

Lewis (1973b)'s theory of causation built the causal dependency of two distinct actual events on the counterfactual dependency of the corresponding propositions of these two events. This idea suggests that for any two distinct actual events, the causal dependency of these two events and the counterfactual dependency of their

[9] Linebarger (1980, 1987) claimed that a DE inference is valid in the *because*-clause in the scope of negation (see (i)); hence, *because*-clauses are DE under negation. On the other hand, Kadmon and Landman (1993) claimed that Linebarger was wrong in treating *because*-clauses as monotonic.

corresponding propositions go hand in hand. In the philosophy literature however, several problems have been pointed out for this analysis (see Menzie 2008 for a detailed summary). Given that the semantics of *because* discussed above (see (42) and (44)) is built on Lewis's (1973b) counterfactual analysis of causal dependency, some of the problems are inherited by these semantics. In the following, I will sketch two of the problems for Lewis's (1973b) counterfactual analysis that have been discussed in the philosophy literature and show that a semantics of *because* based on Lewis's (1973b) idea encounters these problems as well. Based on the semantics of *because* discussed above, it is predicted that a *because*-sentence *q because p* entails the counterfactual conditional *if* $\neg p$, *then* $\neg q$; moreover, it is also predicted that on the ground where *p* and *q* are both true, a counterfactual conditional *if* $\neg p$, *then* $\neg q$ entails the *because*-sentence *q because p*. The following discussion shows that such predictions are not borne out; these two entailment patterns are not always valid.

The two problems that will be discussed are the selection problem (Kim 1973; Abott 1974; a.o.) and the preemption problem (Lewis 1973b, 2000; a.o.); both problems result from correlating causal dependency with counterfactual dependency. The selection problem concerns cases where the counterfactual dependency of two propositions is well established but the causal statement about their corresponding events is deviant; the preemption problem concerns cases where the causal dependency of two distinct actual events is well-established but the counterfactual dependency of the corresponding propositions cannot be formed. While the goal of this chapter is to account for the NPI phenomenon in *because*-sentences, the semantics of *because* that is proposed in this chapter will shed light on these two issues as well.

3.2.1.2.1 The Selection Problem

Lewis's (1973b) counterfactual analysis of causal dependency and causation predicts that for two distinct actual events, if the counterfactual dependency between their corresponding propositions is established, their causal dependency is established as well. Both Kim (1973) and Abott (1974) however have presented examples where a counterfactual conditional is true but the corresponding causal statement is deviant.

(53) a. If Mary hadn't got married, she would not have become a widow.
b. ??Mary's getting married caused her to become a widow. (Abott 1974)

(54) a. If I were not born, I would not have come to Amherst.
b. ??My being born caused me to come to Amherst. (Abott 1974)

This problem is inherited by a semantics of *because* that is built on Lewis's counterfactual analysis of causal dependency. Based on the semantics in (42) or (44), when *p, q* and the counterfactual conditional *if* $\neg p$*, then* $\neg q$ are all true, the *because*-sentence *q because p* should be well-formed and true as well. This prediction is not borne out; as shown in (53) and (54), while the counterfactual conditionals in (53) and (54) are well-formed, their corresponding *because*-sentences (see (55)) are deviant when uttered under normal circumstances even if it is assumed that the two propositions connected by *because* are true[10].

(55) a. ??Mary became a widow because she got married.
b. ??I came to Amherst because I was born.

3.2.1.2.2 The Preemption Problem

[10] (55a) is felicitous in a context in which it is taken to be a sarcasms. Here I put aside such an usage of (55a).

While the selection problem is about cases where the counterfactual dependency is established but the corresponding causal statement is deviant, the preemption problem concerns cases where there intuitively exists a causal relation between two distinct actual events but the counterfactual dependency of their corresponding propositions cannot be maintained. An example that illustrates the preemption problem, which is discussed in Lewis (2000), is given in the following. Suppose Billy and Suzy throw rocks at a bottle. Suzy throws first, or maybe she throws harder. Her rock arrives first. The bottle shatters. When Billy's rock gets to where the bottle used to be, there is nothing there but flying shards of glass. Without Suzy's throw, Billy's throwing the rock would have led to the shattering of the bottle. But, thanks to Suzy's preemptive throw, that impact never happens. In this example, while the causal statement in (56a) is intuitively true, the counterfactual conditional in (56b) is false, for in this scenario, the rock would shatter anyway; if Suzy's rock had not shattered the bottle, Billy's would have[11]. Cases like this pose a problem to Lewis's counterfactual theory because, while intuitively there exists a causal relation between Suzy's throw and the shattering of the bottle, the counterfactual dependency of the corresponding propositions of these two events fails. In the example given above, while the causal statement in (56a) is intuitively true, the counterfactual conditional (56b) is false, for the bottle would have shattered even without Suzy's throw.

(56) a. Suzy's throw caused the shattering of the bottle.
b. If Suzy had not thrown the rock at the bottle, the bottle would not have shattered.

---

[11] The example given here is the case of *late preemption* in Lewis (2000). Lewis (2000) divided cases of preemption into two types, *early preemptions* and *late preemptions*. As he noted in his (1973b) theory of causation, early preemption is not a problem, for although the counterfactual dependency between the corresponding propositions of two distinct actual events cannot be established, the causal dependency between these two evens can still be formed by a causal chain (see footnote 2; see also Menzie 2008 and references cited therein for a detailed summary).

A semantics of *because* that is built on Lewis's (1973b) counterfactual analysis will run into the same problem as well. Given that in such a semantics the truth of a *because*-sentence *q because p* depends on the truth of the counterfactual conditional *if* $\neg p$, $\neg q$, it fails to predict that the *because*-sentence in (57) is true in the context given above.

(57) The bottle shattered because Suzy threw the rock at it.

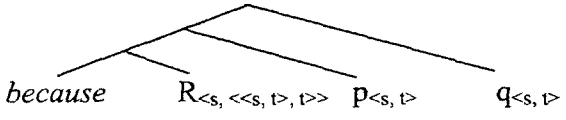
Summarizing the discussion in 3.2.1, first I have shown that a counterfactual semantics of *because* that is built on Lewis's (1973b) counterfactual analysis of causal dependency leads to the incorrect predictions for the NPI phenomenon in *because*-sentences. I further show that a semantics of *because* that adopts Lewis's (1973b) idea inherits the selection problem and the preemption problem, which have been discussed in the philosophy literature. Given that the key solution to the NPI phenomenon in *because*-sentences lies in an appropriate specification of the lexical entry of *because*, a new semantics of *because* will be proposed in the following. While the proposal is aimed to account for the NPI phenomenon in *because*-sentences, it also provides an account for the mismatch of *because*-sentences and counterfactual conditionals in the case of the selection problem and the preemption problem.

3.2.2 Proposal: A New Semantics of *Because*

My proposal for the semantics of *because*-sentences is as follows. Adopting a Kratzer-von Fintel style semantics of modality (see von Fintel and Heim 2005), I treat *because* as a modal connective (cf. Sæbø 1991). In addition to two propositions, however, I suggest that *because* takes an ordering source function $R_{<s,<<s,t>,t>>}$ as an extra argument. The LF of a *because*-sentence *q because p* and its semantics are given in (58).

In (58b), $A_{<s, <<s, t>, t>>}$ is a function that maps a world w to a set of true propositions in w that describe the relevant context; the intersection of A(w) (i.e. $\cap$A(w)) hence is a set of worlds that serves as the modal base. $R_{<s, <<s, t>, t>>}$ is a function that maps a world to a set of propositions which serve as an ideal; all the worlds in the modal base $\cap$A(w) are ordered and arranged into nested spheres (i.e. Lewis's spheres; see Lewis 1973a) with respect to R(w). The function $max_{\leq R(w)}$ picks out the worlds that are the closest to this ideal (i.e. the 'best' worlds; the innermost sphere in the modal base $\cap$A(w)) (see the definitions for the ordering given in (45)).

(58) a. *q because p*



b. $[\![\text{because}]\!]^{w, A}(R)(p)(q)$ is defined only if
i) $q \in A(w)$ and hence $\cap A(w) \subseteq q$;
ii) $w \in max_{\leq R(w)}(\cap A(w))$;
iii) $\cap R(w) \subseteq \{w': max_{\leq R'(w')}(\neg p) \subseteq \neg q\}$; where for any w'', $\cap R'(w'') = \{w''\}$
if defined, $[\![\text{because}]\!]^{w, A}(R)(p)(q)=1$ iff $max_{\leq R(w)}(\cap A(w)) \subseteq p$

According to the semantics in (58), *because* poses restrictions on the modal base and the ordering source; for a *because*-sentence *q because p* to be defined, A(w) must contain the proposition *q*; hence, all the worlds in the modal base $\cap$A(w) are *q*-worlds. In addition, the semantics in (58b) requires that the ordering source R(w) entails the counterfactual conditional *if ¬p, then ¬q* (see (58b, ii)). The semantics in (58b) for *because* further requires that the world of evaluation w be one of the 'best' worlds in the modal base $\cap$A(w) with respect to the ordering source R(w) (i.e. $max_{\leq R(w)}(\cap A(w))$). If defined, a *because*-sentence *q because p* is true iff the *because*-clause *p* is true in all the 'best'

worlds in $\cap$A(w) with respect to the ordering source R(w) (i.e. $max_{\leq R(w)}(\cap A(w))$). In a negated *because*-sentence $\neg$*[q because p]*, the presuppositions (58b, i-iii) are retained and project through negation; if defined, $\neg$*[q because p]* is true iff not all the 'best' worlds in the modal base are *p*-worlds.

What should be the ordering source R(w) for a *because*-sentence? One possibility is that the ordering source R(w) for a *because*-sentence is totally realistic (i.e. $\cap$R(w)={w}). Assuming R(w) is totally realistic however, renders the semantics in (58) too weak: with respect to a totally realistic ordering source, the 'best' worlds in the modal base form a singleton set which contains only the world of evaluation w, for no worlds are better than w with respect to a totally realistic ordering source R(w); this further leads to the unwelcome prediction that for any two propositions *p* and *q*, as long as both *p* and *q* are true in the world of evaluation w, the *because*-sentence *q because p* is true in w. Another possibility is that the ordering source R(w) is realistic (i.e. w$\in \cap$R(w))[12]. Due to the restriction on the ordering source posed by the semantics of *because* in (58b, iii), which states that $\cap$R(w) must entail the corresponding counterfactual conditional, this possibility predicts that when a *because*-sentence *q because p* is true in w, the counterfactual conditional *if* $\neg$*p, then* $\neg$*q* is true in w as well. While in most cases a *because*-sentence *q because p* and a counterfactual conditional *if* $\neg$*p, then* $\neg$*q* go hand in hand, the cases of preemption discussed above show that this is not always the case. Here I suggest that the propositions the ordering source function R selects as an ideal are those taken to be a 'norm' of some kind in the relevant context; a *because*-sentence *q because p* is asserted based on some norm that is relevant to the context with respect to

[12] This includes the possibility that R(w) is epistemic, given that the epistemic conversational background is a special case of the realistic one (see Kratzer 1981).

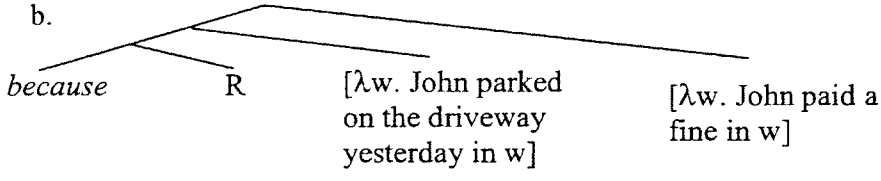
which it is evaluated. A norm can be epistemic knowledge, orders, laws, or someone's belief (see (59) for examples). $\cap R(w)$ hence is the set of worlds in which whatever is going on conforms to a norm that is relevant to the context where a *because*-sentence is evaluated.

(59) a. Mary got hired because she is a woman (the company policy)
b. This plant grows well here because the soil here is rich in minerals. (natural laws)
c. John paid a fine because he parked on the driveway yesterday. (community regulations)

An example that illustrates the semantics of *because* in (58b) is given in (60).

(60) a. John paid a fine because he parked on the driveway yesterday.

b.



c. $[\![(60b)]\!]^{w,A}$ is defined only if:
i) $\{w': \text{John paid a fine in } w'\} \in A(w)$;
ii) $w \in max_{\leq R(w)}(\cap A(w))$;
iii) $\cap R(w) \subseteq \{w': \text{for all worlds } w'' \text{ such that } w'' \text{ is the closet to } w' \text{ and John didn't parked on the driveway yesterday in } w'', \text{ John didn't pay a fine in } w''\}$
if defined, $[\![(60b)]\!]^{w,A} = 1$ iff
$\forall w' \in max_{\leq R(w)}(\cap A(w))$: John parked in the drive way in w'

As shown in (60c), for (60a) to be defined, it is required that: i) it is true in the relevant context that John paid a fine, ii) the world of evaluation w is one of the 'best' worlds, and iii) the ordering source R(w) entails that if John had not parked on the driveway, he would not have paid a fine. If defined, (60a) is true iff John parked on the driveway in all the 'best' worlds. What is the content of A(w) and R(w)? In the example (60a), A(w) contains the propositions that describe what John did, John's paying a fine included. R(w)

is the set of propositions taken to be a norm in the relevant context; in this case, the norm can be the set of propositions the truth of which are demanded by the community regulations; the community regulations state that nobody commits any misbehavior that is harmful to the community, including obstructing the driveway, and anyone who obstructs the driveway pays a fine and anyone who does not commit a violation does not pay a fine; hence, given the regulations, if John had not parked on the driveway, he would not have paid a fine. Note that the worlds contained in $\cap R(w)$ are 'ideal' worlds; these are the worlds in which what happens conforms to what the regulation demands; for all the worlds w' in $\cap R(w)$, given that in w' there are no infractions and nobody pays a fine, it is true in w' that he would not have paid a fine if John had not parked on the driveway.

The semantics of (61a), the negation of (60a), is given in (61c). (61a) carries the same presuppositions as (60a) does. If defined, (61a) is true iff not all the 'best' worlds in the modal base $\cap A(w)$ with respect to the ordering source R(w) are those in which John parked on the driveway yesterday. Note that in (61), the worlds that falsify the causal relation between John's paying a fine and his parking on the driveway do not have to include the world of evaluation w. If it is false in w that John parked on the driveway yesterday, it follows that (61a) is true (and (60a) is false); on the other hand, it could be that it is true in w that John parked on the driveway yesterday and the worlds that falsify this causal relation are those other than w.

(61) a. It is not the case that John paid a fine because he parked on a driveway yesterday.
b. LF:

c. $[\![(61b)]\!]^{w,A}$ is defined only if:
i) {w′: John paid a fine in w′}$\in$ A(w);
ii) w$\in$ $max_{\leq R(w)}(\cap A(w))$;
iii) $\cap$R(w)$\subseteq${w′: for all worlds w″ such that w″ is the closet to w′ and John didn't parked on the driveway yesterday in w″, John didn't pay a fine in w″}
If defined, $[\![(61b)]\!]^{w,A}$=1 iff $\neg[\forall w' \in max_{\leq R(w)}(\cap A(w))$: John parked in the drive way in w′]

The case of a negated *because*-sentence followed by a *but*-conjunct (see (62)), based on the proposal above, is represented as follows[13]. In (62a), each of the two occurrences of *because* comes with its own ordering source function; in the first conjunct, the intersection of the ordering source $R_1(w)$ entails that if John had not parked on the driveway, he would not have paid a fine; in the second conjunct, the intersection of the ordering source $R_2(w)$ entails that if John had not dumped the trash in the front yard, he would not have paid a fine. Moreover, for (62a) to be defined, the world of evaluation w has to be one of the 'best' worlds in the modal base $\cap A(w)$ with respect to both $R_1(w)$ and $R_2(w)$. If defined, (62a) is true iff it is **not** the case that John parked on the driveway yesterday in all the 'best' worlds with respect to $R_1(w)$, and it is the case that he dumped his trash in the front yard in all the 'best' worlds with respect to $R_2(w)$.

(62) a. John didn't get a ticket because he parked on the driveway yesterday, but because he dumped his trash in the front yard.

b. LF: not-[John paid a fine [because-R_1 he parked on the driveway yesterday]], but [John paid a fine [because-R_2 he dumped his trash in the front yard]]

c. $[\![(62a)]\!]^{w,A}$ is defined only if:
i) {w′: John paid a fine in w′}$\in$ A(w);
ii) w$\in$ $max_{\leq R1(w)}(\cap A(w))$ and w$\in$ $max_{\leq R2(w)}(\cap A(w))$

[13] Here for the sake of simplicity, I take *but* to be the operator that conjoins two sentences with the opposite truth values (1 or 0) and assume that in (62a) the consequent *John paid a fine* is visible in the second *but*-conjunct at LF.

iii) $\cap R_1(w) \subseteq$ {w′: for all worlds w″ such that w″ is the closet to w′ and John didn't parked on the driveway yesterday in w″, John didn't pay a fine in w″}, and
$\cap R_2(w) \subseteq$ {w′: for all worlds w″ such that w″ is the closet to w′ and John didn't dump his trash in the front yard in w″, John didn't pay a fine in w″}
If defined, $[\![(62a)]\!]^{w,A}=1$ iff
$\neg[\forall w' \in max_{\leq R(w)}(\cap A(w))$: John parked in the drive way in w′] $\wedge$
[$\forall w' \in max_{\leq R(w)}(\cap A(w))$: John dumped his trash in the front yard in w′]

As shown in (62), given that that the ordering source function R is one of the syntactic arguments of *because* and each occurrence of *because* comes with an ordering source function R; we hence are able to accommodate these two different presuppositions (see (62b′)) on the ordering source of *because*. Note that while $R_1(w)$ and $R_2(w)$ could be different, they could be the same as well. For instance, in (62) $R_1(w)$ and $R_2(w)$ can both refer to the community regulations; on the other hand, in (63) $R_1(w)$ and $R_2(w)$ could be different; while $R_1(w)$ could be the divorce laws, $R_2(w)$ could be laws of morality.

(63) a. John didn't give 100K to his ex-wife because he lost in the divorce law suit, but because he worried about the life of his children.

b. $\cap R_1(w) \subseteq$ {w′: for all worlds w″ such that w″ is the closet to w′ and John didn't lose in the divorce law suit in w″, John didn't give 100K to his ex-wife in w″}

$\cap R_2(w) \subseteq$ {w′: for all worlds w″ such that w″ is the closet to w′ and John didn't worry about the life of his children in w″, John didn't give 100K to his ex-wife in w″}

The consequences of this new semantics of *because* is further discussed in the following.

3.2.2.1 Factivity and Negative Implicatures

Intuitively, a *because*-sentence *q because p* is true only if the main clause *q* and the *because*-clause *p* are both true; in addition, as evidenced by (46), the truth of *q* is presupposed. The factivity on *p* and *q* in *q because p* is captured as follows. The factivity of *q* comes from the presupposition (58b, i): according to (58b, i), for a *because*-sentence *q because p* to be defined, the main clause *q* has to be one of the propositions in A(w), the set of propositions that describe the relevant context and constitute the modal base; hence, *q* has to be true in the world of evaluation w.

The factivity of *p*, according to the new semantics of *because*, is entailed by the presupposition (58b, ii) and the truth conditions. The stipulated presupposition (58b, ii) requires that the world of evaluation w be one of the 'best' worlds in the modal base; on the other hand, the truth conditions state that if defined, a *because*-sentence *q because p* is true in the world of evaluation w iff all the 'best' worlds are *p*-worlds. Given that according to (58b, ii), w is one of the 'best' worlds, it follows that w is also a *p*-world if a *because*-sentence *q because p* is true in w.

In a negated *because*-sentence ¬[*q because p*], the presuppositions (58b, i-iii) are retained and project through negation; if defined, ¬[*q because p*] is true in w iff there is one world among the 'best' worlds in the modal base that is not a *p*-world. Note that the world that falsifies a *because*-sentence *q because p* can, but does not have to be the world of evaluation w; if *p* is false in w, it follows that a *because*-sentence *q because p* is false in w; on the other hand, *p* can be false in 'best' worlds other than w as well. The implicature of the falsity of *p* from ¬[*q because p*] is what Linebarger (1980, 1987) termed 'negative implicature'. (64a) shows that a negated *because*-sentence can give rise to the falsity of the *because*-clause, though as shown in (64b), such a 'negative

implicature' can be cancelled by the follow-up discourse. As mentioned above, the occurrence and cancellation of such a negative implicature is predicted by the newly proposed semantics of *because* in (58b).

(64) a. John did not pay a fine because he parked on the driveway yesterday, but because he hadn't mowed his lawn for months.
Negative Implicature: John didn't park on the driveway yesterday.

b. John did not pay a fine because he parked on the driveway yesterday, but because he hadn't mowed his lawn for months. Though he parked on the driveway yesterday, the police did not come to check this neighborhood.

3.2.2.2 The Selection Problem

As discussed in 3.2.1.2.1, there are cases where a counterfactual conditional is well-formed but a corresponding *because*-sentence is deviant (see (53)-(55); see also (65)), and a semantics of *because* that is based on Lewis's (1973b) idea (see (42) or (44)) fails to capture this deviance.

(65) a. If Mary hadn't gotten married, she would not have become a widow.
b. ??Mary became a widow because she got married.

The deviance of the examples like (65b) follows straightforwardly from the proposed semantics of *because*. Consider the truth conditions of (65b) (see (66)).

(66) $[\![(65b)]\!]^{w,A}$ is defined only if
i) $\{w': \text{Mary became a widow in } w'\} \in A(w)$;
ii) $w \in max_{\leq R(w)}(\cap A(w))$;
iii) $\cap R(w) \subseteq \{w': \text{it is true in } w' \text{ that if Mary had not got married, she would not have become a widow}\}$
If defined, $[\![(65b)]\!]^{w,A} = 1$ iff $max_{\leq R(w)}(\cap A(w)) \in \{w': \text{Mary got married in } w'\}$

As shown in (66), for (65b) to be defined, it is required that that the main clause of a *because*-sentence be one of the true propositions that are selected to compose the relevant

context. Hence, in (65b), the modal base $\cap$A(w) contains only worlds in which Mary became a widow. Since becoming a widow entails getting married at some time earlier, it is also true in all the worlds in $\cap$A(w) that Mary got married as well in all the 'best' worlds in $\cap$A(w) (i.e. $max_{\leq R(w)}(\cap A(w))$). This renders the truth conditions of (65b) too weak: with the truth conditions in (66), (65b) is true in any world in which it is evaluated. Given that its truth is no longer contingent, the deviance of (65b) arises.

3.2.2.3 The Preemption Problem

The preemption problem refers to cases where a causal statement is true but the corresponding counterfactual conditional is false. As discussed in 3.2.1.2.2, a counterfactual analysis of the semantics of *because* leads to the wrong prediction in these cases as well. The example of the preemption problem given in 3.2.1.2.2 is repeated as follows. Suppose Billy and Suzy throw rocks at a bottle. Suzy throws first, or maybe she throws harder. Her rock arrives first. The bottle shatters. When Billy's rock gets to where the bottle used to be, there is nothing there but flying shards of glass. Without Suzy's throw, Billy's throwing the rock would have led to the shattering of the bottle. But, thanks to Suzy's preemptive throw, that impact never happens. In this scenario, intuitively, while the counterfactual conditional (67a) is false, the *because*-sentence (67b) is still true. As discussed, a counterfactual analysis of *because*, in which the truth conditions of a *because*-sentence depend on that of a counterfactual conditional, fails to predict that the *because*-sentence (67b) is intuitively true in this scenario.

(67) a. If Suzy had not thrown the rock at the bottle, the bottle would not have shattered.
b. The bottle shattered because Suzy threw the rock at it.

Unlike a counterfactual analysis, the proposal here is immune to this problem. In the semantics of *because* proposed in this chapter, a *because*-sentence can be true without the corresponding counterfactual conditional being true. Consider the truth conditions of (67b) based on the new semantics of *because*, which are given in (68).

(68) $[\![(67b)]\!]^{w,A}$ is defined only if
i) $\{w'$: the bottle shattered in $w'\} \in \cap A(w)$;
ii) $w \in max_{\leq R(w)}(\cap A(w))$; and
iii) $\cap R(w) \subseteq \{w'$: it is true in w' that if Suzy had not thrown the rock at the bottle, it would have not shattered$\}$
if defined, $[\![(67b)]\!]^{w,A} = 1$ iff $max_{\leq R(w)}(\cap A(w)) \subseteq \{w'$: Suzy threw the rock at the bottle in $w'\}$

The truth conditions given in (68) require that the ordering source R(w) entail the counterfactual conditional (67a); for any world w′ in the modal base ∩A(w), the closer it is to the ideal R(w), the more likely it is that the counterfactual conditional in (67b) is true in w′. Hence the worlds in $max_{\leq R(w)}(\cap A(w))$ are those in which it is the most likely that (67b) is true. This, however, does not guarantee that the counterfactual conditional (67b) has to be true in the world of evaluation w; given that the definition of the ordering is partial rather than total (see (45)), while the world of evaluation w is required to be one of the 'best' worlds, it can be the case that w fails to satisfy some of the propositions in R(w) but is still in tie with other worlds in the 'best' worlds (i.e. $max_{\leq R(w)}(\cap A(w))$)[14]. This allows the possibility that the counterfactual conditional in (67a) doesn't have to be true in a world in which the *because*-sentence in (67b) is evaluated as true.

[14] Lewis (2000) provided an amendment for his (1973b) counterfactual analysis to accommodate the preemption problem. Given that this amendment concerns only the preemption problem in the theory of causation and does not concern other linguistic phenomena discussed in this chapter, I will not discuss it here.

Note that based on the proposed semantics of *because*, the ordering source R(w) in (67b) cannot be a realistic ordering source, for, as mentioned above, a realistic ordering source with the proposed semantics of *because* leads to the prediction that both the counterfactual conditional (67a) and the *because*-sentence (67b) are true at the same time. Given that the intuition about this judgment is not clear, I leave this for further investigation.

3.2.2.4 NPI Licensing and the Failure of Weakening the *Because*-clause

Recall from 3.1 the NPI phenomenon in *because*-sentences and Linebarger's (1980, 1987) observation: NPIs are ungrammatical in a *because*-sentence (e.g., (69)). In a negated *because*-sentence, NPIs are grammatical in the *because*-clause (e.g., (70)); in the main clause of a negated *because*-sentence, NPIs are ungrammatical when their scope is limited to only the main clause but grammatical when they scope over *because* (e.g., (71))[15].

(69) a. *John ate any apples because he was hungry.
b. *John was very full because he ate any apples.

(70) It is not the case that John was full because he ate any apples.

(71) He didn't commit any of those crimes because he was drunk. (Linebarger 1987)
a. *NEG>*because*>*any*:
Paraphrase: The reason why he committed some crimes is **not** his drunkenss.

b. NEG>*any*>*because*:
Paraphrase: There is **no** crime x such that he committed x due to his drunkness.

[15] Note again that the scope configuration *because*>NEG>*any* is not in the interest of this paper, for in this configuration, the licensing of NPIs in the main clause follows from any current theories of NPIs .

The ultimate goal of the semantics given in (58) is to provide a straightforward and adequate solution to the NPI phenomenon in *because*-sentences based on the SDE condition of NPI licensing (von Fintel 1999), according to which NPIs are grammatical only in an SDE context (see (41)). The entailment property of a (negated) *because*-sentence, based on the semantics given in (58), is summarized in (72).

(41) a. The SDE condition on NPI licensing:
An NPI is only grammatical if it is in the scope of α such that $[\![\alpha]\!]$ is SDE.

b. Strawson Downward Entailingness:
A function f of type $<\sigma, \tau>$ is Strawson downward entailing (SDE) iff for all x, y of type σ such that $x \Rightarrow y$ and f(x) is defined: $f(y) \Rightarrow f(x)$

(72) a. *q because p*

	UE	SUE	DE	SDE
p	--	✓	--	--
q	--	✓	--	✓

b. $\neg$ [*q because p*]

	UE	SUE	DE	SDE
p	--	--	--	✓
q	--	✓	--	✓

As summarized in (72), the *because*-clause *p* in a *because*-sentence *q because p* is SUE; hence, NPIs are ungrammatical in the *because*-clause of a *because*-sentence. For instance, based on the semantics in (58), the UE inference from (73b) to (73a) is valid on the ground where the presuppositions of (73a) are satisfied, for it is true in all the 'best' worlds in $\cap$A(w) where John got a white car that he got a car. Note that to keep the context constant when checking the entailment relation between (73a, b), the indices on both occurrences of *because* in (73) have to be the same; hence the *because*-sentences in (73a, b) are evaluated with respect to the same ideal.

(73) a. John was happy because he got a car.
b. John was happy because he got a white car.

On the other hand, when a *because*-sentence is embedded under an (S)DE operator like negation or negative attitude predicates such as *not think*/doubt, the *because*-clause is SDE context. The licensing of NPIs in the *because*-clause in the scope of (S)DE operators, based on the semantics in (58), hence follows from the SDE condition.

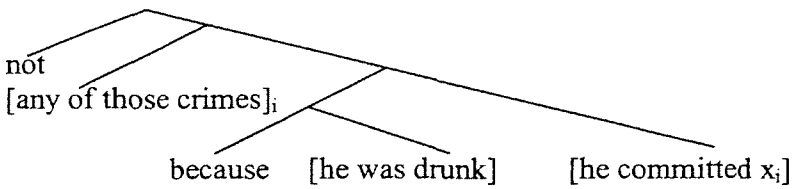
In the semantics in (58), the main clause of a *because*-sentence only plays a role in the presuppositions but not in the truth conditions; as summarized in (72), the main clause *q* of a *because*-sentence *q because p* is both SDE and SUE; for instance, based on the semantics given in (58), (74a, b) entail each other on the ground where the presuppositions of (74a, b) are all taken for granted.

(74) a. John was singing because he was happy.
b. John was singing and dancing because he was happy.

When a *because*-sentence is embedded in the scope of negation, the entailment property of the main clause is still retained, for as mentioned above, the main clause of a *because*-sentence only plays a role in the presuppositions but not in the truth conditions. Recall from 1.1.1 the assumption that while NPIs are grammatical in an SDE context, they can never be licensed in an (S)UE context (Progovac 1993; Lahiri 1998; Guerzoni and Sharvit 2007; a.o,), which is motivated by the contrast between the restrictor of a definite plural and that of a definite singular. Given that the main clause of a *because*-sentence is both SUE and SDE, NPIs can never be grammatical inside the main clause of a (negated) *because*-sentence.

As mentioned above, an NPI can occur in the main clause of a *because*-sentence if it scopes over *because* at LF (e.g., (71b)); the discussion in 3.1 also shows that when an NPI in the main clause of a *because*-sentence fails to scope over *because* at LF, it is ungrammatical. Once an NPI in the main clause of a negated *because*-sentence undergoes LF-movement and scopes over *because*, it is located in the immediate scope of negation and no other operators intervene between the NPI and negation (e.g., see (75) for the LF of (71) with the scope configuration (71c)). Given that the immediate scope of negation is DE, the NPI *any* is grammatical in (75).

(75) the LF of (24) with the scope configuration (24c):



Last but not the least, recall that just as strengthening the antecedent fails, weakening the *because*-clause fails (e.g., (51)), too. The failure of weakening the *because*-clause follows from the semantics in (58) as well. Assuming that weakening the *because*-clause, just like strengthening the antecedent, is subject to strict entailment, the failure of weakening the *because*-clause is due the presupposition (58iii), which states that as for the ideal R(w) in a *because*-sentence, for all the worlds w′ in ∩R(w) such that for all the worlds w″ closest to w′ where the *because*-clause is false, the main clause is false in w″. Take (51) for instance; the premise alone does not guarantee the presupposition on the ideal R(w) in the conclusion; that ∩R(w) entails *if it were not the case that John was not drinking and driving, he would not have been arrested* does not

guarantee that ∩R(w) entails *if it were not the case that John was not drinking/driving, he would not have been arrested*, for the worlds closest to a world w′ where it is not the case that John was drinking and driving may not contain those where John was not drinking/driving. Weakening the *because*-clause hence fails in (51).

(51) a. John was drinking and driving. => John was drinking/John was driving.
b. John was arrested because he was drinking and driving.=/=>
John was arrested because he was drinking./John was arrested because he was driving.

3.2.3 Interim Summary and Further Remarks

In the discussion above, I have first shown that a semantics of *because* based on Lewis's (1973b) counterfactual analysis of causal dependency together with the SDE condition of NPI licensing lead to the wrong prediction for the NPI phenomenon in *because*-sentences. To solve this problem, I have proposed a new semantics of *because* and then shown how this semantics accounts for the NPI phenomenon and other semantic properties of this construction.

Note that the proposal in this chapter is not meant to be the theory of causation; the goal of this chapter is rather humble; the provided criticisms and the proposal here are only intended for a semantics of *because* based on Lewis's (1973b) counterfactual analysis. Note also that Lewis's theory of causation is not meant for *because*-sentences, either; in Lewis (1986a), *because*-sentences are merely taken 'to explain an event by providing information of a causal history', and no further discussion of *because*-sentences is provided.

The concept *causation/causal dependency*, as shown (76), can be realized in different forms in natural language; for instance, the *because*-sentence in (76c), at first

glance, carries the same interpretation as other types of causal statements given in (76a, b).

(76) a. Mary's living nearby causes John to prefer this neighborhood.
(from Dowty 1979, pp. 103)
b. Mary's living nearby is the cause of John's preferring this neighborhood.
c. John prefers this neighborhood because Mary lives nearby.

Given the similarity in interpretation between a *because*-sentence and other types of causal statements, it is desirable to have a unified analysis of causal dependency in natural language. As shown in the following however, further comparison between *because*-sentences and other types of causal statements suggests that *because*-sentences deserve a separate treatment from other causal constructions. For instance, as shown in (77), while (77a-c) all express the causal relation between the occurrence of a storm and that of a flood, the *because*-sentence (77c) behaves differently from the causal statements in (77a, b) with respect to NPI licensing (see the contrast between (77a′, b′) and (77c′)).

(77) a. A storm caused a flood.
a′. It is not the case that <u>any</u> storm caused <u>any</u> flood.

b. A storm is the cause of a flood.
b′. It is not the case that <u>any</u> storm is the cause of <u>any</u> flood.

c. There was a flood because there was a storm.
c′. *It is not the case that there was <u>any</u> flood because there was <u>any</u> storm.

Moreover, the examples in (78) show that while in most cases, a *because*-sentence carries a similar meaning with other causal constructions, they are not always interchangeable. For instance, while it is appropriate to utter the *because*-sentence (78a), it is odd to utter (78b, c). The contrast between (78a) and (78b, c) further suggests that

the relation between the cause and the consequent in a verbal/nominal causal construction like (78b, c) and that between the two propositions connected by *because* are not the same.

(78) a. The sentence 'snow is white' is true because snow is white.
b. Snow being white caused/causes the sentence 'snow is white' to be true/being true.
c. Snow being white is the cause of the sentence 'snow is white' being true.

The third difference between a *because*-sentence and other causal statements concerns transitivity. As shown in (79a, b), most speakers are willing to draw the conclusion from the premises; these two examples suggest that the predicate *to cause/be a cause of* is intuitively transitive, and it is examples of this kind that led to the claim in Lewis (1973b) that causation is transitive.

(79) a. Mary's attending the workshop caused John's attending the workshop.
Bill's attending the workshop caused Mary's attending the workshop.
∴ Bill's attending the workshop caused John's attending the workshop.

b. Mary's attending the workshop is a cause of John's attending the workshop.
Bill's attending the workshop is a cause of Mary's attending the workshop.
∴ Bill's attending the workshop is a cause of John's attending the workshop.

Unlike the causal statements in (79) however, a *because*-sentence seems not to support the transitive inference; a shown in (80), speakers are reluctant or much less willing to draw the conclusion from the premises in (51). In fact, it is very easy to think of a scenario in which the premises in (51) are true but the conclusion is false; for instance, imagine a scenario in which John had no idea that Bill was attending the workshop, or he even had no idea about who Bill was, and hence Bill's attendance would not have any influence on John's decision regarding whether or not to attend the workshop.

(80) John attended the workshop because Mary did.
Mary attended the workshop because Bill did.
??/# ∴ John attended the workshop because Bill did.

The three differences pointed out above indicate that a semantics that is different from other causal constructions is needed for a *because*-sentence. Let me emphasize again that the discussion above is only aimed at showing that *because*-sentences are different from the case of causation and hence merit a different treatment; the proposal and the provided arguments are not intended to shed any lights on the theory of causation. For more discussions of Lewis's counterfactual analysis of causation and alternatives, I therefore simply refer the reader to Menzie (2008) for a detailed overview.

3.3 Previous Analyses of NPI Licensing in *Because*-Sentences

In the discussion above, I have shown that with the new semantics of *because* in (58b), the NPI phenomenon follows straightforwardly from the SDE account of NPI licensing. In this section, I discuss three alternative proposals in the literature regarding the licensing of NPIs in *because*-sentences: Linebarger (1980, 1987), Kadmon and Landman (1993), and Chierchia (2004). After reviewing each of these proposals, I show that these analyses not only are inadequate to account for the puzzles of NPI licensing discussed above but also yield other undesirable consequences.

3.3.1 Linebarger (1980, 1987)

Adopting the idea in Baker (1970), Linebarger (1980, 1987) proposed that the licensing of NPIs in a negated *because*-sentence is subject to the Immediate Scope

Constraint and the negative implicature. In her analysis, the ungrammaticality of the occurrence of NPIs in the main clause of a negated *because*-sentence is explained by the Immediate Scope Constraint, which requires that NPIs can only be licensed by the negative operator in the same proposition and no other logical operators can intervene between NPIs and their licensors. In (81a), due to the intervention of the *because*-clause, the licensing relation between *any* and negation is blocked. In (81b), *because* also intervenes between the weak NPI *any* and the wide scope negation. Along the same lines, it is predicted that due to the violation of the Immediate Scope Constraint, *any* cannot be licensed by the wide scope negation. Hence, Linebarger (1980, 1987) further suggests that the licensing of *any* in (81b) is rescued by the negative implicature in the reasoning adverbial clause. In this example, it is the negative implicature *Sue did not have money* that licenses *any* in the reasoning adverbial clause.

(81) a. *John did not marry *any* woman because he had money, (but because....)
LF: [¬[[***because*** John had money] He married ***any*** woman]]
b. John did not marry Sue because she had *any* money, (but because.....)
LF:[¬[[***because*** Sue had ***any*** money] John marry Sue]]
Negative Implicature: Sue did not have money.

The theoretical problems regarding such a negative-implicature-based analysis have been discussed in the literature (Krifka 1992; Levinson 2008; Guerzoni 2006; a.o.). Krifka (1992) pointed out that every proposition p follows from $\neg\neg p$ and hence this analysis would end up predicting that NPIs can occur everywhere. Any stipulation to exclude this kind of inference would weaken the explanatory power of this analysis. In

addition, Levinson (2008) pointed out that not every negative implicature licenses NPIs. One of the cases is the quantifier *almost everyone* (see (82))[16].

(82) *Almost everyone has anything to eat.
Negative Implicature: It is not the case that everyone has something to eat.

3.3.2 Kadmon and Landman (1993)

Kadmon and Landman (1993) proposed that *any* in the reasoning adverbial clause of a negated *because*-sentence (see (83a)) is licensed by metalinguistic negation cancelling the factivity of the reasoning adverbial clause. In their proposal, the reasoning adverbial clause of a *because*-sentence is not an UE context and therefore not a DE-context when embedded under negation. Moreover, the reasoning adverbial clause, just like the main clause, carries factivity[17]. In (83a), negation serves as metalinguistic negation to reject the whole *because*-sentence on the grounds where the factivity of the reasoning adverbial clause is not satisfied (see (83b)). Since the use of *any* strengthens the denial of the factivity of the *because*-clause, its occurrence is licensed.

(83) a. John did not marry Sue because she had any money.
b. 'I reject the statement that *it is because Sue has money that John married her*, because it is not the case that she has any money.'

A metalinguistic negation analysis conflicts with the observation in Horn (1985, 1989) that metalinguistic negation does not license NPIs (see (60)).

(84) *John DID NOT manage to solve any of the problems- he managed to solve ALL of them.

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[16] Here I will leave it open whether the negative inference from *almost* is an implicature or presupposition.
[17] Kadmon and Landman (1993) did not provide a semantics of *because* but simply assumed that a *because*-sentence presupposes that the main clause and the *because*-clause are true in the world of evaluation.

Another problem of this analysis is that the ungrammaticality of NPIs in the main clause of a negated *because*-sentence is left unexplained. Note that the main clause of a *because*-sentence carries factivity as well. If the factivity in the reasoning adverbial clause could be easily cancelled by metalinguistic negation just for the purpose of licensing NPIs, those in the main clause should be able to be licensed by the same mechanism. Nevertheless, as we have seen above, this prediction is not borne out.

3.3.3 Chierchia (2004)

Relying on the proposal in Kadmon and Landman (1993) that the licensing of weak NPI *any* is subject to domain widening and the strengthening of the assertion, Chierchia (2004) attributed the ungrammaticality of NPIs in the main clause of a *because*-sentence to the factivity of this environment. According to him, due to the presence of factivity in the main clause, the semantics of a *because*-sentence like (85a) can be paraphrased as (85b). In (85b), a *because*-sentence is treated as a covert conjunctive statement: the first conjunct is the main clause, and the second conjunct is formed by the operator CAUSE, of which the first argument is the reasoning adverbial clause and the second argument (x_i) is a covert pronominal element bound by the main clause.

(85) a. John complained because Mary was in a bad mood.
b. [John complained]$_i$ $\wedge$ CAUSE(Mary was in a bad mood, x_i)

Now consider (86a), the negation of (85a). The meaning of (86a) is paraphrased as (86b). Since $\neg(p \wedge q)$ generally implicates $p \vee q$, the strong meaning of (62b) is (62c)[18]. According to Distributive Laws, (86c) is equivalent to (86d). Since the main clause *John complained* is presupposed to be true (due to factivity), (86d) will be equivalent to (86e).

(86) a. John did not complain because Mary was in a bad mood, (but because....)
b. $\neg$[[John complained]$_I \wedge$ CAUSE(Mary was in a bad mood, x_i)]
c. $\neg$ [[John complained]$_I \wedge$ CAUSE(Mary was in a bad mood, x_i)]
$\wedge$ [[John complained]$_I \vee$ CAUSE(Mary was in a bad mood, x_i)]
d. [[John complained]$_I \wedge \neg$ [CAUSE(Mary was in a bad mood, x_i)]]
$\vee$ [[$\neg$[John complained]$_i$] $\wedge$ CAUSE(Mary was in a bad mood, x_i)]
e. [John complained]$_I \wedge \neg$ [CAUSE(Mary was in a bad mood, x_i)]

Now let's turn back to the case of NPIs in the main clause of a negated *because*-sentence (see (87a)). Following the reasoning in (86), (87a) can be paraphrased as (87b). In (87b), the assertion of the main clause of the *because*-sentence is out of the scope of negation and is in the second conjunct. Therefore, the occurrence of *any* in the main clause cannot strengthen the whole statement and (87a) is ungrammatical.

(87) a. *John did not marry any woman because he had money, (but because....)
b. [John married *any* woman]$_I \wedge$ NOT[CAUSE(John had money, x_i)]

This analysis provides an elegant way of accounting for the ungrammaticality of NPIs in the main clause of a negated *because*-sentence. Nevertheless, since Chierchia (2004) did not specify the semantics of the operator CAUSE, it is not clear why the licensing of weak NPI *any* in the reasoning adverbial clause of a negated *because*-sentence is not blocked (see (4)). More substantially, this analysis would bear the burden

[18] According to Chierchia (2004), the strong meaning of a sentence is its truth conditions with the nonconventional part of the meaning of the sentence (i.e. the implicature).

to account for the difference between the factivity in the complement of adversative predicates like *sorry*, *regret* and *surprise* and that in the main clause of a (negated) *because*-sentence. As shown in (88), weak NPIs are licensed in the complement of these adversative predicates, and these adversative predicates force the factivity of their complements.

(88) a. John is surprised that Mary ever read any books on NPIs
b. John regretted that he ever leaked any information to Mary.
c. John is sorry that he ever lost any money in the stock market.

Based on Chierchia's (2004) analysis of (87), the examples in (88) are analyzed as the conjunction the first conjunct of which is the complement of these adversative predicates. Given that the complement of these adversative predicates is presupposed to be true in the world of evaluation, the occurrence of *any* cannot strengthen the whole conjunctive statement; hence, this analysis leads to the prediction that weak NPIs are ungrammatical in (88). As we can see however, this prediction is not borne out[19].

Note that the arguments presented here are not against any analysis of NPI-licensing that appeals to domain widening and strengthening of the assertion (Kadmon and Landman 1993; Cheirchia 2004; a.o.). In fact, the proposal in this chapter, with certain assumptions, is compatible with those analyses on NPI licensing of this line. The main goal of these arguments is to show the inadequacy of these analyses when facing the puzzles regarding NPIs in *because*-sentences and the problems that result from the additional stipulations these analyses pose to accommodate these cases.

[19] Homer (2008) proposes an analysis along the same lines as Chierchia (2004) to account for the licensing of NPIs in *because*-sentences and other contexts with presuppositions. To account for the licensing of NPIs in (88), he suggests that presuppositions that come from the NPI licensors themselves do not block the NPI licensing. This however can only be seen as an observation and no explanation is provided.

3.4 The Licensing of Minimizers in *Because*-sentences

In the discussion above, I have proposed a semantics of *because* (see (58b)) which captures the NPI phenomenon in *because*-sentences as well as other properties of this construction. According to this semantics, the *because*-clause of a *because*-sentence is SUE and, when in the scope of negation, is SDE; hence, weak NPIs such as *any* and *ever* are licensed in the *because*-clause in the scope of negation. On the other hand, the main clause of a *because*-sentence, given the semantics in (58b), is both SUE and SDE at the same time; given that NPIs are never grammatical in SUE environments, they are ungrammatical in the main clause of a (negated) *because*-sentence. In this section, I further examine the distribution of minimizers in *because*-sentences; I will show that, with the scope theory of *even* (Karttunen and Peters 1979; Wilkinson 1996; Lahiri 1998; Guerzoni 2003, 2004; a.o.), the proposed semantics captures the distribution of minimizers in *because*-sentences as well.

Minimizers refer to idioms such as *lift a finger*, *give a damn*, a.o.; as mentioned at the beginning of this chapter, these expressions have a distribution very similar to that of weak NPIs. Just like weak NPIs, minimizers are grammatical when negation is present (see (89)) and ungrammatical when negation is absent (see (90)).

(89) a. John didn't (even) lift a finger to help Mary.
b. John didn't offer Mary any help.

(90) a. *John lifted a finger to help Mary.
b. *John offered any help to Mary.

Moreover, both minimizers and weak NPIs are grammatical in a question environment. There is however a difference between minimizers and weak NPIs in questions. As

shown in (91a), the occurrence of a minimizer in a question gives rise to a negative bias in the answerhood; in (91a), only the negative answer is felicitous and expected by the speaker; a positive answer in (91a) would lead to an oddity. On the other hand, a question with a weak NPI such as *any* does not show such a negative bias effect; both the negative and positive answers are felicitous in (91b).

(91) a. S: Did John (even) lift a finger to help Mary?
#A: Yes. A: No.
b. S: Did John offer any help to Mary?
A: Yes/No.

The distribution of minimizers with overt *even* in *because*-sentences is shown in (92)-(93). (92) shows that unlike weak NPIs, which are licensed in the *because*-clause of a negated *because*-sentence (see (4a, b)), minimizers with an overt *even* are ungrammatical in a negated *because*-sentence. (93) further shows that minimizers with an overt *even* are ungrammatical in the *yes-no* question variant of a *because*-sentence.

(92) a. *John did not **even** lift a finger to help Mary because he loved her, (but because he was intimidated by her).
b. *John did not marry Sue because she **even** lifted a finger to help him, (but because he loved her).

(93) a. *Did John **even** lift a finger to help Mary because he loved her?
b. *Did John marry Mary because she **even** lifted a finger to help him?

Given that minimizers are licensed in the scope of negation and in questions, the data in (92)-(93) are intriguing and call for an explanation. Note that the difference between minimizers and weak NPIs in questions (see (91a, b)) and the *because*-clause of a negated *because*-sentence (see (4a, b) and (92b)) shows that a different semantics from that of weak NPIs is called for to capture the distribution of minimizers. In the literature,

minimizers have been analyzed as the combination of *even* (overt or covert) and the low endpoint of a contextually determined pragmatic scale (see Heim (1984); a.o.)[20]. In the following, an analysis that combines the scope theory of *even* and the semantics of *because* proposed above (see (58b)) is suggested to account for the distribution of minimizers in *because*-sentences. In the following I will first sketch the scope theory of *even* and the licensing of minimizers.

3.4.1 The Scope of *Even* and the Licensing of Minimizers

With the assumption that minimizers are the combination of *even* (covert or overt) and the low endpoint of a pragmatic scale, an analysis that relies on the scope of *even* has been proposed to account for their distribution (Karttunen and Peters 1979; Wilkinson 1996; Lahiri 1998; Guerzoni 2003, 2004; a.o.). In such an analysis, the scope of *even* at LF determines the presuppositions it contributes to a proposition, and minimizers are licensed in a proposition iff the presuppositions brought up by *even* are satisfied[21].

A preliminary version of the semantics of *even* is given in (94)[22]. According to (94), *even* does not contribute to the truth conditions of a proposition but introduces a

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[20] In Lee and Horn (1994), *any* is also analyzed as the combination and an indefinite which denotes the low endpoint of a pragmatic scale. Lahiri (1998), however, has argued against this idea. Lahiri's (1998) argument against Lee and Horn (1994) is built on Heim's (1984) observation on the difference between weak NPIs *any* and *ever* and NPIs that are taken to be associated with *even* when they occur in the restrictor of universal quantifiers. For details, I refer the reader to these works and the references cited therein.

[21] In addition to the scope theory, a theory that appeals to the lexical ambiguity of *even* has been proposed to account for the same set of data. According to the lexical theory, *even* is lexically ambiguous between the PPI and NPI readings; while $even_{PPI}$ requires that its prejacent be the least likely to be true in the alternative set, $even_{NPI}$ requires that its prejacent be the most likely to be true. For the lexical theory of *even* and the arguments against the scope theory, I refer the reader to Rooth (1985), Rullman (1997), and Giannakidou (2007). On the other hand, I also refer the reader to Guerzoni (2003, 2004) for the arguments against the lexical theory of *even*. The debate of these two theories of *even* is beyond the scope of this chapter.

[22] Here and in the following discussion, I disregard the existential presupposition of *even*, given that it is irrelevant to the following discussion.

presupposition, which requires that its prejacent be the least likely proposition to be true in the alternative set C. The alternative set C for *even* is strictly determined by the focus and the scope of *even* at LF.

(94) The Semantics of *Even* (preliminary)

a. $[\![\text{even}]\!]^w(p)$ is defined only if
$\forall q[(q \in C \ \& \ q \neq p) \rightarrow \text{LIKELIHOOD}(p)(w) < \text{LIKELIHOOD}(q)(w)]$
(Scalar Presupposition)
If defined, $[\![\text{even}]\!]^w(p)=1$ iff $p(w)=1$

b. for any two propositions p and q such that $p \neq q$ and any world w,
$\text{LIKELIHOOD}(p)(w) < \text{LIKELIHOOD}(q)(w)$ iff p entails q (i.e. $\{w': w \in p\} \subseteq \{w': w \in q\}$)

In the scope analysis of *even*, which I am assuming in this dissertation, *even* takes scope over DE operators through LF movement (Karttunen and Peters 1979; Wilkinson 1996; Guerzoni 2003, 2004). Along this line of analysis, to satisfy the scalar presupposition, *even* associated with a low endpoint of a pragmatic scale has to scope over a DE operator at LF so that its LF-prejacent can be the least likely proposition to be true in the alternative set; minimizers hence can only occur in DE contexts.

Consider (95a), a case where minimizers are licensed in the scope of negation. In (95a), *even* (covert or overt) moves across negation at LF (see (95b)); the alternative set C contains all the propositions that differ from each other in the degree of helping. Since not helping to the minimal degree entails not helping to some degree other than the minimum, the prejacent of *even* at LF, *John didn't help Mary to the minimal degree*, is the least likely proposition to be true in the alternative set C. Hence, the scalar presupposition of *even* is satisfied and the minimizer *lift a finger* is licensed.

(95) a. John didn't **(even)** lift a finger to help Mary.
b. LF: [even [¬ [John helped Mary to the [minimal]$_F$ degree]]]

c. C={John didn't help Mary to the minimal degree;
John didn't help Mary to a slightly-higher-than-minimum degree;
...
John didn't help Mary to the maximal degree}

Now consider (96a), a case where the minimizer occurs in the absence of a DE operator. Since helping to some degree higher than the minimum entails helping to the minimal degree, the prejacent of *even*, *John helped Mary to the minimal degree* is entailed by all the other alternatives in C and is the most likely proposition to be true. This however contradicts the scalar presupposition of *even*, which requires that the prejacent be the least likely one to be true in C. Given that the scalar presupposition of *even* cannot be satisfied in (96a), the occurrence of the minimizer *lift a finger* is ungrammatical.

(96) a. *John (**even**) lifted a finger to help Mary.
b. LF: [even [John helped Mary to the [minimal]$_F$ degree]]
c. C={John helped Mary to the minimal degree;
John helped Mary to a slightly-higher-than minimum degree;
...
John helped Mary to the maximal degree}

In the semantics of *even* given in (94), the notion of likelihood is based on strict entailments; for any two distinct propositions p and q, p is less likely to be true than q iff p entails q (see (94b)) . However, such a notion of likelihood leads to the wrong prediction when the examples in (97) are considered. As discussed in von Fintel (1999), the complement of adversative predicates, such *surprise* and *sorry*, and the scope of *only* NP are SDE but not strictly DE; hence, the scalar presupposition of *even* in these examples cannot be satisfied even if *even* moved across these SDE operators. As shown in (97), this prediction is apparently incorrect.

(97) a. John is surprised that Mary (**even**) gave a damn about NPIs.
a′. [even [John is surprised that Mary cares to the [minimal]$_F$ degree about NPIs]]

b. John is sorry that he donated (**even**) a red cent to those people.
b′. [even [John is sorry that he donated the [minimal]$_F$ amount to those people.]]

c. Only John (**even**) lifted a finger to help Mary.
c′. [even [only John helped Mary to the [minimal]$_F$ degree]]

To accommodate these cases, I suggest that the notion of likelihood should be based on Strawson entailments rather than strict entailments; for any two distinct propositions p and q, p is less likely to be true than q iff p Strawson entails q. A revised semantics of *even* is given (98). In the rest of the discussion on minimizers, I will assume the semantics in (98) for the semantics of *even*.

(98) The Semantics of *Even* (revised)
a. $[\![\text{even}]\!]^w(p)$ is defined only if
$\forall q[(q \in C \ \& \ q \neq p) \rightarrow \text{LIKELIHOOD}(p)(w) < \text{LIKELIHOOD}(q)(w)]$
(Scalar Presupposition)
If defined, $[\![\text{even}]\!]^w(p)=1$ iff $p(w)=1$

b. for any two propositions p and q such that $p \neq q$ and any world w,
$\text{LIKELIHOOD}(p)(w) < \text{LIKELIHOOD}(q)(w)$ iff p Strawson entails q

I further assume that for the scalar presupposition of *even* to be satisfied, crucially its prejacent can never be the most likely one to be true be in the alternative set C. This assumption is motivated by the contrast in (99). Given that the restrictor of a definite plural is purely SDE, the scalar presupposition of *even* is satisfied; minimizers are licensed in the restrictor of a definite plural, as shown in (99b). On the other hand, the restrictor of a definite singular, in addition to its SDE-ness, is SUE as well. Based on the notion of likelihood in (98), the prejacent of *even* is the most likely and the least likely

proposition to be true in C at the same time. Given that to satisfy the scalar presupposition of *even*, its prejacent can never be the most likely proposition to be true in C, the scalar presupposition of *even* can never be satisfied in (99a′); minimizers are thus ungrammatical in the restrictor of a definite singular.

(99) a. *The student who (**even**) gives a damn about NPIs is enrolled in this seminar.
a′. LF: [even [[the student who cares to the [minimal]$_F$ degree about NPIs] is enrolled....]]

b. The students who (**even**) give a damn about NPIs are enrolled in this seminar.
b′. LF: [even [[the students who care to the [minimal]$_F$ degree about NPIs] is enrolled....]]

3.4.2 Minimizers in *Because*-Sentences

In the following, I will show how the semantics of *because* proposed in this chapter (see (58b)) with the scope theory of *even* accounts for the licensing of minimizers in *because-sentences*. The essential ingredients of the analysis I propose are summarized as follows:

i) minimizers are the combination of *even* and the low endpoint on a pragmatic scale of likelihood; they are licensed only if the scalar presupposition of *even* is satisfied, which requires that the prejacent be the least likely one to be true in the alternative set C; the notion of likelihood is based on Strawson entailments (see the semantics of *even* in (98)) .

ii) *even* can move across a DE operator at LF; the alternative set C of *even* is strictly determined by the focus and the scope of *even* at LF. For a minimizer to be licensed, the prejacent of *even* must be SDE; crucially, the prejacent cannot be SUE (see (99) for the motivation of this assumption).

iii) in a *because*-sentence *q because p*, the main clause is both SDE and SUE, no matter whether it is in the scope of negation or not; on the other hand, the *because*-clause *p* is SUE but becomes SDE in the scope of negation (see the semantics of *because* in (58b) and the monotonicity of a *because*-sentence summarized in (72)).

In the following, I will first discuss the case of minimizers in a negated *because*-sentence and then move to the case of minimizers in the *yes-no* question variant of a *because*-sentence.

3.4.2.1 Minimizers in Negated *Because*-Sentences

3.4.2.1.1 In the Main Clause

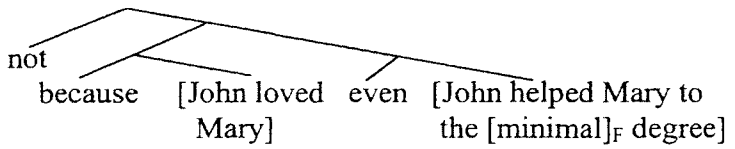
As we have seen in (92a) (repeated as in (100)), minimizers with an overt *even* are ungrammatical in the main clause of a negated *because*-sentence.

(100) *John did not **even** lift a finger to help Mary because he loved her, (but because he was intimidated by her).

Given that the scope of *even* at LF plays an essential role in the licensing of *even*, we should examine each of the possibilities for the LF scope of *even* in (100). In (100), there are three scope possibilities for *even*: *not>because>even* (see (101a)), *not>even >because* (see (102a)), and *even>not>because* (see (103a)). As I will show in the following, (100) is ungrammatical because under none of these possible LFs of (100) can the scalar presupposition of *even* be satisfied.

Let's start with (101a), where the scope of *even* is limited to the main clause. With the LF (101a), the alternative set C of *even* is (101b). Note that *help* is an upward entailing predicate; helping to some degree higher than the minimum entails helping to the minimal degree; hence, the prejacent of *even*, namely *John helped Mary to the minimal degree*, is (Strawson-)entailed by all the other alternatives in C and cannot be the least likely proposition to be true. The scalar presupposition of *even* thus fails in (101a).

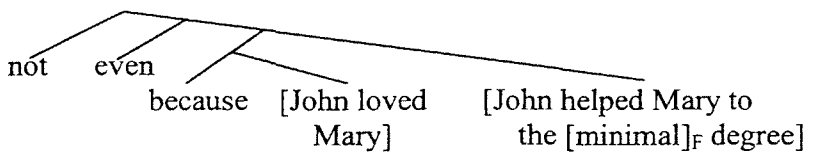
(101) a.



b. C={John helped Mary minimal degree;
John helped Mary to a slightly-higher-than-minimum degree;
…;
John helped Mary to the maximal degree}

In another possibility (102a), *even* scopes over *because* but stays below negation. With this LF, the alternative set C is (102b). Given that the main clause of a *because*-sentence is SUE, the prejacent of *even* in (102a), namely *John helped Mary to the minimal degree because he loved her*, is the most likely proposition to be true in C. The scalar presupposition of *even*, which requires that its prejacent be the least likely preposition to be true, can never be satisfied in the LF (102a). Minimizers thus cannot be licensed under this LF.

(102) a.

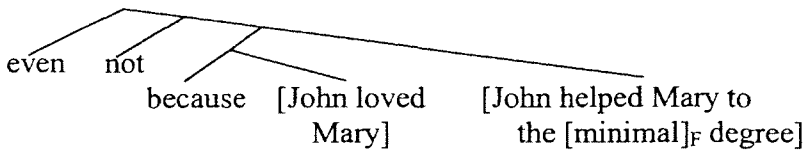


b. C={John helped Mary to the minimal degree because he loved her;
John helped Mary to a slightly-higher-than-minimum degree because he loved her;
…
John helped Mary to the maximal degree because he loved her}

In the last possible LF (103a), *even* scopes over both negation and *because;* the alternative set C with this LF is (103b). Unfortunately, the scalar presupposition of *even* cannot be satisfied in (103a), either. As shown in (72), the main clause of a *because*-

sentence is SUE, and this monotonicity property is retained in the scope of negation; therefore, the scalar presupposition of *even* can never be satisfied in the LF (103a), either.

(103) a.



b. C={it is not the case that John helped Mary to the minimal degree because he lover her;
it is not the case that John helped Mary to a slightly-higher-than-minimum degree because he loved her;
...
it is not the case that John helped Mary to the maximal degree because he loved her}

As the discussion above shows, in the case of minimizers with an overt *even* in the main clause of a *because*-sentence such as (100), there is no possible LF in which the scalar presupposition of *even* can be satisfied. Minimizers with an overt even are thus ungrammatical in such a context.

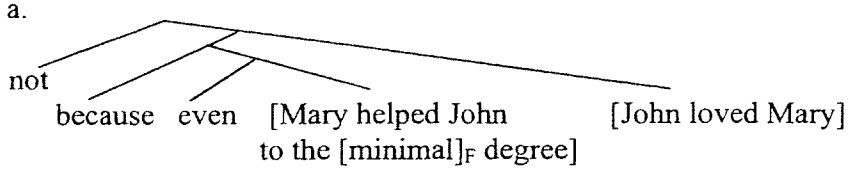
3.4.2.1.2 In the *Because*-Clause

As shown in (92b) (repeated in (104)), minimizers are ungrammatical in the *because*-clause of a negated *because*-sentence.

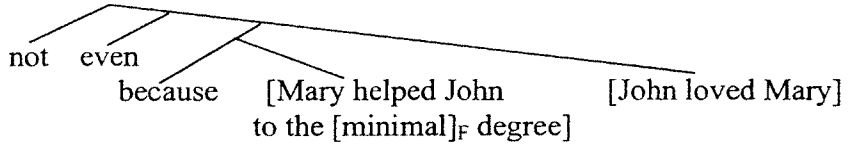
(104) *John did not marry Sue because she **even** lifted a finger to help him, (but because he loved her).

Just like the case of the main clause discussed above, there are three logically possible LFs for (104): *not> because>even* (see (105a)), *not>even>because* (see (105b)), and *even>not>because* (see (105c)).

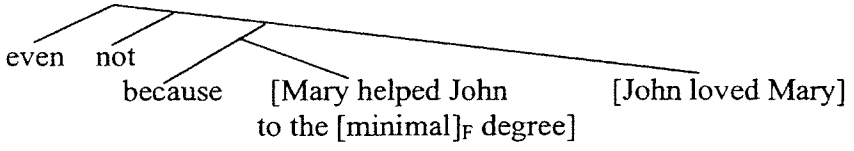
(105) a.



b.



c.



However, independent evidence given in (106)-(107) indicates that (105a) is the only option for the scope of *even* and the other two possibilities, namely (105b, c), are not available at all. In (106), where *even* occurs within the *because*-clause, the only implication available is that it is more likely that Mary made John breakfast at 6am every day; on the other hand, the implication (106b), according to which Mary's making John breakfast at 6am every day is the least likely reason why John loved her, is unavailable. The reported judgment is supported by the contrast in (107a, b). (107c) shows that to get the implication (106b), *even* has to scope over *because* at overt syntax. Note that if *even* were able to move at LF across *because* from the *because*-clause, the implication (106b) should be expected; by this reasoning, the lack of the implication in (106b) suggests that *even* cannot undergo LF movement across *because* when it occurs within the *because*-clause on the surface. Such a restriction on the LF movement of *even* of course requires an explanation, probably syntactic; however, this is beyond the scope of this dissertation.

(106) John loved Mary because she even [made him breakfast at 6am every day]$_F$.
a. Implication: it is the least likely that Mary brought John coffee.
b. #Implication: That Mary brought John coffee is the least likely reason why John loved her.

(107) a. Mary usually worked till 3am, so she almost never made anyone breakfast. John loved Mary because she **even** [made him breakfast at 6am every day]$_F$.

b. #John normally hates girls who cook him breakfast. He'd rather just make himself some oatmeal. Yet, John is crazy about Mary. He loves her because she **even** [makes him breakfast at 6am every day]$_F$.

c. John normally hates girls who cook him breakfast. He'd rather just make himself some oatmeal. Yet, John is crazy about Mary. He **even** loves her because she [makes him breakfast at 6am every day]$_F$.

Now we are left with only one LF representation, namely (105a). However, the scalar presupposition of *even* cannot be satisfied in (105a). With this LF, the alternative set C of *even* is the same as that in (101b). Given that the predicate *help* is UE, the prejacent of *even* in (105a), *John helped Mary to the minimal degree*, is asymmetrically entailed by all the other alternatives in C and cannot be the least likely proposition to be true in C. The scalar presupposition of *even* thus fails. Given that for a negated *because*-sentence like (104) there is no LF in which the scalar presupposition of *even* can be satisfied, minimizers with an overt *even* are ungrammatical in the *because*-clause of a negated *because*-sentence.

3.4.2.2 Minimizers in a *Yes-No* Question Variant of *Because*-Sentences

Minimizers with an overt *even* are ungrammatical in the *yes-no* question variant of a *because*-sentence, as shown in (93). To account for the ungrammaticality of the occurrence of minimizers in these cases, it is essential to consider how *even* scopally interacts with other operators in questions so that it can give rise to a negative bias in a

question. Guerzoni (2003, 2004) suggests that in a question, *even* may have scope interaction with the trace of *whether*. In the following, I first sketch her analysis of the licensing of minimizers in questions and show how her analysis with the semantics of *because* proposed in this chapter captures the ungrammaticality of minimizers with an overt *even* in the *yes-no* question variant of a *because*-sentence.

3.4.2.2.1 The Scope of *Even* in Questions

Following Higginbotham (1993), Guerzoni (2003, 2004) assumes that all questions, including *yes-no* and *wh*-questions, contain an overt or covert *wh*-operator *whether*[23]. Hence, the extension of a question contains all possible positive and negative answers. *Even* may scope over the trace of *whether* through LF movement or stay beneath it. In the answerhood, the possible answers that are inconsistent with the presuppositions of *even* are filtered out by independent pragmatic principles. In the case of questions with minimizers, *even* must move across the trace of *whether* at LF, for instance, in (108). In the answerhood to the *yes-no* question in (108) (see (108b)), given that the scalar presupposition fails in the positive answer (p_1 in (108b)), only the negative answer (p_2 in (108b)) is felicitous. Hence, the *yes-no* question in (108) is negatively biased.

(108) S: Did John **(even)** lift a finger to help Mary? #A: Yes. A: No.
a. LF: [Whether$_1$ [*even* [t_1 John helped Mary to the [minimal]$_F$ degree]]
b. {p_1=[**even** [John helped Mary to the [minimal]$_F$ degree]],
p_2=[**even** [¬[John helped Mary to the [minimal]$_F$ degree]]]}

[23] In Guerzoni's (2003) analysis, the covert *whether* is optional in a *wh*-question. The occurrence of *whether* in a *wh*-question however is obligatory when a minimizer occurs in the question.

Note that the trace of *whether* in a question serves as the place holder for polarity operators (i.e. the affirmation and negation operators). In Wilkinson's (1996) and Guerzoni's (2003, 2004) analyses, minimizers are only grammatical when *even* scopes over DE operators such as negation. In (108), negation in the negative answer comes from the quantifying–in of *whether*. In order to generate a possible answer which is consistent with the scalar presupposition of *even* so that a minimizer can be licensed, *even* must scope over the trace of *whether* at LF.

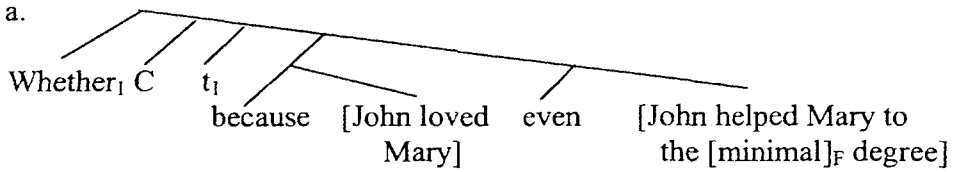
3.4.2.2.2 Minimizers in the Main Clause

As shown in (93a) (repeated in (109)), minimizers with an overt *even* are ungrammatical in the main clause of the *yes-no* question variant of a *because*-sentence. Logically, there are three possible LF scope relations in (109): t_1> *because*>*even* (see (110a)), t_1>*even* >*because* (see (111a)), and *even*>t_1>*because* (see (112a)), where t_1 is the trace of *whether*. As I will show in the following, under none of the LFs can the scalar presupposition of *even* in (109) be satisfied.

(109) *Did John **even** lift a finger to help Mary because he loved her?

In the LF (110a), the scope of *even* is limited to the main clause. In the answerhood generated from this LF (see (110b)), *even* is embedded within the main clause. Since *help* is an UE predicate, the prejacent of *even*, namely *John helped Mary to the minimum degree*, cannot be the least likely proposition to be true in the alternative set; hence, the scalar presupposition of *even* cannot be satisfied in either possible answer in (110b). Given that there is no legitimate answer to (109) if we assume the LF (110a), (110a) cannot be a legitimate LF representation.

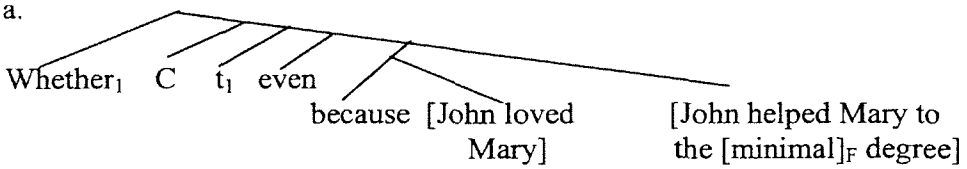
(110) a.



b. Ans: {p_1=[[because John loved Sue][**even** [John helped Sue to the [minimal]$_F$ degree]]];
p_2=[¬[[because John loved Sue][**even** [John helped Sue to the [minimal]$_F$ degree]]]]}

Consider the second possibility (111a), where *even* scopes over *because* but stays beneath the trace of *whether*. Since the main clause is SUE, the scalar presupposition of *even* cannot be satisfied in either of the possible answers in the answerhood generated from the LF (111a) (see (111b)). Given that there is no felicitous answer to (109) with the LF (111a), (111a) cannot be a legitimate LF for (109), either.

(111) a.

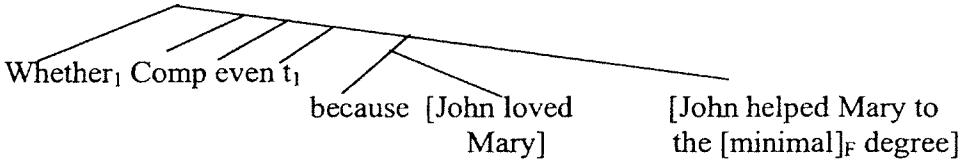


b. Ans: {p_1=[**even** [[because John married Sue][John helped Sue to the [minimal]$_F$ degree]];
p_2=[¬[**even** [[because John married Sue][John helped Sue to the [minimal]$_F$ degree]]]]}

Now we are left with the last possibility, the LF (112a). In (112a), *even* takes wide scope over the trace of *whether*; hence, in the negative answer in the answerhood generated from (112a) (see (112b)), *even* scopes over negation. Nevertheless, since the main clause of a *because*-sentence is SUE and this monotonicity property is retained in

the scope of negation, the prejacent of *even* in both possible answers in (112b) fails to satisfy the scalar presupposition of *even*. Hence, (112a) cannot be a legitimate LF, either.

(112) a.



b. {p_1=[**even** [[because John married Sue][John helped Sue to the [minimal]$_F$ degree]];
p_2=[**even**[¬[[because John married Sue][John helped Sue to the [minimal]$_F$ degree]]]]}

As the discussion above shows, since there is no LF under which the scalar presupposition of *even* can be satisfied so that a *yes-no* question of a *because*-sentence like (109) can be felicitously answered, minimizers with an overt *even* are ungrammatical in the main clause of the *yes-no* question variant of a *because*-sentence.

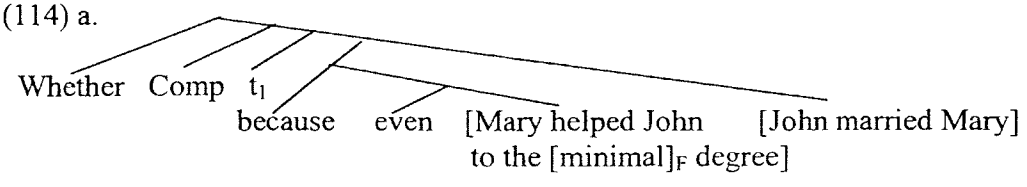
3.4.2.2.3 Minimizers in the *Because*-Clause

As shown in (93b) (repeated as (113)), minimizers with an overt *even* in the *because*-clause are ungrammatical in the *yes-no* question variant of a *because*-sentence.

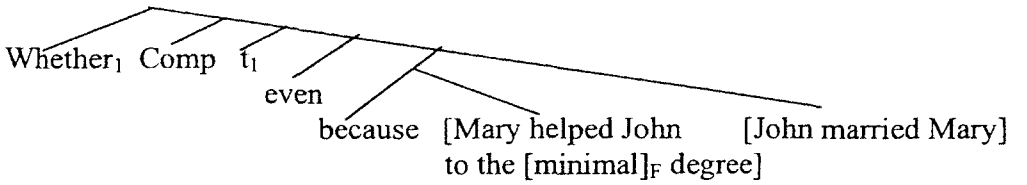
(113) *Did John marry Mary because she **even** lifted a finger to help him?

Logically there are three possibilities for the scope relation between *even* and other operators in (113); these possibilities are shown in (114a-c).

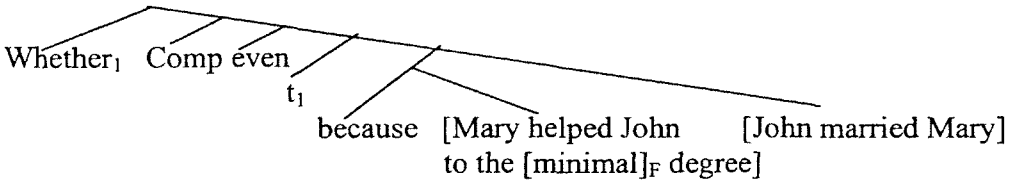
(114) a.



b.



c.



Nevertheless, note that *even* cannot move across *because* from the *because*-clause, as I have argued in (106)-(107); hence, the LFs (114b, c), where *even* moves across *because*, are not available. Now we are left with only one option, the LF in (114a), where the scope of *even* is limited to the *because*-clause. The answerhood generated from (114a) is in (115).

(115) {p_1=[[because [**even** [Sue helped John to the [minimal]$_F$ degree][John married Sue]];
p_2=[¬[[because [**even** [Sue helped John to the [minimal]$_F$ degree][John married Sue]]]]}

In both possible answers in (115), *even* is embedded within the *because*-clause. Since *help* is an UE predicate, the prejacent of *even* cannot be the least likely proposition to be true in the alternative set. Hence, the scalar presupposition of *even* fails in both possible answers. Given that there is no LF under which the scalar presupposition can be satisfied so that (113) can be felicitously answered, minimizers with an overt *even* in the *because*-clause are ungrammatical in the *yes-no* question variant of a *because*-sentence.

3.4.3 More on the Scope of *Even* and Further Predictions

In the discussion above, I have shown how the newly proposed semantics of *because* in (58b) with the scope theory of *even* accounts for the distribution of minimizers with an overt *even* in a *because*-sentence.

The analysis proposed above relies on the movement of *even* at LF. In the case of minimizers with an overt *even* in the *because*-clause (see (104) and (113)), in order to exclude the possibility that minimizers are licensed by *even* moving across the wide-scope negation and the trace of *whether*, the restriction that *even* cannot move across *because* from the *because*-clause at LF, which is motivated by (106)-(107), plays an essential role. If *even* is allowed to move across *because* and then further across negation, we obtain the LF representations (116) and (117a) for (104) and (113), respectively. Note that the *because*-clause of a *because*-sentence is a purely SDE context in the scope of negation (see (72)); hence, in (116) and the negative answer to (117a) (see p_2 in (117b)), the prejacent of *even* asymmetrically Strawson-entails all the other alternatives in the alternative set and is the least likely proposition to be true in the alternative set. We thus incorrectly predict that minimizers are grammatical in the *because*-clause in a negated *because*-sentence and the *yes-no* question variant of a *because*-sentence. To exclude this undesirable prediction, it is essential to maintain the assumption that *even* within the *because*-clause cannot undergo LF movement across *because*.

(116) [**even** [¬[[because Mary helped John to the [minimal]$_F$ degree][John married Mary]]]]

(117) a. [Whether$_i$ [**even** [t_i [[because Mary helped John to the [minimal]$_F$ degree][John married Mary]]]]]

b. {p_1= [**even** [[because Mary helped John to the [minimal]$_F$ degree][John loved Mary]]];
p_2= [**even** [¬[[because Mary helped John to the [minimal]$_F$ degree][John loved Mary]]]]}

Note that this restriction only concerns the LF movement of *even* across *because*; hence, the suggested analysis predicts that if *even* can scope over the wide scope negation and the trace of *whether* through other strategies, minimizers can be licensed in the *because*-clause in the scope of negation and questions. (118)-(119) show that this prediction is borne out. In (118)-(119), *even* is outside the *because*-clause at the surface and therefore the possibility of its scoping over negation as well as the trace of *whether* at LF is not blocked. In the a.- examples in (118)-(119), *even* moves across negation and the trace of *whether* without moving across *because*; in the b.-examples, *even* already scopes over *because* and the trace of *whether* at the surface (see the LFs (116) and (117a) for (118)-(119) respectively). Note that the *yes-no* questions (119a, b) are negatively biased, and this is predicted by the analysis suggested above as well.

(118) a. John did not marry Mary **even** because she lifted a finger to help him, but because he loved her.
b. John **even** did not marry Mary because she lifted a finger to help him, but because he loved her.

(119) a. Did John marry Mary **even** because she lifted a finger to help him?
b. Did John **even** marry Mary because she lifted a finger to help him?

Interestingly, compared to (118)-(119), (120), cases where minimizers in the *because*-clause without an overt *even*, are found grammatical but slightly degraded by native speakers. I suggest a tentative analysis that in (120), a covert *even* is located outside the *because*-clause and scopes over the wide scope negation and the trace of *whether* at LF, and the degradability in these examples then is attributed to speakers' difficulty in parsing this phonetically null *even* at syntax. This claim of course requires

psycholinguistic and sentence processing evidence, and here I leave this issue for future study.

(120) a. ?John did not marry Mary because she lifted a finger to help him.
b. ?Did John marry Mary because she lifted a finger to help him?

3.5 Conclusion and Further Question

In this chapter, I have shown that to account for the licensing of weak NPIs and minimizers in a *because*-sentence, the semantics of *because* plays an important role. When it comes to the NPI phenomenon, a semantics of *because* that is built on Lewis's (1973b) counterfactual analysis of causal dependency, with the SDE account, is inadequate and leads to incorrect predictions for the distribution of NPIs in *because*-sentences. To account for the licensing of NPIs in this construction with the SDE condition, I have proposed a new semantics of *because* in this chapter; I have also shown that the proposed semantics of *because* accounts not only for the NPI phenomenon but also for other semantic properties of this construction.

There are two problems left open in the proposal of this chapter. The first problem concerns the licensing of minimizers in *why*-questions; the second problem concerns the gradability in *because*-sentences. In the following, I will briefly address these two problems respectively but leave the solutions to each for future research.

3.5.1 Minimizers in *Why*-Questions

The first open question concerns the licensing of minimizers in *why*-questions. As (121) shows, minimizers are licensed in *why*-questions. More specifically, in (121), the minimizer occurs in the main clause (the consequent) of a *because*-sentence and

brings up a negative bias in the question[24]. If we follow Guerzoni (2003, 2004) and assume that *why*-questions, just like other *wh*-questions, contain a covert *whether*, there are three possible LF representations (see (122a-c)) for the *why*-question in (121).

(121) S: Why did John even lift a finger to help Mary?
A: No reason. #/??A: Because he liked her.

(122) a. [Whether$_j$ [why$_i$ [t_j [[because t_i][even [John helped Mary to the [minimal]$_F$ degree]]]]

b. [Whether$_j$ [why$_i$ [t_j [even [[because t_i][John helped Mary to the [minimal]$_F$ degree]]]]]

c. [Whether$_j$ [why$_i$ [even [t_j [[because t_i][John helped Mary to the [minimal]$_F$ degree]]]]]

Note that given that the main clause of a (negated) *because*-sentence is SUE, the scalar presupposition of *even* cannot be satisfied in any of the LF representations in (122). Hence, it is predicted that the *why*-question in (121) is ungrammatical. This prediction however is not borne out. To account for (121), a deeper understanding of the nature of *why*-questions is required. I will have to leave this for future research.

3.5.2 Gradability in *Because*-Sentences

The second question that is not yet addressed and will have to be left open in this chapter is the gradability in *because*-sentences. As shown in (123), a *because*-sentence may involve gradability.

(123) a. Sue got this position <u>partially</u> because she is a woman.
b. He shot himself <u>mostly</u> because gasoline wasn't obtainable, but also <u>to a certain degree</u> because it was too hot.
(from Sæbø 1991, with slight modification)

[24] The judgment here is not clear. For some speakers, the negative bias seems to be missing in *why*-questions with minimizers.

With a counterfactual analysis that is similar to (42), Sæbø (1991) hinted without providing a detailed analysis that this phenomenon may be matched by the solution of using the scalar notion of distance from actuality proposed by Abott (1974) and Dowty (1979).

In the proposal in this chapter, I suggest that gradability in *because*-sentences can be captured in the following way: the degree adverbs in (123) serve to specify the ordering source R, and the meaning of a *because*-sentence with a degree adverb differs from its counterpart without a degree adverb only in the presupposition on the ordering source R. These degree adverbs specify the quantificational force in the proposition that $\cap R(w)$ entails. For instance, the semantics of a *because*-sentence with the degree adverb *partially* is given in (124).

(124) $[\![$ partially because $]\!]^{w, A}(R)(p)(q)$ is defined only if
i) $q \in A(w)$;
ii) $w \in max_{\leq R(w)}(\cap A(w))$;
iii) $\cap R(w) \subseteq \{w': max_{\leq R'(w')}(\neg p) \cap \neg q \neq \varnothing\}$, where R' is the unique function such that $\cap R'(w') = \{w'\}$
if defined, $[\![$ because $]\!]^{w, A}(R)(p)(q)=1$ iff $max_{\leq R(w)}(\cap A(w)) \subseteq p$

(124) differs from (58b) only in the presupposition on the ordering source R: while a *because*-sentence without a degree adverb *q because p* presupposes that $\cap R(w)$ entails the counterfactual dependency of *p* and *q* is a necessity (i.e. *if* $\neg p$, *then* $\neg q$), a *partially-because*-sentence *q partially-because p* presupposes that $\cap R(w)$ entails that the counterfactual dependency of *p* and *q* is a possibility (i.e. *if* $\neg p$, *it might be that* $\neg q$). Based on this idea, it is presupposed in (123) that the intersection of the ordering source R(w) entails that if she were not a woman, she might not have gotten that position.

Along these lines, a *because*-sentence with the degree adverbs *mostly* and *to a certain degree* poses the presuppositions (125a, b) respectively on the ordering source R.

(125) a. $[\![\text{mostly-because}]\!]^{w, A}(R)(p)(q)$ is defined only if
$\cap R(w) \subseteq \{w' :$ for most worlds w'' in $max_{\leq R'(w')}(\neg p)$, w'' is a $\neg q$-world$\}$

b. $[\![\text{to-a-certain-degree-because}]\!]^{w, A}(R)(p)(q)$ is defined only if
$\cap R(w) \subseteq \{w' :$ there is an number n such that more than n worlds in $max_{\leq R'(w')}(\neg p)$ are $\neg q$-worlds $\}$,
(where R' is the unique function such that $\cap R'(w') = \{w'\}$)

It is however unclear how the idea suggested above can be incorporated compositionally into the newly proposed new semantics of *because*. I hence leave this for future investigation.

Chapter 4 *If only there were ANY*: NPI licensing in *If-Only* Constructions

This chapter concerns NPI licensing in the antecedent of the optative conditional *if only p, would-q*. Examples of this construction are given in (1). Here and in the following, I refer to *p* in *if only p, would-q* as the antecedent and *q* as the consequent.

(1) a. If only John had taken off 10 minutes earlier, he would have avoided the traffic.
b. If only John had studied harder, he would have passed the exam.

Here I term conditional constructions like (1a, b) optative conditionals (cf. Asarina and Shklovsky 2008; Biezma 2011; a.o.). Intuitively, this type of conditional construction (namely, *if only p, would-q*) carries a conditional-like meaning and expresses that the consequent *q* follows from the antecedent *p*; in addition, it further carries the inference of the speaker's desire toward *q* or *p* (or both) being true. For instance, (1a) implies that the speaker at least wishes it were true that John avoided the traffic. Comparing (1) with the ordinary counterfactual conditionals in (2), which do not carry any inference of the speaker's desire, a remarkable morphological characteristic of optative conditionals is the presence of *only* inside the *if*-clause; putting aside the presence of *only* within the *if*-clause, optative conditionals carry the same morpho-syntactic make-up as that of ordinary counterfactual conditionals.

(2) a. If John had taken off 10 minutes earlier, he would have avoided the traffic.
b. If John had studied harder, he would have passed the exam.

As I will show in the following, an optative conditional (see (1)) bears a similarity with an ordinary counterfactual conditional (see (2)) in many aspects; one might hence analyze optative conditional constructions as a variant of conditionals. This might further lead to

the expectation that optative conditional constructions like (1) behave the same as ordinary counterfactual conditionals with respect to NPI licensing. As observed by Lakoff (1969) however, contrary to this expectation, while NPIs are grammatical in the antecedent of ordinary counterfactual conditionals (see (3b) and (4b)), they are ungrammatical in the antecedent of the optative conditional *if only p, would-q* (see (3a) and (4a)).[1]

(3) a. If only *anyone/someone had explained the theory of relativity to John, he would have passed the exam.

b. If anyone/someone had explained the theory of relativity to John, he would have passed the exam.

(4) a. *If only John had ever explained the theory of relativity to me, I would have passed the exam.

b. If John had ever explained the theory of relativity to me, I would have passed the exam.

The non-licensing of NPIs in the antecedent of an optative conditional is the focus of this chapter. I suggest that taking *only* in *if only p, would-q* to be an instance of the exclusive focus particle *only*, the ungrammaticality of NPIs in an optative conditional can be captured if we assume that the whole antecedent is in focus associated with *only*. As observed in the literature (Jacobsson 1951; Jacobson 1964; Visser 1969; Horn 1969, 1996, 2002; Wagner 2006; a.o.), while NPIs are grammatical in the scope of *only*, they are ungrammatical within the focus (see (5)). Assuming that the whole antecedent *p* is in focus associated with *only* in *if only p, would-q*, the ungrammaticality of NPIs in (3a) and (4a) can be seen as parallel with that in (5b).

[1] There might exist some dialectal difference regarding the grammaticality of NPIs in optative conditionals, as I will briefly address in the next section. This variation will be further discussed in 4.3.3.

(5) a. Only $[John]_F$ ate any vegetables.
b. *John ate only $[any\ vegetables]_F$.

Note that the analysis suggested in this chapter for the ungrammaticality of NPIs in optative conditionals is built on the assumption that *if only p, would-q* is a conditional and the assumption that the occurrence of *only* in *if only p, would-q* is an instance of the exclusive focus particle *only*, just like that in (5a). Hence, in order for this analysis to be well-grounded, a semantic composition of an optative conditional *if only p, would-q* that is built on these two assumptions is required. In the rest of this chapter, I will further investigate the meaning of an optative conditional and provide a semantics of this construction that is derived from the combination of a Lewis-Kratzer-von Fintel style semantics of conditionals and that of the exclusive focus particle *only*.

This chapter is structured as follows. In 4.1, I introduce the morphological and semantic properties of optative conditionals *if only p, would-q* and further discuss the similarity and the difference between this construction and the ordinary (counterfactual) conditional. In 4.2 I first sketch the NPI phenomenon related to the *only*-focus and then show how the ungrammaticality of NPIs in the antecedent of *if only p, would-q* can be paralleled with the case of NPIs in focus associated with *only*. In 4.3, the meaning of an optative conditional *if only p, would-q* is further investigated; with the assumption that the occurrence of *only* in *if only p, would-q* is an exclusive focus particle, a semantic composition of this construction that combines a Lewis-Kratzer-von Fintel-style semantics of conditionals and the semantics of the exclusive particle *only* is suggested. The conclusion is in 4.5.

4.1 Some Properties of Optative Conditionals

As mentioned earlier, the optative conditional construction *if only p, would-q*, just like an ordinary conditional, intuitively expresses the necessity relation between *p* and *q*. *If only p, would-q* (like (1)), however, differs from an ordinary counterfactual conditional (like (2)) in that while an ordinary counterfactual conditional *if p, would-q* simply expresses the necessity relation between the two propositions *p* and *q*, an optative conditional *if only p, would-q* further carries optativity and expresses the speaker's wish toward *q* or *p* or both. The optativity that arises in *if only p, would-q* but not in ordinary counterfactual conditionals *if p, would-q* is further evidenced by the contrast between the a- and b- examples in (6)-(7); given that normally no one desires the unfortunate things mentioned in (6)-(7), the use of optative conditionals *if only p, would-q* like (6b) and (7b) is odd under normal circumstances; on the other hand, such an effect is not found in an ordinary counterfactual conditional like (6a) and (7a).

(6) a. If I had been run over by that bus, I would have died right there and then.
b. If only I had been run over by that bus, I would have died right there and then.

(7) a. If John had a speech impediment, he would need speech therapy.
b. If only John had a speech impediment, he would need speech therapy.

The flavor of optativity in an optative conditional is even more salient when the consequent is omitted, as shown in (8a, b). The contrast in (8)-(9) further indicates another difference between optative conditionals and ordinary conditionals: the omission of the consequent is grammatical in an optative conditional but ungrammatical in an ordinary conditional[2].

[2] In the following discussion, I will not discuss this difference between these two constructions and simply assume that in the case where the *if-only* clause occurs alone, as in (8b), there is a covert consequent clause

(8) a. If only I had a bit more time, I would have solved all the problems.
b. If only I had a bit more time!!

(9) a. If I had a bit more time, I would have solved all the problems.
b. *If I had a bit more time.

Another characteristic of optative conditionals *if only p, would-q* is the presence of *only* in the *if*-clause; without the presence of *only* in the *if*-clause, (1a, b) would just be ordinary counterfactual conditionals. Note that there is a restriction on the occurrence of *only* in optative conditionals: as Rifkin (2000) points out, in an optative conditional, the occurrence of *only* has to be higher than negation in the *if-clause*; in (10d) *only* occurs lower than negation in the *if*-clause and is ungrammatical as an optative conditional[3].

(10) a. If only he had not had a gun, Rambo would have stood a chance against the battalion.

b. If he only had not had a gun, Rambo would have stood a chance against the battalion.

c. If he had only not had a gun, Rambo would have stood a chance against the battalion.

d. *If he had not only had a gun, Rambo would have stand a chance against the battalion.

As briefly mentioned above, optative conditionals and ordinary counterfactual conditionals share the same tense/aspect/mood morphological make-up (see (11)).

(see however Grosz (2011) for arguments against this assumption). For the syntactic difference between an optative conditional like (8a) and its reduced form (8b), I refer the reader to Rifkin (2000), Grosz (2011), Biezma (2011) and references cited therein. In this dissertation, the difference between optative conditionals and ordinary counterfactual conditionals will not be addressed and must be left for future research.

[3] While (10d) is ungrammatical as an optative conditional, it is grammatical as an ordinary counterfactual conditional.

(11) a. If only John had read the letter, he would have understood everything.
b. If John had read the letter, he would have understood everything.

Note that although optative conditionals predominantly occur with the counterfactual morphology, they are also found with indicative morphology, as (12) shows. In addition, the lack of the counterfactual inference in (12) further indicates that just like ordinary conditional constructions, the counterfactual inference in the *if-only* construction depends on the presence of the counterfactual morphology as well.

(12) He will get a distinction if he will only buckle down to some hard work.
(Huddleston and Pullum 2002)

Another morpho-syntactic similarity between optative conditionals and ordinary counterfactual conditionals is shown in (13)-(14): just like ordinary counterfactual conditionals (see (13)), optative conditionals permit subj-aux inversion (see (14)). The subj-aux inversion in optative conditionals shown in (14) indicates that the combination of *if* and *only* in this construction cannot be totally idiomatic[4].

(13) a. If John had read the letter, he would have understood everything.
b. Had John read the letter, he would have understood everything.

(14) a. If **only** John had read the letter, he would have understood everything.
b. Had John **only** read the letter, he would have understood everything.

The goal of this section is merely to show that although optative conditionals differ from ordinary counterfactual conditionals in some aspects, they also share a lot of properties in common. Based on the similarities between ordinary counterfactual

[4] In the case of subject-Aux inversion, *only* has to be after the subject and cannot precede the subject (see (i)).

(i) *Had only John read the letter, he would have understood everything.

conditionals *if p, would-q* and the *if-only* construction *if only p, would-q* (namely, the morphological make-up, subject-auxiliary inversion and the similarity on the interpretation), I hence follow Rifkin 2000, Asarina and Shklovsky 2008 and others by assuming that *if only p, would-q* is a type of conditional construction.

As already pointed out in the beginning of this chapter, despite the morphological and syntactic similarity between optative conditionals *if only p, would-q* and ordinary counterfactual conditionals *if p, would-q*, these two constructions behave differently with respect to NPI licensing. As Lakoff (1969) observed, while weak NPIs are grammatical in the *if*-clause of an ordinary counterfactual conditional (see (15)), they are ungrammatical in that of an optative conditional *if only p, would-q* (see (16a, b)). (16a′, b′) show that the ungrammaticality of weak NPIs in optative conditionals still remains when *if* and *only* are separated from each other.

(15) a. If anyone had explained the theory of relativity to John, he would have passed the exam.

b. If John had ever explained the theory of relativity to me, I would have passed the exam.

(16) a. *If only anyone had explained the theory of relativity to John, he would have passed the exam.

a′. *If anyone only had explained the theory of relativity to John, he would have passed the exam.

b. *If only John had ever explained the theory of relativity to me, I would have passed the exam.

b′.*If John only had ever explained the theory of relativity to me, I would have passed the exam.

The non-licensing of NPIs in an optative conditional *if only p, would-q* is the center of the discussion in this chapter. Examples like (16) are intriguing in that while the contrast in (15)-(16) seems to suggest that it is the occurrence of *only* that blocks the licensing of NPIs in the *if*-clause of an optative conditional, (17) shows that the occurrence of *only* does not always block the licensing of NPIs in the *if*-clause; in (17) the weak NPIs *any* and *ever* are licensed despite the occurrence of *only* in the *if*-clause.

(17) a. If only $[John]_F$ had eaten any vegetables yesterday, we would not have had to do grocery shopping today.

b. If only $[John]_F$ had ever seen the Arc de Triomphe, the professor would have brought the picture to class.

As hinted in the beginning of this chapter, I suggest that with the assumption that the occurrence of *only* in *if only* is an instance of the exclusive focus article *only*, like that in (5) (repeated as (18)), the ungrammaticality of weak NPIs in (16) is parallel with that in (18b); as shown in (18), while NPIs are grammatical in the scope of the exclusive focus particle *only*, they are ungrammatical within the focus.

(18) a. Only $[John]_F$ ate any vegetables.
b. *John only ate $[any\ vegetables]_F$.

Along this idea, the contrast between (15)-(16) and (17) can be captured in the following way: in (15)-(16), the occurrence of NPIs is within the focus associated with *only* and hence cannot be licensed; on the other hand, the occurrence of NPIs in (17) are outside the focus and hence does not lead to an ungrammaticality. For this analysis to be well-grounded, I further suggest a semantic composition of optative conditionals based on a Lewis-Kratzer-von-Fintel style semantics of conditionals and that of the exclusive focus

particle *only*. Under my proposal, putting aside optativity in this construction, the semantic composition of an optative conditional like (19a) is similar to that of the ordinary counterfactual conditional (19b).

(19) a. If only John had read that book, he would have passed the exam.
(optative conditional)
b. If John had read only that book, he would have passed the exam.
(ordinary counterfactual conditional with *only* in the antecedent)

In the next section, I will first review the connection between *only* and NPI licensing and then show how the ungrammaticality of NPIs in the antecedent of an optative conditional *if only p, would- q* can be accounted for by the SDE condition on NPI licensing (von Fintel 1999) and the semantics of the exclusive focus particle *only*.

One note before we move on: there seems to be some dialectal difference regarding the occurrence of NPIs in optative conditionals (e.g., (16)). While most speakers I have consulted strongly found unacceptable the occurrence of NPIs in the antecedent of an optative conditionals, a few speakers have reported that examples of this kind are acceptable to them; for those speakers, (16a, b) are grammatical. Moreover, there are some examples of optative conditionals with NPIs in the antecedent found online through the internet search, though examples of this kind are pretty limited (see (20)). Nonetheless, for those speakers I have consulted who do not accept NPIs in optative conditionals, examples in (20) are unacceptable to them as well.

(20) a. Beautifully animated graphics, bright, lush colours, big scary beasties for enemies and classic arcade adventure gameplay made for a game which could have changed the public perception of hermaphrodite non-vertebrates forever, **if only** anyone had ever bought it. (http://www.ysrnry.co.uk/articles/ystop100_2.htm)

b. It's actually a piece of accidental Surrealism — the sort of movie David Lynch

might make **if only** he would ever really let himself go.
(http://www.eyeweekly.com/film/feature/article/66816--wiseau-serious)

c. **If only** the robins had chosen any one of a dozen full-grown trees on our property ... [a cat wouldn't have got the nest].
(From Corpus of Contemporary American English (COCA))

d. "Oh, **if only** I could ever get to that point," he said, " when I..."
(From Corpus of Contemporary American English (COCA))

e. "**if only** the children would ever sleep"
(From Corpus of Contemporary American English (COCA))

The discussion in the following is solely based on the judgments from those speakers I have consulted who have found NPIs ungrammatical in the antecedent of optative conditionals. Nevertheless, this potential dialectal difference and a possible account for the judgments from speakers who accept NPIs in the antecedent of an optative conditional will be discussed in 4.3.3.

4.2 *Only*, NPIs, and the SDE Condition

4.2.1 NPI Licensing and Focus Association with *Only*

4.2.1.1 NPIs in the Scope of *Only*

It is observed by Klima (1964) that NPIs are licensed by the exclusive focus particle *only*. As shown in (21), the weak NPI *ever* is grammatical in the scope of the *only* NP.

(21) Only [young writers]$_F$ ever accept suggestions with any sincerity. (Klima 1964)

The licensing of NPIs by *only* poses a problem for a strict DE account of NPI licensing: while the scope of the *only*-focus licenses NPIs, it is not strictly DE; for instance, in (22),

it could be the case that John ate vegetables other than broccoli and nobody else ate vegetables and hence the premises in (22) are true but the conclusion is not.

(22) broccoli $\subseteq$ vegetables
Only John ate vegetables. =/=> Only John ate Broccoli.

As suggested in von Fintel (1999) however, the licensing of NPIs by *only* can be captured by the SDE condition (see (23)); assuming the semantics of *only* in (24), a DE inference is supported in the scope of *only* if the presupposition of the conclusion is taken for granted, as (25) shows[5]; in (24) and (25), ALT is the alternative set introduced by the discourse context.

(23) a. The SDE condition on NPI licensing (von Fintel 1999):
An NPI is only grammatical if it is in the scope of α such that $[\![\alpha]\!]$ is SDE.
b. Strawson Downward Entailingness:
A function f of type $<\sigma, \tau>$ is Strawson downward entailing (SDE) iff, for all x, y of type σ such that $x \Rightarrow y$ and f(x) is defined: $f(y) \Rightarrow f(x)$

(24) $[\![only]\!](x_\sigma)(P_{<\sigma, t>})$ is defined only if P(x)=1
(where σ can be any type)
If defined, $[\![only]\!](x_\sigma)(P_{<\sigma, t>>}) = 1$ iff
$\neg\exists y_\sigma[y \in ALT \wedge x \neq y]$: P(y)

(25) a. Only $[John]_F$ ate vegetables.
LF: $[\![only]\!](John)([\lambda x_e.$ x ate vegetables$])$
Presupposition: John ate vegetables.
Truth Conditions: $\neg\exists y_e[y \in ALT \wedge y \neq John]$: x ate-vegetables

b. Only $[John]_F$ ate broccoli.
LF: $[\![only]\!](John)([\lambda x_e.$ x ate broccoli$])$
Presupposition: John ate broccoli.
Truth Conditions: $\neg\exists y_e[y \in ALT \wedge y \neq John]$: x ate broccoli.

c. (25a) + the presupposition of (25b) => (25b)

---

[5] Note that the SDE condition can only be seen as a necessary condition for NPIs; for an NPI to be licensed, crucially a licensing environment cannot be SUE (see Progovac 1993; Lahiri 1998; Guerzoni and Sharvit 2007; a.o.).

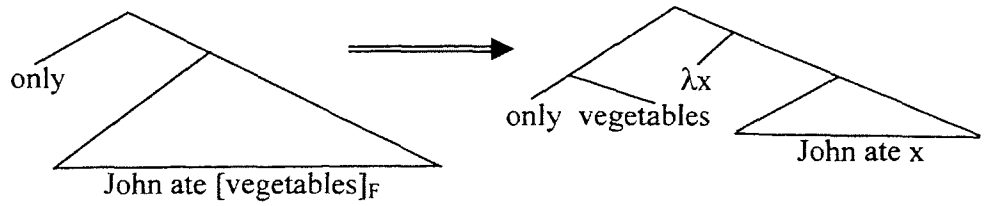
Just like the DP-*only*, weak NPIs are licensed by the VP-*only* as well. This is shown in (26).

(26) John only gave $[kale]_F$ to <u>any</u> of his friends.

To extend the SDE account of NPI licensing and the semantics of *only* in (24) to the case of VP *only*, here I follow Wagner (2006) and others by assuming that the focalized constituent associated with *only* undergoes focus movement at LF, adjoins to *only* and becomes its first argument (cf. McCawly 1996)[6]. Take (27a) for instance; at LF, the focalized nominal object moves and adjoins to *only*; after focus movement, a predicate of type <e, t> that serves as the second argument of *only* is created by λ-abstraction over the trace of the moved constituent[7].

(27) a. John only ate $[vegetables]_F$.

b.



[6] For arguments for the LF movement associated with *only*, see Wagner (2006) and the references cited therein.

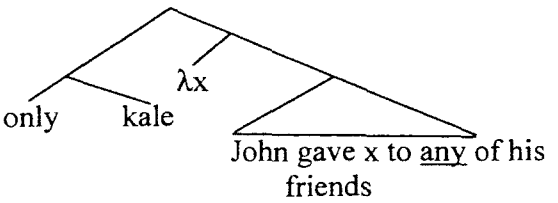
[7] This syntactic assumption encounters problems in the case of focus association into islands, for focus association is not island-sensitive (Anderson 1972; Jakendoff 1972; Rooth 1985; a.o.); as (i) shows, the focus association with *only* crosses a complex NP island.

(i) I don't know anyone who grows bananas. I only know a guy who $[smokes]_F$ them. (Wagner 2006)

Drubig (1994), Wagner (2006) and others have argued for a pied-piping analysis for such cases; in case of focus association into islands, it is the entire island containing the focus that moves. Here I simply refer the readers to these two references and those cited therein.

The license of NPIs in (26) (repeated as (28a)) can thus be captured by the semantics of *only* in (24) and the syntactic assumption of the LF-movement of the *only*-focus as follows. As shown in (28b), the focalized NP moves and adjoins to *only* at LF. After the LF-movement of the focalized constituent, the NPI *any* is in the scope of the *only*-focus. Given that based on the semantics in (24), the scope of *only* is SDE, the NPI *any* is licensed in (28a).

(28) a. John only gave $[kale]_F$ to <u>any</u> of his friends.
b. LF:



4.2.1.2 NPIs in the Focus of *Only*

While NPIs are grammatical in the scope of *only*, <u>they are ungrammatical within the focus</u> (see Jacobsson 1951; Jacobson 1964; Visser 1969; Horn 1969, 1996, 2002; Wagner 2006; a.o.). This is evidenced by (29a). (29b) further shows that this is not limited to the case of the DP-*only*; in the case of the VP-*only*, NPIs are ungrammatical in the focus as well. (30) further shows that NPIs within the focus associated with *only* cannot be rescued by higher (S)DE operators.

(29) a. *Only $[$<u>any</u> students$]_F$ ate vegetables.
b. *John only gave kale to [any of his students]$_F$.

(30) *John doubted that only $[$<u>any</u> students$]_F$ ate vegetables.

There have been counterexamples reported in the literature to the claim that NPIs cannot occur within the focus associated with *only* (see Linebarger 1987; Geurts and van der Sandt 2004). These counterexamples are given in (31a) and (32a). Nevertheless, as evidenced by the b- examples in (31)-(32), (31a) and (32a) involve the occurrence of *any* that are already licensed by operators other than *only*, a point that has been made in Horn (1996), Beaver (2004) and others. Therefore, the challenge based on the examples given in (31a) and (32a) to the claim that NPIs are ungrammatical within the *only*-focus does not stand.

(31) a. Only [that John didn't bring <u>any</u> present]$_F$ was surprising.
b. That John didn't bring <u>any</u> present any present was surprising.

(32) a. Only [anyone from Paris]$_F$ would have known about this place.
b. <u>Anyone</u> from Paris would have known about this place.

Intuitively, the focus associated with *only* is non-monotonic (Wagner 2006); as shown in (33), neither a DE nor UE inference is supported in the *only*-focus, even when the presupposition of the conclusion is granted.

(33) a. Only [some student]$_F$ ate vegetables.
Presupposition: some student ate vegetables.

b. Only [some linguistic student]$_F$ ate vegetables.
Presupposition: some linguistics student ate vegetables.

c. Intuitively,
(33a) + the presupposition of (33b) =/=> (33b)
(33b) + the presupposition of (33a) =/=> (33a)

This intuition is consistent with the NPI phenomenon in the focus associated with *only* (see (29)-(30)). An adequate semantics of *only* hence should capture the intuition shown

in (33) and predict the licensing of NPIs in the scope of *only* and the non-licensing within the focus. The semantics of *only* given in (24) correctly predicts the licensing of NPIs in the scope. As I will show in the following, however, it fails to capture the intuition demonstrated in (33).

Before we proceed to further discussion, a few words have to be said. First, I assume that focus evokes a set of alternatives in a presuppositional way: when a syntactic phrase ϕ contains a focus, a presupposition is introduced that the alternative set ALT is a subset of $[\![\phi]\!]^f$ which contains $[\![\phi]\!]^0$ and at least one other element[8]. Furthermore, when checking the entailment relation between any two distinct propositions, the alternative set ALT should be kept constant in the premise and the conclusion; otherwise, there would be no constant context within which to access the downward or upward inference. Therefore, when checking the entailment relation between (33a, b), the alternative set ALT should be constant in the premise and the conclusion and contain as its members both *some student* and *some linguistics student.*

Moreover, I assume that NPI licensing is independent of contexts; to license an NPI, an environment has to be SDE regardless of the utterance context; NPIs are grammatical in a linguistic expression only if its SDE-ness is guaranteed by its definedness condition and truth conditions. In an environment that is SDE only when implemented with some information beyond the definedness condition and the truth conditions, NPIs cannot be licensed. In the discussion above, I have assumed that in the semantics of *only*, the alternative ALT is not presented as a syntactic object; rather, ALT is provided by the context, though the scope of *only* and the focus at the surface also play a

[8] $[\![\phi]\!]^0$ is the ordinary semantic value denoted by ϕ; $[\![\phi]\!]^f$ is the focus value of ϕ. For instance, $[\![\text{John}_F \text{ smokes}]\!]^0$ is the proposition 'λw. John smokes in w'; $[\![\text{John}_F \text{ smokes}]\!]^f$ denotes the set of propositions of the form 'λw. x runs in w'.

role in determining the content of ALT. Along the assumption that NPI licensing is independent of the context, the specification of ALT should not interfere when checking the entailment property of an environment for the purpose of NPI licensing.

Note that this position is not uncontroversial; there have been cases reported where the contextual information plays a role in NPI licensing, among them the restrictor of superlatives. For instance, Herdan and Sharvit (2006) point out that the contextual restrictor of the superlative morpheme *-est* plays an important role in the licensing of NPIs in the syntactic restrictor of *–est*. To account for the difference between definite and indefinite superlatives regarding the occurrence of NPIs in the syntactic restrictor (see (34a, b)), Herdan and Sharvit (2006) postulate the lexical entry in (34c) for *–est*. Based on (34c), only when S, the first argument of *-est*, is a singleton set is the relative clause in (34b) SDE, and the source of the uniqueness of S comes from the determiner *the* and a pragmatic principle that by default chooses a singleton set as the value of S.

(34) a. The longest book that I ever read is *War and Peace*.
b. A longest book that I (*ever) read is *War and Peace*.

c. $[\![\text{-est}]\!]=[\lambda S_{<<e,t>,t>}.\ [\lambda R_{<d,<e,t>>}.\ [\lambda P_{<e,t>}.\ [\lambda x_e$: (i) there is a $X_{<e,t>} \in S$ s.t. $x \in X$; and (ii) $P(x)=1$. For some $X_{<e,t>} \in S$ s.t. $x \in X$, there is a degree d s.t. $\{z \in X: R(d)(z)=1$ and $P(z)=1\}=\{x\}]]]]$

Unlike the semantics of *only* in (24), in which the alternative set ALT occurs only in the meta-language and is provided by the context, the contextual restriction anaphor S is present as a syntactic argument of *–est*. As pointed out by Herdan and Sharvit (2006), it is *–est* together with the contextual restriction pronoun S, where S denotes a singleton set, that licenses NPIs.

In order to maintain the assumption that NPI licensing is independent of the context and at the same time accommodate the case of superlatives, I hereby suggest to revise the SDE condition in (23) as in (35). The following discussion on NPIs within the *only*-focus will be based on (35). Note that (35) also covers the case of NPIs in the scope of *only*, which has been discussed in the previous subsection.

(23) a. The SDE condition on NPI licensing (von Fintel 1999):
An NPI is only grammatical if it is in the scope of α such that $[\![\alpha]\!]$ is SDE.
b. Strawson Downward Entailingness:
A function f of type $<\sigma, \tau>$ is Strawson downward entailing (SDE) iff, for all x, y of type σ such that $x \Rightarrow y$ and f(x) is defined: $f(y) \Rightarrow f(x)$

(35) a. The SDE condition on NPI licensing: (revised)
An NPI is only grammatical if it is in the scope of α such that α is SDE.
b. Strawson Downward Entailingness:
A subtree α is SDE iff there is some type σ and there is some type τ such that for any context c:
i) $[\![\alpha]\!]^c \in D_{<\sigma, \tau>}$; and
ii) for all x, y such that $x \Rightarrow y$ and $[\![\alpha]\!]^c(x)$ is defined, $[\![\alpha]\!]^c(x) \Rightarrow [\![\alpha]\!]^c(y)$

(35) differs from (23) in that while (23) is applicable to functions proper, (35) is applicable to syntactic objects that denote functions. Based on (35), the subtree composed of *–est* and the contextual variable S is SDE and hence licenses NPIs in the relative clause that restricts a superlative. In the case of *only*, although the alternative set ALT is contextually provided as well, for NPI licensing it is the syntactic object *only* alone that is subject to the SDE condition; ALT is only present in the meta-language and not as a syntactic object.

Now back to NPIs in the focus associated with *only*. According to the semantics given in (24) (repeated in (36)), an *only*-sentence is evaluated with respect to a context c; the content of the alternative set ALT is specified by the context c. The truth conditions of

an *only*-sentence require that none of the alternatives other than the prejacent (in (36), P(x)) is true.

(36) $[\![\text{only}]\!]^c(x_\sigma)(P_{<\sigma, t>})$ is defined only if P(x)=1 (First try)
(where σ can be any type)
If defined, $[\![\text{only}]\!]^c(x)(P)$ =1 iff
$\neg\exists y_\sigma[y \in \text{ALT} \wedge x \neq y]$: P(y)=1

Suppose that the value of the alternative set ALT in (33a, b) (repeated as in (38a, b)) is like that in (37). Based on (36), (38a) is true only if the individual who ate vegetables is a student and no linguistics students, staff, or professors ate vegetables. On the other hand, (38a) is true only if the individual who ate vegetables is a linguistic student and no students, staff or professors ate vegetables. As shown in (38), the truth conditions of (38a) contradicts the presupposition of (38b), and the truth conditions of (38b) contradicts to the presupposition of (38a). Given that a contradiction entails any propositions, (36) predicts that (38a, b) Strawson-entail each other, which is inconsistent with the intuition shown in (33). Also note that assuming (37) for the value of ALT in (38), the semantics in (36) renders the truth conditions inconsistent with the intuition; with this semantics, we reach a contradictory meaning for (38b) according to which the individual who is a linguistic student and ate vegetables is not a student.

(37) ALT:={some student, some linguistic student, some staff, some professor}

(38) a. Only [some student]$_F$ ate vegetables.
LF: $[\![\text{only}]\!]^c([\lambda P_{<e, t>}.\ \exists x_e[[\![\text{student}]\!]^c(x) \wedge P(x)]])([\lambda f_{<<e, t>, t>}.\ f([\![\text{ate-vegetables}]\!]^c)])$
Presupposition: $\exists x_e[[\![\text{student}]\!]^c(x) \wedge [\![\text{ate-vegetables}]\!]^c(x)]$
Truth Conditions: $\neg\exists f_{<<e, t>, t>}[f \in \text{ALT} \wedge f \neq [\lambda P_{<e, t>}.\ \exists x_e[[\![\text{student}]\!]^c(x) \wedge P(x)]]]$:
$f([\![\text{ate-vegetables}]\!]^c)$ =1

b. Only [some linguistics student]$_F$ ate vegetables.
LF: $[\![\text{only}]\!]^c([\lambda P_{<e, t>}.\ \exists x_e[[\![\text{linguistics student}]\!]^c(x) \wedge P(x)]])([\lambda f_{<<e, t>, t>}.\ f([\![\text{ate-}$

vegetables]]^c)])
Presupposition: $\exists x_e$[[[linguistics student]]^c(x) $\wedge$ [[ate-vegetables]]^c(x)]
Truth Conditions: $\neg\exists f_{<<e,t>,t>}[f \in ALT \wedge f \neq [\lambda P_{<e,t>}. \exists x_e[[[linguistics student]]^c(x) \wedge P(x)]]: f([[ate\text{-}vegetables]]^c)=1$

c. (38a) + the presupposition of (38b) => (38b)
(38b) + the presupposition of (38a) => (38a)

A possible amendment of the semantics of *only* in (36) is to exclude only the alternatives that are stronger than the prejacent rather than all the alternatives that are not identical to the prejacent. Along this idea, we reach a semantics of *only* like in (39), according to which the truth conditions of an *only*-sentence merely require that the alternatives that are not entailed by the prejacent are excluded[9]. In (39), an *only*-sentence is evaluated with respect to a world and a context. Just like in (36), the content of the alternative set ALT is specified by the context c.

(39) $[[only]]^{w,c}(x_\sigma)(P_{<s,<\sigma,t>>})$ is defined only if P(w)(x)=1 (second try)
(where σ can be any type)
If defined, $[[only]]^{w,c}$ (x)(P) =1 iff
$\neg\exists y_\sigma[y \in ALT \wedge \{w' \in W: P(w')(x)\} \subsetneq \{w' \in W: P(w')(y)\}]: P(w)(y)=1$

This semantics, however, is still inadequate in that it renders the focus associated with *only* an SDE context. As shown in (40), assuming the value in (36) for ALT in (40), the presupposition of (40b) contradicts the truth conditions of (40a), for the prejacent of (40b), namely *a male student ate vegetables*, is not entailed by that of (40a), namely *a student ate vegetables*, and hence the prejacent of (40b) is excluded in the truth

[9] Here I assume that the compositional rule Intensional Function Application (IFA) (see (i); Heim and Kratzer 1998; see also 1.3) when the constituent that consists of *only* and the focus combines with its second argument.

(i) Intensional Functional Application (IFA)
If α is a branching node and $\{\beta, \gamma\}$ the set of its daughters, then, for any world w assignment g: if $[[\beta]]^{w,g}$ is a function whose domain contains $[\lambda w'. [[\gamma]]^{w',g}]$, then $[[\alpha]]^{w,g} = [[\beta]]^{w,g}(\lambda w'. [[\gamma]]^{w',g})$

conditions of (40a). Therefore, although (40b) together with the presupposition of (40a) do not entail (40a), (40a) with the presupposition of (40b) together entail (40b).

(40) a. Only [some student]$_F$ ate vegetables.
LF: $[\![\text{only}]\!]^{w,c}([\lambda P_{<e,t>}.\ \exists x_e[\,[\![\text{student}]\!]^{w,c}(x) \wedge P(x)])([\lambda w'.\ \lambda f_{<<e,t>,t>}.\ f([\![\text{ate-vegetables}]\!]^{w',c})])$
Presupposition: $\exists x_e[[\![\text{student}]\!]^{wc}(x) \wedge [\![\text{ate-vegetables}]\!]^{wc}(x)]$
Truth Conditions: $\neg\exists f_{<<e,t>,t>}[f \in \text{ALT} \wedge \{w' \in W: \exists x_e[[\![\text{student}]\!]^{w}(x) \wedge [\![\text{ate-vegetables}]\!]^{w',c}(x)]\} \not\subseteq \{w' \in W: f([\![\text{ate-vegetables}]\!]^{w',c})\})]$: $f([\![\text{ate-vegetables}]\!]^{w',c})=1$

b. Only [some linguistics student]$_F$ ate vegetables.
LF: $[\![\text{only}]\!]^{w,c}([\lambda P_{<e,t>}.\ \exists x_e[\,[\![\text{linguistics-student}]\!]^{w,c}(x) \wedge P(x)])([\lambda w'.\ \lambda f_{<<e,t>,t>}.\ f([\![\text{ate-vegetables}]\!]^{w'})])$
Presupposition: $\exists x_e[[\![\text{linguistics student}]\!]^{w,c}(x) \wedge [\![\text{ate-vegetables}]\!]^{w,c}(x)]$
Truth Conditions: $\neg\exists f_{<<e,t>,t>}[f \in \text{ALT} \wedge \{w' \in W: \exists x_e[[\![\text{linguistics student}]\!]^{w}(x) \wedge [\![\text{ate-vegetables}]\!]^{w',c}(x)]\} \not\subseteq \{w' \in W: f([\![\text{ate-vegetables}]\!]^{w',c})\})]$: $f([\![\text{ate-vegetables}]\!]^{w',c})=1$

c. (40a) + the presupposition of (40b) => (40b)
(40b) + the presupposition of (40a) =/=> (40a)

This further leads to an unwelcome prediction: based on the SDE condition of NPI licensing, which states that NPIs are grammatical in an SDE environment, the semantics in (39) predicts that NPIs are licensed within the focus associated with *only*. As we have seen in (29), this prediction is incorrect.

One note on the criticism on (39) regarding NPI licensing: the reason why (39) renders the focus of an *only*-sentence SDE is that, as shown in (40), the truth conditions of the premise contradicts the presupposition on the prejacent of *only* in the conclusion. Given that the SDE inference illustrated in (40) is trivial, one way to avoid the wrong prediction on NPI licensing if assuming the semantics in (39) is to assume that only environments that support non-trivial SDE inferences can license NPIs; along this idea, given that the *only*-focus only supports trivial SDE inferences, NPIs are ungrammatical in

the *only*-focus. Nevertheless, note that the trivial SDE inference in the *only*-focus results from the presupposition of *only* that the prejacent is true. One can simply weaken the presupposition of *only* in (39) to avoid the trivial SDE inference but still runs into the wrong prediction on NPI licensing. For instance, some research have suggested that, rather than presupposing that its prejacent is true, *only* merely presupposes that some alternatives in the alternative set is true (i.e. Horn (1996); see the semantics of *only* in (41)). Such a claim, however, renders the *only*-focus a non-trivial SDE context and hence predicts that NPIs are grammatical in this environment.

(41) a. $[\![\text{only}]\!]^{w,c}(x_\sigma)(P_{<s,<\sigma,t>>})$ is defined only if $\exists y_\sigma[y \in \text{ALT} \wedge P(w)(y)]$
(where σ can be any type)
If defined, $[\![\text{only}]\!]^{w,c}(x)(P) = 1$ iff
$\neg\exists y_\sigma[y \in \text{ALT} \wedge \{w' \in W: P(w')(x)\} \not\subseteq \{w' \in W: P(w')(y)\}]: P(w)(y)$

b. Only [some student]$_F$ ate vegetables.
Presupposition: $\exists y_\sigma[y \in \text{ALT} \wedge [\![\text{ate-vegetables}]\!]^{w,c}(x)]$
Truth Conditions: $\neg\exists f_{<<e,t>,t>}[f \in \text{ALT} \wedge \{w' \in W: \exists x_e[[\![\text{student}]\!]^w(y) \wedge [\![\text{ate-vegetables}]\!]^{w',c}(x)]\} \not\subseteq \{w' \in W: f([\![\text{ate-vegetables}]\!]^{w',c})\}]: f([\![\text{ate-vegetables}]\!]^{w',c}) = 1$

c. Only [some linguistics student]$_F$ ate vegetables.
Presupposition: $\exists y_\sigma[y \in \text{ALT} \wedge [\![\text{ate-vegetables}]\!]^{w,c}(x)]$
Truth Conditions: $\neg\exists f_{<<e,t>,t>}[f \in \text{ALT} \wedge \{w' \in W: \exists x_e[[\![\text{linguistics student}]\!]^w(x) \wedge [\![\text{ate-vegetables}]\!]^{w',c}(x)]\} \not\subseteq \{w' \in W: f([\![\text{ate-vegetables}]\!]^{w',c})\}]: f([\![\text{ate-vegetables}]\!]^{w',c}) = 1$

d. (41a) + the presupposition of (41b) => (41b)
(41b) + the presupposition of (41a) =/=> (41a)

Arguments in favor of either of these claims about the presupposition of *only* have been presented in the literature, and comparing these views is out of the scope of this discussion. What I meant to show above is that it is inadequate to solve the problem discussed in (40) by assuming that a trivial SDE context does not license NPIs, for one

can easily change the lexical specification of *only* and render the *only*-focus non-trivially SDE context. A fundamental re-consideration of the lexical entry of *only* hence is required.

To reach a semantics of *only* which renders the focus non-monotonic, I, following the idea in Fox (2007), suggest that in the truth conditions of an *only*-sentence, only the innocently excludable alternatives to the prejacent are excluded (see also 2.4.1 in this dissertation for details about Fox's (2007) idea of innocent exclusion). Based on this idea, the alternatives that can and have to be excluded in the truth conditions of an *only*-sentence are those the conjunction of negation of which is consistent with the prejacent of *only*. A semantics of *only* implemented with this idea and a cross-categorial definition of innocent exclusion is given in (42)[10].

(42) a. $[\![\text{only}]\!]^{w,c}(x_\sigma)(P_{<s,<\sigma,t>>})$ is defined only if $P(w)(x)=1$
(where σ can be any type)
If defined, $[\![\text{only}]\!]^{w,c}(x)(P)=1$ iff $\neg\exists y_\sigma \in \text{I.E.}(x, \text{ALT}, P): P(w)(y)=1$

b. for any x of type σ and its alternative set $C_{<\sigma,t>}$ and any $f_{<s,<\sigma,t>>}$, the set of innocently excludable alternatives to x with respect to f (henceforth, I.E.(x, C, f)) is defined as the following:

$\text{I.E.}(x, C, f) = \cap\{C' \subseteq C: C' \text{ is a maximal set in C relative to } [\lambda K_{<\sigma,t>}. \cap(\{[\lambda w. \neg f(w)(y)]: y \in K\} \cup \{[\lambda w: f(w)(x)]\}) \neq \varnothing]$
(where for any C' and any function $g_{<<\sigma,t>,t>}$, $C'$is a maximal set in C relative to f iff: (i) $C' \subseteq C$; (ii) $f(C')$; and (iii) for any $C'' \subseteq C$ such that $C'' \supseteq C'$ and $f(C'')$, $C'' = C'$)

For any $z_\sigma \in C$, z is innocently excludable to x with respect to $f_{<s,<\sigma,t>>}$
iff $z \in \text{I.E.}(x, C, f)$

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[10] The lexical entry for *only* and the original definition of innocent exclusion suggested by Fox (2007) are given in (i).

(i) $[\![\text{only}]\!](A_{<<s,t>,t>})(p_{<s,t>}) = \lambda w: p(w)=1. \forall q \in \text{I.E}(p, A) \rightarrow q(w)=0$

$\text{I.E}(p, A) = \cap\{A' \subseteq A: A' \text{ is a maximal set in A s.t. } A'^{\neg} \cup \{p\} \text{is consistent}\}$
$A'^{\neg} = \{\neg p: p \in A\}$

(43) and (44) are toy examples to show how innocent exclusion plays a role in the semantics of *only* given in (42). Assume that there are students other than linguistics students in the relevant context.; as shown in (43a), if the alternative set ALT contains *some student, some linguistic student, some staff* and *some professor*, then the alternative *a linguistics student* is in the set of I.E. for *a student*, for the conjunction of negation of *a linguistic student ate vegetables* and that of the other two alternatives is consistent with the prejacent *a student ate vegetables.*

(43) Only [some student]$_F$ ate vegetables.
a. ALT: ={*some student*, *some linguistics student*, *some professor*, *some staff*}
maximal excludable alternative set: {*some linguistics student*, *some professor*, *some staff*}
I.E.(*some student*, ALT, *ate-vegetables'*): = {*some linguistics student*, *some professor*, *some staff*}

Now switch to a different context. This time, the set of alternatives contains *some student*, *some linguistics student*, *some philosophy student*, *some professor*, and *some staff* (see (44)). Furthermore, let's assume that in this context c the set of linguistics students and the set of philosophy students together exhaustify the set of students (i.e. {x: x is a linguistics student in c}$\cup${x: is a philosophy student in c}={x: x is a student in c}). As shown in (44b), if ALT contains both *some linguistics student* and *some philosophy student*, then these two alternatives cannot be in the same maximal set for exclusion, for the conjunction of negation of *some male student ate vegetables* and that of *some female student ate vegetables* contradicts the prejacent *some student ate vegetables*. In this case, neither of these two alternatives is in the set of I.E for *some student.*

(44) Only [some student]$_F$ ate vegetables.

a. ALT:={*some student*, *some linguistics student*, *some philosophy student*, *some professor*, *some staff*}
maximal excludable alternative set:
{*some linguistics student*, *some professor*, *some staff*},
{*some philosophy student*, *some professor*, *some staff*}
I.E.(*some student*, ALT, *ate-vegetables'*): =
{*some linguistics student*, *a professor*, *a staff* }∩{*some philosophy student*, *some professor*, *some staff* }
={*a professor*, *a staff*}

(assuming that {x: x is a linguistics student in c}∪{x: is a philosophy student in c}={x: x is a student in c})

The new semantics of *only* given in (42) renders the focus of an *only*-sentence non-monotonic. As discussed in (43) and (44), whether the prejacent of *only* in the conclusion is in the I.E. of the premise depends on the specification of ALT by the context. Given that there is no guarantee in the lexical specification of *only* that the prejacent of *only* in the conclusion is in the I.E. in the premise or the other way round, neither an SDE nor SUE inference is always supported in the *only*-focus.

(45) a. Only [some student]$_F$ ate vegetables.
b. Only [a male student]$_F$ ate vegetables.

(**46**) and (47) are aimed to show how the value of the alternative set ALT in (45) influences the inference pattern in the *only*-focus. In (46), assuming that (43a) is the value of the alternative set ALT, the alternative *some linguistic student* is included in the I.E. in (**46**a). On the other hand, the I.E. for *some linguistic student* (see (**46**b)) cannot contain the alternative *some student* because the negation of *some student ate vegetables* contradicts the prejacent of (46b) *some linguistic student ate vegetables*. In this case, (46a) together with the presupposition of (46b) entail (46b), for (**46**a) together with the presupposition of (46b) is a contradiction; in the truth conditions of (46a), the alternative

some linguistics student is in the I.E for *some student* and hence is excluded. In this case, (**46**a) Strawson-entails (46b) but not the other way round.

(46) ALT: ={*some student*, *some linguistics student*, *some professor*, *some staff*}

a. Only [some student]$_F$ ate vegetables.
LF: $[\![\text{only}]\!]^{w,c}([\lambda P_{<e,t>}.\ \exists x_e[[\![\text{student}]\!]^{w,c}(x) \wedge P(x)])([\lambda w.\ \lambda f_{<<e,t>,t>}.\ f([\![\text{ate-vegetables}]\!]^{wc})])$
Presupposition: $\exists x_e[[\![\text{student}]\!]^{w,c}(x) \wedge [\![\text{ate-vegetables}]\!]^{w,c}(x)]$
Truth Conditions: $\neg\exists f_{<<e,t>,t>} \in$ I.E(*some student*, ALT): $f([\![\text{ate-vegetables}]\!]^{wc})=1$
maximal excludable alternative set:= {*some linguistics student*, *some professor*, *some staff*}
I.E.(*some student*, ALT, *ate-vegetables'*): = {*some linguistics student*, *some professor*, *some staff*}

b. Only [some linguistics student]$_F$ ate vegetables.
LF: $[\![\text{only}]\!]^{w,c}([\lambda P_{<e,t>}.\ \exists x_e[[\![\text{linguistics student}]\!]^{w,c}(x) \wedge P(x)])([\lambda w.\ \lambda f_{<<e,t>,t>}.\ f([\![\text{ate-vegetables}]\!]^{wc})])$
Presupposition: $\exists x_e[[\![\text{linguistics student}]\!]^{wc}(x) \wedge [\![\text{ate-vegetables}]\!]^{wc}(x)]$
Truth Conditions: $\neg\exists f_{<<e,t>,t>} \in$ I.E(*some linguistics student*, ALT): $f([\![\text{ate-vegetables}]\!]^{wc})$
maximal excludable alternative set: {*some professor*, *some staff*}
I.E.(*some male student*, ALT, *ate-vegetable'*): = {*some professor*, *some staff*}

c. (46a) + the presupposition of (46b) --> (46b)
(46b) + the presupposition of (46a) -/-> (46a)

On the other hand, let's assume in (47) that ALT has the value as that in (44a) and further assume that the set of students in the context is exhaustified by the set of linguistics students and the set of philosophy students. In this case, as shown in (44a), the alternative *some linguistics student* is not in the I.E. in (47a), for the conjunction of negation of the alternatives *some linguistics student* and *some philosophy student* contradicts the prejacent of *only* in (47a). As shown in (47c), taking (44a) to be the value for ALT, (47a) together with the presupposition of (47b) do not entail (47b); on the other hand, (47b) together with the presupposition of (47a) do entail (47a).

(47) ALT:={*some student, some linguistic student, some philosophy student, some professor, some staff*}
(assuming that {x: x is a linguistics student in c}∪{x: is a philosophy student in c}={x: x is a student in c})

a. Only [some student]$_F$ ate vegetables.
LF: $[\![\text{only}]\!]^{w,c}([\lambda P_{<e,t>}.\ \exists x_e[[\![\text{student}]\!]^{w,c}(x) \wedge P(x)])([\lambda w.\ \lambda f_{<<e,t>,t>}.\ f([\![\text{ate-vegetabls}]\!]^{wc})])$
Presupposition: $\exists x_e[[\![\text{student}]\!]^{w,c}(x) \wedge [\![\text{ate-vegetables}]\!]^{wc}(x)]$
Truth Conditions: $\neg\exists f_{<<e,t>,t>} \in$ I.E(*a student*, ALT): $f([\![\text{ate-vegetables}]\!]^{wc})=1$
maximal excludable alternative set:
{*some linguistic student, some professor, some staff*},
{*some philosophy student, some professor, some staff*}
I.E.(*some student*, ALT, *ate-vegetables'*):
={*some linguistic student, some professor, some staff*}∩{*some philosophy student, some professor, some staff*}
={*some professor, some staff*}

b. Only [some linguistics student]$_F$ ate vegetables.
LF: $[\![\text{only}]\!]^{w,c}([\lambda P_{<e,t>}.$
$\exists x_e[[\![\text{linguistics-student}]\!]^{wc}(x) \wedge P(x)])([\lambda w.\ \lambda f_{<<e,t>,t>}.\ f([\![\text{ate-vegetables}]\!]^{wc})])$
Presupposition: $\exists x_e[[\![\text{linguistics-student}]\!]^{w}(x) \wedge [\![\text{ate-vegetables}]\!]^{wc}(x)]$
Truth Conditions: $\neg\exists f_{<<e,t>,t>} \in$ I.E(*some linguistics student*, ALT, *ate-vegetables'*):
$f([\![\text{ate-vegetables}]\!]^{wc})$
maximal excludable alternative set: {*some philosophy student, some professor, some staff*}
I.E.(*some linguistics student*, ALT, *ate-vegetables'*): =
{*some linguistics student, some professor, some staff*}

c. (47a) + the presupposition of (47b) -/-> (47b)
(47b) + the presupposition of (47a) --> (47a)

The discussion in (43)-(47) has shown that, with the semantics of *only* given in (42), neither an SDE nor an SUE inference is always supported in the focus of an *only*-sentence. Given that the focus associated with *only* is non-monotonic, the intuition demonstrated in (33) and the non-licensing of NPIs within the focus associated with *only* (see (29)-(30)) are captured.

(29) a. *Only [any students]F ate vegetables.

b. *John only gave kale to [any of his students]$_F$.

(30) *John doubted that only [<u>any</u> students]$_F$ ate vegetables.

The discussion above also shows that whether the focus in an *only*-sentence can be SDE or SUE depends on the value of the alternative set ALT. Therefore, one might wonder whether the choice of the value of ALT have influence on grammaticality of the NPIs within the *only*-focus. As discussed above, ALT is contextually provided and not present as a syntactic object; given that it is not the case that for any value of ALT the SDE inference is supported in the *only*-focus, the *only*-focus cannot be SDE for the purpose of NPI licensing. Note that in the discussion above, it is crucial that ALT is not presented as a syntactic argument of *only*. If ALT were presented as the first syntactic argument of *only*, the analysis above would allow [[only]](ALT) to be SDE and hence lead to the wrong prediction that NPIs can be licensed in the *only*-focus.

In summary, I have shown above that i) while NPIs are grammatical in the scope of *only*, they are ungrammatical inside the focus, ii) the syntactic assumption that the focalized constituent undergoes LF movement and adjoins to *only* provides a unified account for the cases of the DP-*only* and the VP-*only*, and iii) the difference between the scope and the focus of *only* on NPI licensing can be captured by the SDE condition and the semantics of *only* given in (42): whereas the scope of *only* (the second argument of *only*) is SDE and hence licenses NPIs, the focus associated with *only* (the first argument of *only*) is non-monotonic and hence fails to license these items[11].

4.2.2 NPIs in *If-Only*

[11] The semantics of *only* (42) is inadequate when the projection of the prejacent from the antecedent of a conditional is considered. This will be discussed in 4.3.

With the background introduced above, I suggest that the ungrammaticality of NPIs in the *if*-clause of an optative conditional (see (16a, b), repeated in (48a, b)) can be captured if it is assumed that in an optative conditional *if only p, would-q*, the whole antecedent *p* is in focus associated with *only* within the *if*-clause.

(48) a. If only *anyone/someone had explained the theory of relativity to John, he would have passed the exam.

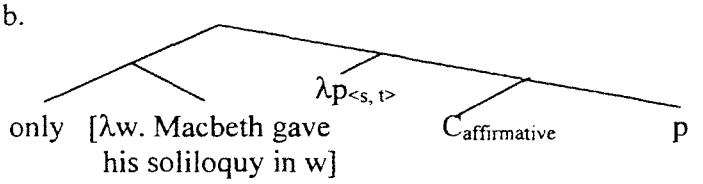
b. *If only John had ever explained the theory of relativity to me, I would have passed the exam.

An example in which a proposition (type <s, t>) is in focus associated with *only* is given in (49); in (49a), the whole proposition *Macbeth gave his dialogue* is in focus. Following Wagner (2006), I further assume that once a proposition is in focus, the scope of *only* (the second argument of *only*) is the polarity of the sentence[12]. With this assumption, the LF of the sentence with the *only*-focus in (49a) is represented as in (49b); in (49b), *only*, with the polarity operator $C_{affirmative}$ in its scope, first takes the proposition in focus as its first argument; then a predicate of type <<s, t>, t> created by λ-abstraction over the trace of the moved propositional constituent serves as the second argument of *only*. The denotation of the polarity operator $C_{affirmative}$ is given in (49c); a possible value for the alternative set in (49a) is given in (49d).

(49) a. They promised to stage Macbeth in its entirety, but then Macbeth only gave his soliloquy. So the witches didn't give their dialogue,... (Wagner 2006)

[12] For the discussion of polarity operators, see Guerzoni (2003, 2004), Polinsky and Carponigro (2008) and others.

b.



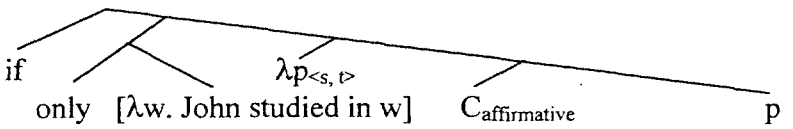
c. $[\![C_{affirmative}]\!]^{w,c} = \lambda p_{<s,t>}.\ p(w)=1$

d. ALT:={λw. Macbeth is staged in its entirety in w;
λw. the witches gave their dialogue in w;
λw. Macbeth gave his soliloquy in w;
λw. Macbeth killed Duncan in w; ...
λw. Macbeth and Baquo talked to each other; ...}

With all the assumptions introduced above, the LF of the *if*-clause of an optative conditional like (50a) can be represented as in (50b). As shown in (50b), within the *if*-clause, the proposition *John studied* adjoins to *only* via LF-movement and serves as its first argument. A possible value for the alternative set in (50a) is given in (50c).

(50) a. If only John had studied, he would have passed the exam.

b.



c. d. ALT:={λw. John studied in w;
λw. the instructor revealed the questions in w;
λw. John had a good tutor in w;...}

As mentioned in 4.2.2, while the exclusive focus particle *only* is SDE on its second argument (the scope of *only*), it is non-monotonic on its first argument (the associated focus). In an optative conditional *if only p, would-q*, given that the whole proposition *p* is in focus associated with *only* and is hence non-monotonic, NPIs are ungrammatical in *p*, despite the fact that it is further embedded in the *if* clause, which is an SDE context.

The analysis suggested above, namely that the proposition *p* in an optative conditional *if only p, would-q* is in focus associated with *only*, is supported by the incompatibility of optative conditionals with the concessive focus particle *even*. (51) shows that an optative conditional is incompatible with the concessive *even*; when the surface form *if only p,would- q* occurs with the concessive *even*, it cannot be interpreted as an optative conditional (see (51a)); instead, *only* in *if only p, q* has to be taken to be associated with the embedded subject in the *if*-clause (see (51b)).

(51) a. *Even if only John had shown up, we would have won the vote. (optative)

b. Even if only $[\text{John}]_F$ had shown up, we would have won the vote.
(ordinary concessive conditional with the embedded subject in the *only*-focus)

Guerzoni and Lim (2007) propose that in a concessive conditional (e.g., (52a)), the polarity operator of the antecedent is in focus associated with *even* (see (52b)). The alternative set introduced in a concessive conditional *even if p, would-q* hence contains only two propositions: *if p, would-q* and *if not-p, would-q* (see (52c, d)). In a concessive conditional *even if p, would-q*, *even* only introduces presuppositions and does not contribute to the truth conditions (see the semantics of *even* in (52e)); the scalar presupposition of *even* (see (52e, ii)) requires that *if p, would-q* is less likely to be true than *if not-p, would-q*; the additivity presupposition ((52e, i)) guarantees the truth of *if not-p, would-q* in the world of evaluation.

(52) a. Even if the bridge were standing, I wouldn't cross.

b. LF: [even [if $[C_{\text{affirmative}}]_F$ the bridge were standing, I wouldn't cross]]

c. $[\![C_{\text{affirmative}}]\!]^w_F = \{[\lambda p_{<s,t>}.\ p(w)=1], [\lambda p_{<s,t>}.\ p(w)=0]\}$

d. ALT:={*if the bridge were standing, I wouldn't cross*;
if the bridge were not standing, I wouldn't cross}

e. $[\![\text{even}]\!]^w(p_{<s,t>})$ is defined only if:
i) $\exists q_{<s,t>} \in$ ALT: $p \neq q \wedge q(w)=1$ (Additivity)
ii) $\forall q[q \text{ ALT} \wedge p \neq q]$: LIKELIHOOD(q) is greater than LIKELIHOOD(p) (Scalar)
if defined, $[\![\text{even}]\!]^w(p_{<s,t>})=1$ iff $p(w)=1$

To the extent that Guerzoni and Lim (2007) is correct about concessive conditionals, the incompatibility of the concessive *even* with an optative conditional can be captured under the proposal above as an instance of intervention effects (see Beck (2006) and others). Based on Guerzoni and Lim's (2007) suggestion on concessive conditionals and the proposal above that in an optative conditional *if only p, would-q*, *p* is in focus associated with *only*, the LF of (51a, b) are represented as in (53a, b).

(53) a. LF of (51a):
[even$_2$ [if [[only$_1$-[John had shown up]$_{F1}$] 3 [[$C_{affirmative}$]$_{F2}$ t_3]]]...

b. LF of (51b):
[even$_2$ [if [[$C_{affirmative}$]$_{F2}$ [[only$_1$-[John]$_{F1}$ 3 [t_3 had shown up]]]]]...

As shown in (53a), the LF of (51a), the focus association from the concessive *even* to $C_{affirmative}$ has to cross an intervener, namely, the exclusive focus operator *only*, and hence is blocked. An optative conditional therefore is not compatible with the concessive *even*. On the other hand, as shown in (53b), the LF of (51b), the focus association from *even* to $C_{affirmative}$ need not cross the exclusive focus *only*, which is associated with the embedded subject, and hence is not blocked.

Note that the analysis suggested above for the non-licensing of NPIs in an optative conditional *if only p, would-q* is built on the assumption that the occurrence of *only* in *if only* is an instance of the exclusive focus particle *only* , just like that in *only*

[John]$_F$ ate vegetables. For this analysis to be well-grounded, a semantic composition is needed that shows that the meaning of an optative conditional can be derived from the semantics of conditionals and the exclusive focus particle *only*. The following discussion is devoted to this task.

4.3 The Semantics of Optative Conditionals

What does an optative conditional *if only p, would-q* mean? As mentioned above, in addition to the necessity relation between *p* and *q*, an optative conditional *if only p, would-q* carries optativity and conveys the desire of the speaker at least toward *q*; for instance, (54) conveys the speaker's wish at least to John's passing the exam.

(54) If only John had studied hard, he would have passed the exam.

Asarina and Shklovsky (2008) show that the optativity on *q* in *if only p, would-q* is presupposed rather than asserted. As they observe, the inference of optativity on *q* passes the tests for presuppositions; one of the tests they use is the *hey, wait a minute* test (von Fintel 2004), an example of which is given in (55). As shown in (55), the presupposition triggered by the definite description *the mathematician who proved Goldbach's conjecture* (namely, *someone proved Goldbach's conjecture*), unlike the assertion, can be questioned with *Hey, wait a minute*.

(55) A: The mathematician who proved Goldbach's Conjecture is a woman.
B: Hey, wait a minute! I had no idea that some one proved Goldbach's Conjecture.
B: #Hey, wait a minute! I didn't know that that was a woman.
(von Fintel 2001b)

Applied to an optative conditional *if only p, would-q* (see (56)), the *hey! wait a minute* test shows that the inference of optativity on *q* behaves like a presupposition and can be questioned with *hey, wait a minute.* On the other hand, the conditional meaning of an optative conditional fails this test. Asarina and Shklovsky (2008) hence claim that while the conditional meaning of an optative conditional *if only p, would-q* is asserted, the inference of optativity on *q* is presupposed.

(56) A: If only I were rich, I would have a Porsche.
B: Hey, wait a minute! I didn't know that you wanted a Porsche.
B: #Hey, wait a minute! I didn't know that, if you were rich, you would have a Porsche.

Now consider the optativity on *p* in *if only p, would-q*. (57) shows that optativity on *p*, if there is any, does not fare as well as that on *q* in the *hey, wait a minute!* test. Assuming that the inferences of a proposition that pass the *hey, wait a minute!* test are presuppositions, (57) shows that the status of optativity on *p* is not the same as a presupposition.

(57) A: If only I were rich, I would have a Porsche.
B: ??Hey, wait a minute! I didn't know that you wanted to be rich.

The following examples further show that optativity on *p* relies on optativity on *q*; (58) shows that with a different consequent, an unfortunate thing mentioned by *p* can become someone's desire: while it is hard to find a context where (58a) is uttered reasonably, given that people normally do not wish for death, it is not difficult to imagine a context in which (58b) can be a reasonable statement with respect to the world knowledge; for

example, (58b) can be uttered by a desperate father who is working hard to reduce his beloved daughter's debt.

(58) a. If only I had been run over by that bus, I would have died there and then.
b. If only I had been run over by that bus, my daughter would have collected my insurance and paid off her debts.

Based on the examples in (57)-(58), I suggest that optativity on *p* in *if only p, would-q* is pragmatically inferred from the speaker's wish toward *q* and the conditional meaning *if p, would-q*. By using *if only p, would-q*, the speaker wishes for *q* and believes that *q* follows from *p* and hence implies that he is longing for *p*.

In summary, I suggest that the meaning of an optative conditional *if only p, would-q* contains the following ingredients:

i) the conditional meaning: that *q* follows from *p* is expressed in *if only p, would-q*.

ii) optativity: based on the result from the *hey, wait a minute!* test, *if only p, would-q* presupposes that the speaker has a desire/wish toward *q*. On the other hand, optativity toward *p* is pragmatically inferred from this presupposition of the speaker's wish for *q* and his belief that *q* follows from *p*.

The proposal I would like to make for the semantics of optative conditionals is sketched as follows. The conditional meaning of an optative conditional *if only p, would-q* follows straightforwardly from the semantics of conditionals. Nevertheless, it is not clear how optativity can be derived from the combination of the semantics of conditionals and that of the exclusive focus particle *only*. In the proposal below, optativity in an optative conditional *if only p, would-q* is captured by the stipulation that an optative conditional *if only p, would-q* uttered by the speaker x comes with a specific modal base and ordering source; the ordering source R(w) for an optative conditional *in only p, would-q*, just like

that for a counterfactual conditional, is totally realistic; the modal base, on the other hand, is the revision of the doxastic worlds accessible to the speaker such that in this set of worlds the *q*-worlds are better than the $\neg q$-worlds with respect to the speaker's preference in the world of evaluation.

Before spelling out all the details, there is one more problem that needs to be addressed; with the assumption that *if only p, would- q* is a type of conditional construction and that the occurrence of *only* in an optative conditional *if only p, would- q* is an exclusive focus particle, just like that in *John only ate [vegetables]*$_F$, the semantics of *only* given in (42) would result in an incorrect meaning for an optative conditional *if only p, would-q*. Another revision of the semantics of *only* given in (42) hence is required, and this is the center of the discussion in the following subsection.

4.3.1 More on the Semantics of *Only*

4.3.1.1 *Only*, its Prejacent, and its Presupposition

According to the semantics of *only* given in (42) (repeated as in c(59)), it is presupposed that the prejacent of *only* (i.e. in (59), P(w)(x)) is true; hence, for *John only ate [vegetables]*$_F$ to be defined, it has to be true that John ate vegetables; if defined, *John only ate [vegetables]*$_F$ is true iff no one other than John ate vegetables.

(59) a. $[\![\text{only}]\!]^{w,c}(x_\sigma)(P_{<s,<\sigma,t>>})$ is defined only if P(w)(x)=1
(where σ can be any type)
If defined, $[\![\text{only}]\!]^{w,c}(x)(P) = 1$ iff $\neg\exists y_\sigma \in$ I.E.(x, ALT, P): P(w)(y)=1

b. for any x of type σ and its alternative set $C_{<\sigma,t>}$ and any $f_{<s,<\sigma,t>>}$, the set of innocently excludable alternatives to x with respect to f (henceforth, I.E.(x, C, f)) is defined as the following:

I.E (x, C, f) = $\cap\{C' \subseteq C$: C′ is a maximal set in C relative to $[\lambda K_{<\sigma,t>}. \cap(\{[\lambda w. \neg f(w)(y)]: y \in K\} \cup \{[\lambda w: f(w)(x)]\}) \neq \varnothing]$

(where for any C′ and any function $g_{<<\sigma, t>, t>}$, C′is a maximal set in C relative to f iff: (i) $C' \subseteq C$; (ii) f(C′); and (iii) for any $C'' \subseteq C$ such that $C'' \supseteq C'$ and f(C″), C″ = C′)

For any $z_{\sigma} \in C$, z is innocently excludable to x with respect to $f_{<s, <\sigma, t>>}$ iff $z \in$ I.E.(x, C, f)

This semantics, however, is problematic when we consider the projection behavior of presuppositions from the antecedent of a (counterfactual) conditional. Presuppositions triggered by lexical items that occur inside the antecedent of a conditional project through; hence, a conditional inherits the presuppositions triggered by the elements in the antecedent. For instance, the attitude verb *regret* triggers the presupposition that its complement is true in the world of evaluation, and this factivity presupposition is inherited by the conditional in the antecedent of which the attitude verb *regret* is embedded (see (60b)). (61) shows that the presupposition of the additive focus particle *too* projects when it is embedded in the antecedent of a conditional; the conditional (61b) is felicitous in a context only if it is true that someone salient in the context who is not John drives a BMW.

(60) a. John regretted that he mistook Mary's lunchbox.
Presupposition: John mistook Mary's lunchbox.

b. If John had regretted that he mistook Mary's lunch box, he would have sent her a card to apologize.
Presupposition: John mistook Mary's lunchbox.

(61) a. John was driving a BMW, too.
Presupposition: Some salient individual other than John drove a BMW.

b. If John had been driving a BMW, too, I would have gone get one.
Presupposition: Some salient individual other than John drives a BMW.

In the semantics of *only* in (59), the prejacent of *only* is treated as a presupposition. This leads to the prediction that the prejacent of *only*, just like the presuppositions of *too* and *regret*, projects from the antecedent of a conditional. Consider the conditional in (62); if the prejacent of *only* in (62a), namely *Justin invited Lucy*, were presupposed, it should be predicted that (62a) is infelicitous in the discourse in (62b), for it is already established in (62b) that no one is invited. As shown in (62b), this prediction is not borne out.

(62) a. If Justin had only invited $[\text{Lucy}]_F$, he would have upset Mary.

b. No one is invited to Justin's house for dinner. If he had invited only $[\text{Lucy}]_F$, he would have upset Mary; but if he had invited Lucy and someone else, he would have upset himself. So he decided not to invite anyone.

Treating the occurrence of *only* in an optative conditional *if only p, would-q* as that of the exclusive focus particle *only*, the proposal in this chapter encounters this problem as well. Assuming the semantics of *only* in (59), we are led to the prediction that the optative conditional in (63) carries the presupposition that John studied hard. This is incorrect; the expected presupposition is not found in (63); intuitively, the optative conditional in (63) is felicitous in a context in which the speaker believes that John didn't study hard.

(63) If only John had studied hard, he would have passed the exam.

The problem discussed above indicates that the semantics of *only* given in (42) (repeated in (59)) is inadequate; the status of the prejacent of *only* should be re-considered. Note that this problem remains if we, following Horn (1996), assume that the presupposition of an *only*-sentence is an existential presupposition. Horn's (1996) proposal is illustrated in (64). In this proposal, instead of the prejacent of *only*, *Only* $[\textit{John}]_F$ *ate vegetables*

presupposes that someone in the alternative set ate vegetables; the prejacent is entailed by the existential presupposition and the assertion (namely, the exclusive meaning) together.

(64) Only $[\text{John}]_F$ ate vegetables.
Presupposition: $\exists x \in$ ALT: x ate vegetables
Assertion: $\neg\exists y \in$ ALT: $y \neq$John and y ate vegetables

Under this proposal, the conditional in (62a) presupposes that John invites someone. This proposal does not fare better in (62b); while this proposal predicts that (62a) is felicitous only in a context in which it is established that John invites someone, (62b) shows that the prediction is not borne out; as mentioned above, in (62b), it is already established that no one is invited.

To solve this problem, I adopt the idea in Ippolito (2008) that the presupposition triggered by *only* is a conditional presupposition; an *only*-sentence *only* $[A]_F$ *is B* presupposes that if some alternative is B, then A is B. Ippolito's (2008) idea is discussed in details in the following.

4.3.1.2 The Conditional Presupposition of *Only*

Ippolito's (2008) suggests that instead of presupposing the prejacent, an *only*-sentence *Only A is B* carries a conditional presupposition that if *B* is true of some alternative to *A*, then *B* is true of *A* as well. Implemented with her proposal, the semantics of *only* given in (59) is revised as in (65). Along with her idea, the *only*-sentence in (66) presupposes that if some relevant alternative ate vegetables, then John ate vegetables; the exclusive component of *only* is still taken to be the truth conditions. Note that the conditional presupposition, based on Ippolito (2008), is interpreted in terms

of material implication. Hence, in a context in which no relevant alternative ate vegetables, the conditional presupposition is satisfied but vacuously.

(65) a. $[\![\text{only}]\!]^{w,c}(x_\sigma)(P_{<s,<\sigma,t>>})$ is defined only if $[\exists y: y \in \text{ALT} \wedge P(w)(y)]] \rightarrow P(w)(x)$
(where σ can be any type)
If defined, $[\![\text{only}]\!]^{w,c}(x)(P) = 1$ iff $\neg\exists y_\sigma \in \text{I.E.}(x, \text{ALT}, P): P(w)(y)=1$

b. for any x of type σ and its alternative set $C_{<\sigma,t>}$ and any $f_{<s,<\sigma,t>>}$, the set of innocently excludable alternatives to x with respect to f (henceforth, I.E.(x, C, f)) is defined as the following:

I.E(x, C, f) = $\cap\{C' \subseteq C: C'$ is a maximal set in C relative to $[\lambda K_{<\sigma,t>}. \cap(\{[\lambda w. \neg f(w)(y)]: y \in K\} \cup \{[\lambda w: f(w)(x)]\}) \neq \varnothing]$
(where for any C′ and any function $g_{<<\sigma,t>,t>}$, C′is a maximal set in C relative to f iff: (i) $C' \subseteq C$; (ii) f(C′); and (iii) for any $C'' \subseteq C$ such that $C'' \supseteq C'$ and f(C″), $C'' = C'$)

For any $z_\sigma \in C$, z is innocently excludable to x with respect to $f_{<s,<\sigma,t>>}$
iff $z \in$ I.E.(x, C, f)

(66) Only John ate vegetables.
Presupposition: $\exists x[x \in \text{ALT} \wedge [\textit{ate-vegetables}'(w)(x)]] \rightarrow \textit{ate-vegetables}'(w)(\textit{John})$
Truth Conditions: $\neg\exists x[x \in \text{I.E}(\text{John}, \text{ALT}, \textit{ate-vegetables}') \wedge \textit{ate-vegetables}'(w)(x)]$

Ippolito (2008) further suggests that the prejacent in (66), namely *John ate vegetables*, is a scalar implicature that arises from the competition between (66) and *no one ate vegetables* due the Gricean Maxim of Quantity. Her analysis is sketched as follows: given that *no one ate vegetables* carries a stronger assertion (i.e. truth conditions) than *only John ate vegetables*, assuming that a speaker is being cooperative, it must be the case that he is not in a position to utter *no one ate vegetables* without violating the Maxim of Quantity when he utters *only John at vegetables.* Further assuming that the speaker is knowledgeable about the subject matter, he must be epistemically certain that it is not the case that no one ate vegetables and hence someone ate vegetables. The

implicature that someone ate vegetables, together with the conditional presupposition, according to which if someone ate vegetables, then John ate vegetables, further leads to a stronger implicature that John ate vegetables. Noticing that the prejacent of an *only*-sentence is not cancelled easily as other inferences that have been taken to be scalar implicatures (see (67)-(68))[13], Ippolito further proposes a constraint within the framework of Context Change Potential Semantics (Heim 1983; a.o.) that a presupposition cannot be vacuously satisfied in a context $c_{<s, t>}$; hence, for the conditional presupposition of (66) to be satisfied, the context has to at least be compatible with the possibility that someone ate vegetables.

(67) a. John ate five apples.
Implicature: John didn't more than five apples.
b. John ate five apples; in fact, he ate six.

(68) a. #Only John ate vegetables; in fact, he didn't, either.
b. #Only John ate vegetables, in fact, even he didn't.

While I adopt Ippolito's (2008) idea in the following that *only* triggers a conditional presupposition that if some alternatives is true, then the prejacent is true, here I will not follow her idea that the prejacent of *only* is a scalar implicature whose cancellation is subject to a pragmatic ban against vacuously satisfied constraints. Instead,

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[13] As discussed in Roberts (2006) and Ippolito (2008), to cancel the implicature in (68) that someone ate vegetables, epistemic modals and focus particles such as *even* and *either* are required. Furthermore, based on the contrast in (i), Ippolito (2008) claims that while the strong implicature that the speaker knows that someone can speak French can be cancelled, the weak implicature that the speaker does not know that nobody speaks French cannot.

(i) a. #Only Mary can speak French—in fact, not even she can.
b. Only Mary can speak French, and maybe not even she can.

Given that the distinction of the so-called weak and strong implicatures from an *only*-sentence in Ippolito (2008) is not relevant to the purpose of this chapter, I will ignore it here for the sake of simplicity. For a detailed discussion of this issue, I refer the readers to these two papers and the references cited therein.

given that in this dissertation presuppositions are taken to be definedness conditions of a linguistic expression, I assume a semantic ban against vacuously defined propositions in the world of evaluation: for any proposition $p_{<s,t>}$ and any world w where *p* is defined in w, the presupposition (i.e. definedness condition) of *p* cannot be vacuously true in w. This semantic ban provides a further constraint on worlds in which a proposition with a presupposition is defined. Given that due to this semantic ban the prejacent of *only* has to be true in a world of evaluation, it is predicted that the prejacent can never be cancelled.

As mentioned above, presuppositions that are triggered by elements that are embedded in the antecedent of a (counterfactual) conditional project; hence, based on the semantics of *only* given in (65), the counterfactual conditional (69b) inherits the conditional presupposition of (69a).

(69) a. Justin only invited $[\text{Lucy}]_F$.
Presupposition: $\exists x[x \in \text{ALT} \wedge [\![\text{invited}]\!]^w(x)(\text{John})] \rightarrow [\![\text{invited}]\!]^w(\text{Lucy})(\text{John})$

b. If Justin had only invited $[\text{Lucy}]_F$, he would have upset Mary.

Recall that the conditional presupposition of *only* is interpreted in terms of material implication; hence, in a context in which no relevant alternatives ate vegetables in the world of evaluation w, the conditional presupposition of (69a) is satisfied vacuously. This predicts the felicity of the occurrence of the conditional (69b) in (70); given that in (70) it is established that no one is invited, the conditional presupposition of *only* that projects from the antecedent of (69b) is vacuously satisfied.

(70) No one is invited to Justin's house for dinner. If he had invited only $[\text{Lucy}]_F$, he would have upset Mary; but if he had invited Lucy and someone else, he would have upset himself. So he decided not to invite anyone.

Note that in the counterfactual conditional in (69b), the *only*-sentence *Justin only invited Lucy*, is embedded in the *if*-clause and is not evaluated in the world of evaluation w. Therefore, the conditional presupposition triggered by *only* (69b) is not subject to the semantic ban against vacuously defined proposition in the world of evaluation w. The prejacent of *only* in (69b), namely *Justin invited Lucy*, hence is not required to be true in (70).

4.3.2 The Semantic Composition of Optative Conditionals

Assuming that *if only p, would-q* is a type of conditional construction and that the occurrence of *only* in *if only p, would-q* is that of the exclusive focus particle *only*, now we have the tools to derive the semantics of an optative conditional *if only p, would-q*: a semantics of *only* that is revised based on the proposal in Ippolito (2008) (see (65); repeated as (71)) and a semantics of conditionals suggested in von Fintel (1999) (see (72))[14].

(71) a. $[\![\text{only}]\!]^{w,c}(x_\sigma)(P_{<s,<\sigma,t>>})$ is defined only if $[\exists y: y \in \text{ALT} \wedge P(w)(y)]] \rightarrow P(w)(x)$
(where σ can be any type)
If defined, $[\![\text{only}]\!]^{w,c}(x)(P) = 1$ iff $\neg\exists y_\sigma \in \text{I.E.}(x, \text{ALT}, P): P(w)(y)=1$

b. for any x of type σ and its alternative set $C_{<\sigma,t>}$ and any $f_{<s,<\sigma,t>>}$, the set of innocently excludable alternatives to x with respect to f (henceforth, I.E.(x, C, f)) is defined as the following:

$\text{I.E}(x, C, f) = \cap\{C' \subseteq C: C' \text{ is a maximal set in C relative to } [\lambda K_{<\sigma,t>}. \cap(\{[\lambda w. \neg f(w)(y)]: y \in K\} \cup \{[\lambda w: f(w)(x)]\}) \neq \varnothing]$
(where for any C′ and any function $g_{<<\sigma,t>,t>}$, C′is a maximal set in C relative to f iff: (i) $C' \subseteq C$; (ii) f(C′); and (iii) for any $C'' \subseteq C$ such that $C'' \supseteq C'$ and f(C″), $C'' = C'$)

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[14] This semantics is a slightly modified version of von Fintel (1999) from Gajewski and Sharvit (2008). See 1.1.2 for the definition of admissibility.

For any $z_{\sigma} \in C$, z is innocently excludable to x with respect to $f_{<s, <\sigma, t>>}$
iff $z \in$ I.E.(x, C, f)

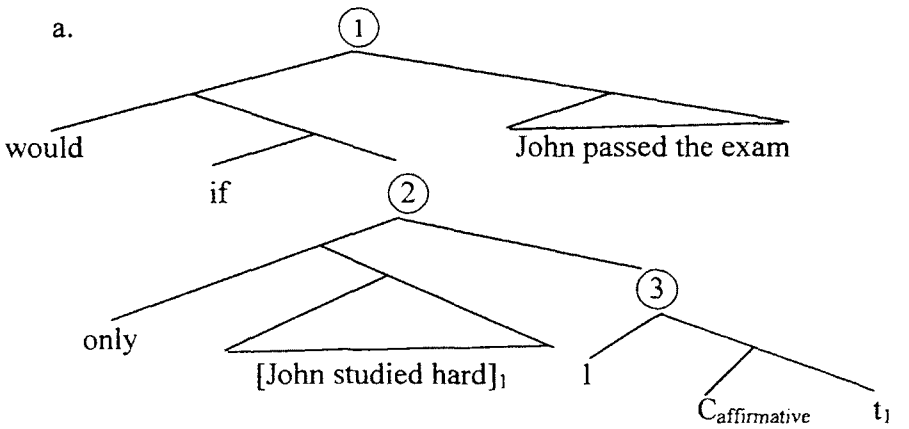
(72) For any $W' \subseteq W$, $[\![$ would $]\!]^{A,R,w,W'}$(if p)(q) is defined only if
i. W′is an admissible sphere in the modal base $\cap$A(w) with respect to an ordering source R(w); (Admissibility Presupposition)
ii. $W' \cap p \neq \varnothing$ (p is compatible W′) (Compatibility Presupposition)
if defined, $[\![$ would $]\!]^{A,R,w,W'}$(if p)(q)=1 iff $\forall w' \in W' \cap p$: $w' \in q$

With these two ingredients, the semantics of an optative conditional *if only p, would-q* is represented as follows. An optative conditional *if only p, would-q* like (73) has the LF (74a) and the semantics in (74b); as shown in (74a), the whole proposition *John studied hard* is in focus associated with *only* and undergoes focus movement within the *if*-clause. If defined, (73) is true iff John passed the exam in all the relevant worlds in which it is true that he studied hard and no other innocently excludable alternatives are true. The content of the alternative set ALT is determined by the context c; an instance of the value for the alternative set ALT is given in (74c).

(73) If only John had studied hard, he would have passed the exam.

(74)

a.



b. $[\![C_{affirmative}]\!]^{w} = \lambda p_{<s, t>}.\ p(w)$
$[\![③]\!]^{w} = \lambda p_{<s, t>}.\ p(w)$

$[\![②]\!]^{w,c}$ is defined only if $[\exists q_{<s,t>} \in$ ALT and $q(w)] \rightarrow$
$[\lambda w'.\ [\![$studied-hard$]\!]^{w'}$(John)](w)
(the Conditional Presupposition of *only*)
If defined, $[\![②]\!]^{w,c} = 1$ iff
$\neg\exists q_{<s,t>} \in$ I.E.([$\lambda w'$. John studied hard in w'], ALT, [$\lambda w'$. λp. $[\![C_{affirmative}]\!]^{w}(p)$]: $q(w)=1$

$[\![①]\!]^{w, A, R, W'}$ is defined only if
i) W′ is an admissible sphere in $\cap A(w)$ with respect to the ideal R(w)
(Admissible Presupposition)
ii) $W' \cap \{w: [\![②]\!]^{w,c}=1\} \neq \varnothing$ (Compatibility Presupposition)

if defined, $[\![①]\!]^{w, A, R, W'}=1$ iff
$\forall w' \in W' \cap \{w: [\![②]\!]^{w,c}=1\}$: John passed the exam in w′

c. ALT=$\{\lambda w$. John studied hard in w;
λw. someone did review for him in w;
λw. someone told him the answers in w;
λw. the exam was curved in w;
.....$\}$

In the *if*-clause in (72), *only* triggers the presupposition that if some proposition in the alternative set ALT is true, then it is true that John studied hard. Due to the semantic ban against vacuously defined propositions, in the worlds in the modal base in which the antecedent of (73) is true, some proposition in the alternative set is true in these worlds and hence, based on the conditional presupposition of *only*, it is true in those worlds that John studied hard. This conditional presupposition then further projects from the *if*-clause in (72); due to the projection of the conditional presupposition of *only*, (72) is admitted to a context *c* only if *c* entails this conditional presupposition. Recall that the conditional presupposition triggered by *only* is interpreted in terms of material implication; the projected conditional presupposition in (72) is vacuously satisfied if none of the alternatives in ALT is true in the world of evaluation.

There is another gap that needs to be filled in the semantic composition above; up to now nothing has been mentioned about optativity, the modal base $\cap$A(w), and the ordering source R(w) in an optative conditional. At this moment I have nothing smart to say but suggest that an optative conditional comes with a specific ordering source and modal base, and optativity in an optative conditional is due to the requirement on the modal base for an optative conditional. I assume that an optative conditional *if only p, would-q* comes with a specific kind of modal base and ordering source; an optative conditional *if only p, would- q*, just like a counterfactual conditional[15], has a totally realistic ordering source, the definition of which is given in (75).

(75) An ordering source function $R_{<s, <<s, t>, t>>}$ is totally realistic iff, for any world w′, $\cap R(w')=\{w'\}$.

I further assume by stipulation that an optative conditional *if only p, would-q* further carries a presupposition on the modal base $\cap$A(w), which is given in (76a). Based on (76a), the modal base of an optative conditional *if only p, would-q* uttered by α has to be the set of worlds that contains worlds doxastically accessible to α and is compatible with the consequent *q* (see (76a, i-iii)); furthermore, all the *q*-worlds in $\cap$A(w) have to be better than all the $\neg q$-worlds with respect to α's preference in the world of evaluation w (see (76a, iv)).

(76) a. $[\![$ *if only p, would-q* $]\!]^{w, A, R, \alpha}$ is defined only if:
i. $DOX_\alpha(w) \subseteq \cap A(w)$;
ii. $\cap A(w) \cap q \neq \varnothing$;
iii. $\cap A(w) - q \neq \varnothing$; and
iv. For any two worlds w′, w″ in $\cap$A(w) such that $w' \in q$ and $w'' \notin q$, $w' \leq_{R'(w)} w''$;

[15] See Kratzer (1981) for the assumption that counterfactual conditionals carry a totally realistic ordering source.

where R′(w) is a set of propositions specifying the preferences of α in w

b. for any $x \in D_e$ and any $w \in W$,
$Dox_x(w)=\{w' \in W: w'$ conforms to what x believes in w$\}$ (Heim 1992)

I suggest that the presupposition in (76a) is the source of optativity in an optative conditional *if only p, would-q*. According (76a), all the *q*-worlds in the modal base ∩A(w) are more desirable to the speaker than all the ¬*q*-worlds; this hence gives rise to the inference that uttering an optative conditional *if only p, would-q*, the speaker desires for *q* to be true.

The semantic composition of an optative conditional *if only p, would-q* proposed above suggests that the rise of optativity in optative conditionals has nothing to do with the occurrence of *only* in the *if*-clause. This is supported by the fact shown in (77) that the occurrence of *only* associated with the whole proposition embedded in the *if*–clause does not always give rise to optativity. In (77), *only* is associated with the whole proposition within the *if*-clause; if *only* in (77) induced optativity, the conditional should be judged odd, given that being asked for a refund by the audience is usually not wished for under normal circumstances.

(77) At least yesterday the witches performed their dialogue. If Macbeth had only given his soliloquy, the audience would have asked for a refund.

Note however that while *only* in the *if*-clause does not always give rise to optativity, optativity always arises when *only* is preposed within the *if*-clause and becomes adjacent to *if*. This is evidenced by (78), in which the oddity of the utterance of *if only p, q* is attributed to the rise of optativity.

(78) At least yesterday the witches performed their. ??If only Macbeth had given his soliloquy, the audience would have asked for refund.

(78) shows that unlike a conditional in which *if* and the occurrence of *only* in the antecedent are separated (e.g. (77)), a conditional in which *if* and *only* in the antecedent are adjacent to each other obligatorily introduces optativity and can only be interpreted as an optative conditional. One possible explanation is that the surface form *if only*, while still maintaining the semantic properties of conditionals and the exclusive focus particle *only*, is undergoing some grammaticalization process and hence is obligatorily associated with optativity. Due to the limit and the scope of this chapter, I leave this issue for future research.

4.3.3 A Possible Account for the Variation on NPI Licensing

The discussion on the semantics of optative conditionals proposed above is based on the judgments from speakers to whom NPIs are ungrammatical in the antecedent of an optative conditional in *if only p, would-q*. It has been briefly mentioned in 4.1 that there exists a variation among speakers regarding the grammaticality of NPIs inside the antecedent of an optative conditional; for some speakers, NPIs are grammatical in the antecedent of an optative conditional; in addition, through the internet search, a couple examples where NPIs occur in the antecedent of an optative conditional have been found (see (20)).

(20) a.. Beautifully animated graphics, bright, lush colours, big scary beasties for enemies and classic arcade adventure gameplay made for a game which could have changed the public perception of hermaphrodite non-vertebrates forever, **if only** anyone had ever bought it. (http://www.ysrnry.co.uk/articles/ystop100_2.htm)

b. It's actually a piece of accidental Surrealism — the sort of movie David Lynch

might make **if only** he would ever really let himself go.
(http://www.eyeweekly.com/film/feature/article/66816--wiseau-serious)

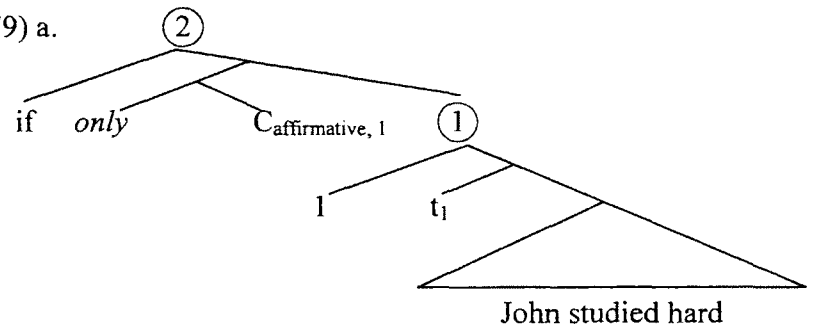
c. **If only** the robins had chosen any one of a dozen full-grown trees on our property … [a cat wouldn't have got the nest].
(From Corpus of Contemporary American English (COCA))

d. "Oh, **if only** I could ever get to that point," he said, " when I…"
(From Corpus of Contemporary American English (COCA))

e. "**if only** the children would ever sleep"
(From Corpus of Contemporary American English (COCA))

One way to account for the intuition of the speakers to who accept NPIs in the antecedent of an optative conditional is as the following: for those speakers, it is the positive polarity operator $C_{affirmative}$ rather than *p* that is in focus associated with *only* in *if only p, would-q* (see the LF in (79a)). As shown in (79), the positive polarity operator $C_{affirmative}$ being in focus, the embedded proposition p in *if only p, would-q* is in the scope of the *only*-focus and serves as the second argument of *only*. Given that NPIs are grammatical in the second argument of *only*, NPIs are grammatical in the antecedent of am optative conditional *if only p, would-q* (see (80)).

(79) a.



b. $[\![C_{affirmative}]\!]^w = \lambda p.\ p(w)$
$[\![①]\!]^w = \lambda f_{<<s,t>,t>}.\ f([\lambda w'.$ John studied hard in w'$])$
$[\![②]\!]^{w,c}$ is defined only if $[\exists f_{<<s,t,t>}[f \in ALT \wedge f([\lambda w'.$ John studied hard in w'$])] \rightarrow$
$[\![C_{affirmative}]\!]^w([\lambda w'.$ John studied hard in w'$])$
If defined, $[\![②]\!]^{w,c} = 1$ iff

$\neg\exists f'_{<<s,t>,t>} \in$ I.E.([[$C_{affirmative}$]]^w, ALT, [$\lambda f_{<<s,t>,t>}$. f([$\lambda w'$. John studied hard in w'])]: f'([$\lambda w'$. John studied hard in w']

c. ALT=: {$C_{affirmative}$, $C_{negative}$} (where [[$C_{negative}$]]^w= [$\lambda p. \neg p(w)$])

(80) a. If only John had studied <u>any</u> harder, he would have passed the exam.
b. LF: [if [[only-$C_{affirmative}$] [John studied <u>any</u> harder]]

Such an account further predicts that speakers who accept NPIs in an optative conditional have different interpretation from those who do accept NPIs in this construction. For those speakers who do not accept NPIs in optative conditionals, the set of alternatives ALT, as shown in (74), is a set of propositions. On the other hand, for those who do accept NPIs in an optative conditional, as shown in (79b, c), the set of alternatives ALT is a set of polarity operators (i.e., a set whose members are the positive polarity operator $C_{affirmation}$ and the negative polarity operator $C_{negative}$). Due to the difference on the value of ALT, one would expect that there are contexts where the use of an optative conditional *if only p, would –p* is felicitous to speakers who accept NPIs in optative conditionals but infelicitous to those who do not accept NPIs in this constructions and *vice versa.* At this moment, whether such contexts can be found will have to be left for future research[16].

4.4 Grosz (2011) and Biezma (2011) on Optativity

In the analysis I propose above for optative conditionals *if only p, would-q*, optativity is derived by the stipulation that an optative conditional comes with a specific modal base; in the modal base of an optative conditional *if only p, q*, all *q*-worlds are

[16] Jonathan David Bobaljik (p.c.) suggests that it might be possible to use the stress pattern to test this account for speakers' variation on NPI licensing. Based on the information I have gathered, it seems that for both types of speakers' a neutral intonation is possible in the case of optative conditional and hence it is hard to construct a minimal pair. More factors thus need to be considered before drawing any further conclusion.

better than $\neg q$-worlds with respect to the speaker's preference in the world of evaluation. Recently, various proposals have been suggested to derive optativity in optative constructions. In the following I will review two proposals for optativity in optative conditionals and show that neither proposal is adequate. Due to their inadequacy, I do not adopt these two proposals here in deriving optativity in an optative conditional. Most important of all, neither of the proposals addresses the non-licensing of NPIs in the antecedent of an optative conditional.

4.4.1 Grosz (2011)

Investigating the optative constrictions like (81a, b) in German as well as other languages, Grosz (2011) proposes that optativity in the constructions like (81) comes from the exclaimative operator and argues against that the meaning of the particles that occurs in optative constructions (such as *doch* and *nur* 'only') is a compositional ingredient of optativity. In his analysis, the *if*-clause and the *that*-clause in (81) are the complements of the exclaimative operator EX (see (82a, b) respectively). According to his lexical entry (see (83)), the operator EX gives rise to an inference that its propositional complement is ranked higher than other relevant alternatives with respect to a scale that is related to a speaker's emotion. In the optative constructions like (81a, b), the relevant scale is defined based on a speaker's desirability or preference; (81a, b) are felicitous iff for a speaker it is preferable to other relevant alternatives that the proposition expressed by the *if*- and *that*- clause is true.

(81) a. Ach, wenn ihre Schiffe unsere Ufer doch nur nie erreicht hätten!
oh if their ships our shores DOCH only never reached had
'Oh, if only their ships had never reached our shores!'
(Grosz (2011), (11a))

b. Ach, dass ihre Schiffe unsere Ufer doch nur nie erreicht hätten!
oh that their ships our shores DOCH only never reached had
'Oh, that only their ships had never reached our shores!'
(Grosz (2011), (12a)

(82) a. EX [if only their ships had never reached our shores]
b. EX [that only their ships had never reached our shores]

(83) a. *Lexical entry for* **EX** (Grosz (2011), (138))
For any scale S and proposition p, interpreted in relation to a context c and assignment function g, an utterance EX(S)(p) is felicitous iff $\forall q$[THRESHOLD(c) $>_S$ $q \rightarrow p >_S q$]

"EX expresses an emotion that captures the fact that p is higher on a (speaker-related) scale S than all contextually relevant alternatives q below a contextual threshold."

where THRESHOLD(c) is a function from a context into a set of worlds / a proposition that counts as high with respect to a relevant scale S.

b. *definition of scale*
i. A scale S is defined as a set of ordered pairs of worlds ($S \subseteq W \times W$), which are ordered by an ordering relation R, such that for every pair of worlds $<w_7,w_3>$ in S, the relation $R(<w_7,w_3>)$ holds.

ii. For any scale S and corresponding ordering relation R, $w_7 >_S w_3$ to means 'w7 is strictly higher than w3 on S' , i.e. $R(<w_7, w_3>) \wedge \neg R(<w_3, w_7>)$.

iii. For any proposition p and q, $p >_S q$ iff $\forall w_3 \in q[\exists w_7 \in p$ such that $w_7 >_S w_3$, and it is not the case that $\forall w_7 \in p[\exists w_3 \in q$ such that $w_3 >_S w_7]$.

Grosz (2011) further extends this analysis to the optative construction in English like (84). To capture the strict link between optativity and the occurrence of *only*, Grosz (2011) proposes the lexical entry in (85) for the occurrence of *only* (in his term, $only_{opt}$) in English optative constructions and further suggests that $only_{OPT}$ has becomes an obligatory optative marker in English.

(84) a. If only John had study harder!
b. EX [If only John had studied harder]

(85) a. $[\![\text{only}_{\text{opt, c}}]\!]=\lambda S.\ \lambda p$: most $q \in g(C)[q >_s p] \wedge$ LOWERNESS
"**Presupposition 1**: The modified proposition is low on the salient scale."

b. S is a bouletic ordering. BOULETIC
"**Presupposition 2**: The contextually salient scale is a bouletic scale."

c. p IDENTITY
"**Truth Conditional Content**: $only_{OPT}$ is truth-conditionally vacuous.

Two notes regarding Grosz's (2011) analysis of optativity: first, Grosz (2011) mainly focuses on *if-only* sentences without a consequent (e.g.,(84)); in addition, his discussion mainly centers on German, though data from other languages are employed to support his claim. Second, in Grosz's (2011) analysis, the *if-only* sentences in (84a) and (86) are treated as separate constructions; according to his analysis, the *if*-clause in (84a) is simply the complement of the operator EX rather than the antecedent of a conditional sentence. In Grosz (2011), conditional constructions like (86) may be treated as what he termed 'minimal sufficiency condition' (Grosz (2011): pp. 24). In a minimal sufficiency conditional, *only* carries a meaning that is similar to *at least* and gives rise to an inference that its prejacent proposition is the lowest on a salient scale. Although in English the *at-least* reading is generally not available for *only* (see (87)), Grosz (2011), employing the examples in (88), claims that English still has the residual of *only* carrying a meaning similar to *at least*.

(86) If only John had studied harder, he would have passed the exam.

(87) If only two people get into the boat, it will sink.
READING 1: The boat will sink if no more than two people get in.
*READING 2: The boat will sink if at least two people get in.
(Grosz (2011), (581); with slight modification)

(88) a. It was a remarkable performance, an inspiring example of what the busy man of affairs can really accomplish [if he **only** applies himself].
(Thomas Wolfe. 1934. *You Can't Go Home Again*. New York: Harper & Row, p.255.)

b. According to [the American] dream, hard work, discipline and frugality will bring success. Everyone can be a millionaire [if he **only** applies himself].
(Peter J. Leithart. 2006. "Death of a Salesman". In *Omnibus III. Reformation to the Present*,ed. by Douglas Wilson and G. Tyler Fischer. Lancaster, PA: Veritas Press, p.551)

c. Jenkins has made it to where he is by his own efforts. It only goes to show what a good Welsh boy can do [if **only** he applies himself].
(Ken Jones. 1999. "Rugby Union: Jenkins kicks Wales into the reckoning". The Independent.)

Note, however, that as shown in the discussion above, optativity arises in an *if-only* sentence with an overt consequent; it is hence inadequate to simply label *if-only* sentences like (86) as minimal sufficiency conditional and more has to be said.

Admitting the existence of optativity in an *if-only* sentence like (86), one may follow this analysis and suggests that the occurrence of *only* in an *if-only* sentence like (86) has the lexical entry in (85) and hence gives rise to optativity (see the LF in (89)). Note that in an analysis along with this idea, we merely derive the optativity toward to the antecedent *p* in *if only p, q* but say nothing regarding the consequent *q*. This prediction is undesirable in that as discussed in 4.3, using the *if-only* conditional *if only p, q*, what a speaker wishes for is the consequent *q* and optativity toward *p* in *if only p, would-q* is pragmatically inferred from the speaker's wish toward *q* and the conditional meaning *if p, would-q*.

(89) [*would*-[*if* [$only_{opt}$ [*John had studied harder*]]][*he passed the exam*]]

4.4.2 Biezma (2011)

Biezma (2011) agrees with the proposal in this chapter that i) in an optative conditional, the speaker's true desire is toward the consequent rather than the antecedent,

and ii) the focus particle *only* is associated with the whole proposition in the *if*-clause. Unlike my analysis however, in Biezma's (2011) proposal, optativity is cashed out as a result of reversed topicality in a conditional. Biezma (2011) follows the idea of Haiman (1978) and others that the antecedent of a regular conditional is a topic. In an optative conditional, the antecedent being in focus associated with *only* leads to the reverse of topicality: in an optative conditional, the antecedent is the focus whereas the consequent is the topic. The reverse of topicality in an optative conditional *if only p, q* further gives rise to the Immediate Question under Discussion (IQuD; see Roberts (1996)) in (90).

(90) How do we bring about *q*? or How would we have brought *q* about?

Biezma (2011) suggests that the IQuD in (90) for an optative conditional is a mention-some, goal-oriented question, just like those in (91). Given that this type of question implies that the speaker desires for the proposition embedded in the question, an optative conditional, via the IQuD in (90), gives rise to the inference that the speaker desires for the consequent.

(91) a. How do I get to the supermarket?
b. How do I get to play in the NBA?

In Biezma's proposal, the connection between the reverse of topicality and the rise of a goal oriented IQuD in (90) is a stipulation. Furthermore, her proposal leads to an overgeneration of optativity in conditional constructions. As shown in (77), the antecedent being in focus does not necessarily gives rise to optativity. Her proposal also wrongly predicts that optativity can arise in the conditional constructions in (92), where the whole antecedent is also in focus associated with *only*.

(92) a. Only if John had studied harder would he have passed the exam.
b. John would have passed the exam only if he had studied harder.

4.5 Conclusion

In this chapter, I have discussed the NPI phenomenon in optative conditionals *if only p, would-q*. While optative conditionals *if only p, would-q* bear morphological and semantic similarities with ordinary counterfactual conditionals *if p, would-q*, these two conditional constructions differ from each other in NPI licensing in the *if*-clause; weak NPIs such as *any* and *ever* are grammatical in the *if*-clause of an ordinary (counterfactual) conditional but ungrammatical in that of an optative conditional *if only p, would-q*. To account for the non-licensing of NPIs in optative conditionals, a semantic composition of this construction has been proposed that is built on a Lewis-Kratzer-von-Fintel style semantics of conditionals, as well as the assumption that the occurrence of *only* in the *if*-clause of an optative conditional is an instance of the exclusive focus particle *only*. The proposal in this chapter can be summarized as follows:

a. In an optative conditional *if only p, would-q*, the proposition *p* is in focus associated with *only* within the *if*-clause; while NPIs are licensed in the scope of the *only*-focus, they are ungrammatical within the focus; hence, NPIs are ungrammatical in the *if*-clause of an optative conditional *if only p, would-q*.

b. A semantics of *only* that is implemented with Fox's (2007) idea of Innocent Exclusion and Ippoliot's (2008) conditional presupposition of *only* is suggested to account for the non-licensing of NPIs within the *only*-focus and the non-projection of the prejacent of an *only*-sentence from the antecedent of a counterfactual conditional. An *only*-sentences presupposes that if some relevant alternative is true, then the prejacent is true. In the truth conditions, only the alternatives the conjunction of negation of which is compatible with the prejacent are excluded.

c. An optative conditional comes with a specific ordering source and modal base. An optative conditional, just like an ordinary counterfactual conditional, comes with a totally realistic ordering source. Furthermore, by stipulation, an optative conditional *if*

only p, would-q uttered by x is defined only if the q-worlds in the modal base are closer to the preferences of x in the world of evaluation w than the $\neg q$-worlds. This presupposition on the modal base gives rise to the inference of x's desire toward q and hence is the source of optativity .

Appendix:

Incorporating an adapted notion of innocent exclusion from Fox (2007), the semantics of *only* given in this chapter (see (42)) leads to the prediction that the meaning of an *only*-sentence like (2a) varies from context to context in the alternatives that are excluded in the truth conditions. For instance, in the truth conditions of (93a), the alternative some *linguistics student* might be excluded in one context but not in another.

(42)a. $[\![\text{only}]\!]^{w,c}(x_\sigma)(P_{<s,<\sigma,t>>})$ is defined only if $P(w)(x)=1$
(where σ can be any type)
If defined, $[\![\text{only}]\!]^{w,c}(x)(P)=1$ iff $\neg\exists y_\sigma \in$ I.E.(x, ALT, P): $P(w)(y)=1$

b. for any x of type σ and its alternative set $C_{<\sigma,t>}$ and any $f_{<s,<\sigma,t>>}$, the set of innocently excludable alternatives to x with respect to f (henceforth, I.E.(x, C, f)) is defined as the following:

I.E.$(x, C, f) = \cap\{C' \subseteq C$: C' is a maximal set in C s.t.
$\cap(\{[\lambda w. \neg f(w)(y)]: y \in C'\} \cup \{[\lambda w: f(w)(x)]\}) \neq \varnothing\}$
(in other words, I.E.$(x, C, f) = \cap\{C' \subseteq C: \cap(\{[\lambda w. \neg f(w)(y)]: y \in C'\} \cup \{[\lambda w: f(w)(x)]\}) \neq \varnothing$ and for all $C'' \subseteq C$ s.t. $C' \subseteq C''$ and $\cap(\{[\lambda w. \neg f(w)(y)]: y \in C''\} \cup \{[\lambda w: f(w)(x)]\}) \neq \varnothing$, $C'=C''\}$

For any $z_\sigma \in A$, z is innocently excludable to x with respect to $f_{<s,<\sigma,t>>}$
iff $z \in$ I.E.(x, C, f)

(93) a. Only [some STUdent] ate vegetables.
Presupposition: $\exists y_\sigma[y \in \text{ALT} \wedge [\![\text{ate-vegetables}]\!]^{wc}(x)]$
Truth Conditions: $\neg\exists f_{<<e,t>,t>}[f \in \text{ALT} \wedge \{w' \in W: \exists x_e[[\![\text{student}]\!]^w(y) \wedge [\![\text{ate-vegetables}]\!]^{w',c}(x)]\} \subseteq \{w' \in W: f([\![\text{ate-vegetables}]\!]^{w',c})\})]$:
$f([\![\text{ate-vegetables}]\!]^{w',c})=1$
ALT: {some student, some linguistics student,....}

The examples in (94)-(95) provide evidence for this prediction. While the alternative *some linguistics student* is excluded in the truth conditions of the *only*-sentence, it is not in (95). In the context in (94), the set of students is exhaustified by the set of linguistics students and that of philosophy students. Given that excluding both the alternatives *some*

linguistics student and *some philosophy student* is inconsistent with the prejacent of *only*, both alternatives *some linguistics student* and *some philosophy student* cannot be in the I.E in the *only*-sentence uttered in (94). Hence, in the truth conditions of the *only*-sentence uttered in (94), the alternative *some linguistic student* is not excluded.

(94) Context: The college is holding a reception to honor the graduate students in Linguistics and philosophy only. In addition to those students, the faculty and staff of the entire college are invited. While at this reception you see that the faculty and staff show no interest in the vegetables, but someone you identify as being a student ate vegetables voraciously. The next day someone asked you who at the reception ate vegetables…

You: Only [some STUdent] ate vegetables.
(intended reading: The intended reading: the alternatives *some faculty* and *some staff* are excluded, while the alternatives *some linguistics student* and *some philosophy student* are not.)

ALT:{some student, some linguistics student, some philosophy student, some faculty, some staff}

In the context given in (95), the set of students is not exhaustified by the set of linguistics students. Excluding the alternative *some linguistics student* hence is still consistent with the prejacent. Therefore, the alternative *some linguistics student* is in the I.E and is excluded in the truth conditions of the *only*-sentence uttered in (95).

(95) Context: The college is holding a campus-wide reception for the new president. Faculty, staff, and students are all invited. You know the faculty, the staff, and you also know the students from linguistics. Nonetheless, you don't know the rest of the students by name. You see that the faculty, staff and the linguistics students have no interest in the vegetables that are served, but one of the other students are is eating them voraciously. The next day someone asks you who at the reception ate vegetables….

You: Only [some STUdent] ate vegetables.
(Intended reading: all the alternatives other than

ALT:{some student, some linguistics student, some faculty, some staff}

Without further implementation, the semantics of *only* suggested here might wrongly predict that the *only*-sentence in (96) carries the unattested inference that John didn't eat vegetables (see (96a)). The *only*-sentence in (96) carries only the meaning in (96b) but not the one in (96a).

(96) Only [John or Mary] ate vegetables.

a. Intended meaning: it is not the case that John ate vegetables.
ALT: {John or Mary, John, John and Mary}
I.E(John or Mary, alt, *ate-vegetales*
(*Mary*$\notin$ ALT)

b. intended reading: it is not the case that both John and Mary ate vegetables. (without committed to the truth of either John ate vegetables or Mary ate vegetables)
ALT: {John or Mary, John, Mary, John and Mary}

Nevertheless, as discussed in Fox and Katzir (2011), in a disjunction *a or b*, both disjuncts *a* and *b* have to be included in the alternative set. In the mechanism proposed in Fox and Katzir (2011), the alternatives *John or Mary*, *John*, *Mary*, *John and Mary* are *exhaustively relevant* and hence have to be included. Following the suggestion in Fox and Katzir (2011), the alternative set for the *only*-sentence has to at least include John or Mary, John, Mary, and John and Mary (see (96b)). Given that, assuming the alternative set in (96b), excluding the alternatives *John* and *Mary* is inconsistent with the prejacent, neither of them is in the I.E in the *only*-sentence in (96). For details about exhaustive relevance, I refer the reader to Fox and Katzir (2011).

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