

NPI-Licensing in Negated Causal
Constructions¹

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March 12, 2001

Abstract

This paper aims at explaining the occurrence of negative polarity items (NPIs) in negated because-clauses. The (un)acceptability of these expressions in negative because-constructions is argued to be a result of the interaction of the ordinary semantics of because (in terms of counterfactuals), negation and an implicature triggered by the NPI. Basically, I follow Krifka (1995) in assuming that NPIs generally induce either an even-related or an ordinary scalar implicature and I provide evidence (contra Krifka) that only a theory with lexically ambiguous even makes the correct prediction for the data considered. The analysis is formalized on the basis of Rooth's alternative semantics in analogy to focus interpretation.

1 Introduction

1.1 The ambiguity of negative because clauses

It is well known that negated because-clauses as in (1) have two readings depending on scope interactions of the negation and the causal operator because: one with the negation having scope over because, as represented in (1-a), and one where the negation has narrow scope with respect to because, as represented in (1-b).¹

- (1) Alma WASN'T happy because a LINGuist read her paper.
- a. [VP not [VP [VP Alma was happy] [CP because a linguist read Alma's paper]]]
 - b. [IP [VP not [VP Alma was happy]] [CP because a linguist read Alma's paper]]

In the first reading (with wide scope of the negation) it is denied that there was a causal relation between the fact that Alma is happy and the fact that a linguist read Alma's paper. In the second reading (with narrow scope of negation) the reason for Alma's not being happy was that a linguist read her paper.

Linebarger (1987: 332) points out several diagnostics for the wide scope reading and the narrow scope reading of the negation. Among other things, NPIs may resolve the ambiguity.

NPIs in the subordinate clause are only acceptable in causal constructions on the reading with a wide scope negation, as shown in (2) and (3).

(2) Alma wasn't happy because any LINGuist read her paper.

- a. [VP not [VP [VP Alma was happy] [CP because any linguist read Alma's paper]]]
- b. #[IP [VP not [VP Alma was happy]] [CP because any linguist read Alma's paper]]

(3) Fred didn't shout at his dog because it ever chased CATS.

(Johnston 1993: 172)

- a. [VP not [VP [VP Fred shouted at his dog] [CP because the dog ever chased cats]]]
- b. #[IP [VP not [VP Fred shouted at his dog]] [CP because the dog ever chased cats]]

It has been suggested that it is only a property of so-called weak NPIs that they occur in the negated subordinated clause (e.g. Johnston 1994**b**: 171).²

But this is not true. So-called strong (or even-related) NPIs like a red cent may occur in negative because-clauses, too, as the examples in (4) and (5) show.

(4) Trade and industry do not prosper because the government contributed a red cent.

a. [VP not [VP [VP trade and industry prosper] [CP because the government contributed a red cent]]]

b. #[IP [VP not [VP trade and industry prosper]] [CP because the government contributed a red cent]]

(5) I didn't buy the ticket because I had a hope in hell of WINning.

(Linebarger 1981: 73)

a. [VP not [VP [VP I bought the ticket] [CP because I had a hope in hell of winning]]]

b. #[IP [VP not [VP I bought the ticket]] [CP because I had a hope in hell of winning]]

However, there seem to exist restrictions on the occurrence of NPIs, as the examples in (6) and (7) reveal. These sentences do not seem to express either of the above readings.

(6) #I didn't buy the ticket because I saw the horse's EARS budge.

(Linebarger 1981: 61)

a. #_{[VP not [VP [VP I bought the ticket] [CP because I saw the horse's ears budge]]]}

b. #_{[IP [VP not [VP I bought the ticket]] [CP because I saw the horse's ears budge]]}

(7) #Marty didn't sell the ticket because it was worth a red cent.

(Johnston 1993: 171)

a. #_{[VP not [VP [VP Marty sold the bike] [CP because the bike was worth a red cent]]]}

b. #_{[IP [VP not [VP Marty sold the bike]] [CP because the bike was worth a red cent]]}

And sometimes constructions with weak NPIs may also have no reading at all, as shown in (8).

(8) #Dogs don't see because they have any EARS. (Linebarger 1987: 376)

a. #_{[VP not [VP [VP dogs see] [CP because dogs have any ears]]]}

b. #_{[IP [VP not [VP dogs see]] [CP because dogs have any ears]]}

All NPIs in the main clause are acceptable in negative causal constructions on the narrow scope negation reading, as exemplified in (9).

(9) He didn't budge an inch because he was pushed.

(Linebarger 1987: 337)

a. # $[_{VP} \text{ not } [_{VP} [_{VP} \text{ he budged an inch}] [_{CP} \text{ because he was pushed}]]]$

b. $[_{IP} [_{VP} \text{ not } [_{VP} \text{ he budged an inch}]] [_{CP} \text{ because he was pushed}]]]$

This sentence only has the meaning that the pushing caused the person to stay in his original place. The sensible reading in which the causal relation between the pushing and some movement of the person is intended is not available. If we substituted the NPI budge an inch by move, both readings would become perfect: (a) that there was some other source for the movement of the person, but not the pushing (wide scope negation), and (b) that the person was pushed and he moved but there was no causal relation between these two events. That is, semantically there is nothing wrong with the wide scope reading of (9).

In addition, it seems to be the case that with any in the main clause readings with a wide scope negation are possible.

Linebarger (1981: 73) points out that any in the matrix clause may occur in both the wide scope reading for the negation and the narrow scope reading.

(10) I didn't cut any of his classes because I disagreed with the lecturer.

(10) may mean that my disagreement with the lecturer was not the reason for my cutting his classes (wide scope negation). In the wide scope reading, (10) is intuitively assumed to entail that I did indeed cut some of the lecturer's classes, but for another reason. But it may also mean that my reason for attending all of the lecturer's classes was that I disagreed with him (narrow scope negation).

The same must be held true for other weak NPIs like ever. (11) has a wide scope reading for the negation. Nevertheless, the NPI in the main clause is possible.

(11) Fido didn't ever bite his owner because he WANTED to [bite him].

(11) intuitively means that Fido bit his owner, but never intentionally.

These data raise the following questions: Why are NPIs contained in the because-clause only licensed in the wide scope negation reading, and why are they not licensed in the narrow scope reading? How can the occurrence restrictions of NPIs be modeled? How can it be explained that some expres-

sions usually considered as NPIs like ever and any may occur in the main clause but not other NPIs if the negation has wide scope with respect to the causal operator? In the literature we find some answers to these questions.

1.2 Licensing conditions

Ladusaw (1979) proposes a purely semantic account of negative polarity. He observes that expressions that license NPIs are downward entailing with respect to expressions in their scope. A predicate like order meat, for example, may be substituted in the scope of negation by a more specific predicate like order veal in every utterance situation.

$$(12) \quad \llbracket \text{order veal} \rrbracket \subseteq \llbracket \text{order meat} \rrbracket$$

- (13) a. Maria didn't [_{VP} order meat]. \Rightarrow
 b. Maria didn't [_{VP} order veal].

There is some disagreement in the literature as to whether negated *because*-clauses are downward entailing. According to Linebarger (1987: 376) they are. She argues as follows: the predicate have lidded eye is more specific than have eyes (14). And superset-subset substitution is possible without changing the truth value of the negated *because*-construction (15).

(14) $\llbracket \text{have lidded eyes} \rrbracket \subseteq \llbracket \text{have eyes} \rrbracket$

- (15) a. Dogs don't hear because they have eyes. \Rightarrow
 b. Dogs don't hear because they have lidded eyes.

Therefore, negated because-constructions are downward-entailing and we predict that NPIs are possible in the subordinate clause.

Linebarger already showed that even if a particular because-construction is downward-entailing this does not predict the acceptability of the NPI. (16) is not an acceptable sentence.

(16) #Dogs don't hear because they have any eyes.

Therefore, she concludes that Ladusaw's account is not correct.

Kadmon & Landman (1993) argue that negated because-clauses are not downward-entailing. They discuss the following example. It is obvious that drunken men are a subset of all men, as in (17).

(17) $\llbracket \text{drunken man} \rrbracket \subseteq \llbracket \text{man} \rrbracket$

However, the substitution of man in (18-a) by drunken man in (18-b) is not possible if we want to preserve intuitive truth conditions. If the environment of a negative because-clause is downward-entailing, this substitution

should not affect the truth conditions of the sentence. According to Kadmon & Landman (1993: 392), in (18-b) “the fact that a man is present is not problematic but the fact that the man is drunk”, contrary to (18-a).

- (18) a. I don't leave the party because a man is here. \Rightarrow ?
 b. I don't leave the party because a drunken man is here.

(18-b) might be true without (18-a) being true. Therefore, Kadmon & Landman conclude that Ladusaw's account in terms of downward-entailment cannot be correct.

Their argument rests on the assumption that we shift the focus in the conclusion from man to the adjective drunken. Now, it is well known that because-clauses may be focus sensitive, that is, their truth conditions may differ with differences in focus.³ And, indeed, if we keep the focus fixed on the NP (accenting man in both sentences in (18)), the entailment from (18-a) to (18-b) goes through. Therefore, Kadmon & Landman's example is not a suitable argument against Ladusaw's account. However, I think that Kadmon & Landman are right in judging negative because-constructions not to be downward-entailing. In order to demonstrate this we have to exclude the undesirable focus effect.

An anonymous reviewer of a previous version of this paper suggested elaborating on Kadmon & Landman by adding the following paradigm in order to show that negative because-clauses are not generally downward-entailing. Every movement that counts as dancing is also a movement.

$$(19) \quad \llbracket \text{dance} \rrbracket \subseteq \llbracket \text{move} \rrbracket$$

Superset-subset substitution seems not to be possible in the following pair of sentences if we want to preserve truth conditions. Uttering (20-a) we may have in mind that dancing is the true reason for John's being happy but not uttering (20-b).

- (20) a. John isn't happy because Mary MOVED. \nRightarrow
 b. John isn't happy because Mary DANCED.

Whereas (20-a) may be continued by a phrase like but because Mary danced without leading to a contradiction, such a continuation leads to a contradiction with (20-b).

This discussion shows that a simple account of these constructions in terms of Ladusaw's theory is not sufficient to explain the occurrence of NPIs in negated because-clauses.

Linebarger (1981) shows that purely syntactic theories that aim to predict the occurrence of an NPI by structural means only are not suitable to explain the whole range of data. She argues that NPIs may be licensed either directly by a sentence-grammatical process or indirectly by a derivative process. Linebarger's Immediate Scope Constraint requires the clause containing the NPI to be adjacent to and in the scope of the negation at the level of Logical Form.

This requirement cannot be met for NPIs within negated because-clauses. Following Linebarger (1981), the sentence in (21) gets the LF representations in (21-a) and (21-b). Intuitively, only the narrow scope reading for negation in (21-b) is unacceptable.

- (21) I didn't help him because I have any sympathy for urban guerillas.
- a. [VP not [VP [VP I helped him] [CP because I have any sympathy for urban guerillas]]]
- b. # [IP [VP not [VP I helped him]] [CP because I have any sympathy for urban guerillas]]

Due to the Immediate Scope Constraint, both representations should be ungrammatical. In (21-b) the NPI is not in the scope of the negation. In (21-a)

the NPI is in the scope of the negation but not in the immediate scope. In this configuration the causal operator intervenes between the NPI and its licenser, the negation. Because-clauses have the syntactic status of adjuncts. Since adjuncts are barriers for movement, a raising analysis for the NPI into the immediate scope of the negation is not plausible. Nevertheless, the NPI is fully acceptable in the wide scope reading. This fact, among others, motivates Linebarger's theory of derivative licensing of NPIs.

In order to account for the acceptability of sentences with NPIs that do not obey the Immediate Scope Constraint, Linebarger (1981) proposes that these sentences must have a pragmatic relation to some other sentence that contains the NPI and whose LF satisfies the Immediate Scope Constraint (Linebarger 1987: 342).

Consider the sentence in (21) again. It has been argued that this sentence implicates that I do not sympathize with urban guerillas. Therefore, it is contradictory to continue (21) with a sentence that means that I, in fact, do sympathize with urban guerillas, as shown in (22).

- (22) # I didn't help him because I have any sympathy for urban guerillas,
 although I do sympathize with urban guerillas.

Linebarger (1981) suggests that the existence of negative implications of this sort can be taken to license the NPIs. The implication of (21) in (23-a) may be represented by the LF in (23-b).

- (23) a. I do not have any sympathy for urban guerillas.
 b. [_{IP} [_{VP} not [_{VP} I have any sympathy for urban guerillas]]]

It is easily seen that the LF in (23-b) satisfies the Immediate Scope Constraint. The problem with Linebarger's account is that she cannot explain why the negative causal constructions with NPIs do indeed have the implications they have.

It is not characteristic for negative because-clauses to imply the negation of the reason. Consider the sentence in (24-a).

- (24) a. Peter didn't come because Mary was sick.
 b. [_{VP} not [_{VP} [_{VP} Peter came] [_{CP} because Mary was sick]]]

The reading I am interested in here (24-b) is the wide scope reading of the negation. On this reading the sentence in (24) means approximately that Mary's sickness was not the reason for Peter's coming. But if this sentence is true, it does not follow from the utterance context that Mary, in fact, was sick.⁴ For instance, it is possible to continue the sentence in (24) with a

sentence that presupposes the putative reason, i.e., that Mary was sick, or the negation of the putative reason, as shown in (25-a) and (25-b).

- (25) a. Peter didn't come because Mary was sick. And, everybody regretted that Mary was sick.
- b. Peter didn't come because Mary was sick. Nevertheless, everybody regretted that Mary wasn't sick.

Kadmon & Landman (1993: 394) reject the derivative licensing account of Linebarger. They claim that the negative implications in negative causal constructions are, in fact, denials of a factivity presupposition associated with the because-clauses and that any is licensed since it strengthens the denial of the presupposition. But this metalinguistic account is problematic, since it rests on the assumption that because-clauses presuppose their argument. However, this is not generally true.

For instance, it is possible to ask a causal yes-no-question, as in (26), in a situation in which you know that I wish a linguist would read my paper, but in which you do not know if in fact a linguist has read my paper.

- (26) Are you happy because a LINGuist read your PAper?

In this case the truth of the because-clause is not presupposed, and it is not plausible to assume that it is not presupposed due to a cancellation process. Therefore, because-clauses fail at least one of the familiar tests for presuppositions.

This reasoning shows that it is unlikely that it is due to metalinguistic negation that because-clauses containing NPIs imply what they imply.

Johnston's theory of NPI-licensing in negative because-clauses is a translation of Linebarger's immediate scope constraint into the so-called roofing theory of Ladusaw (1992). I cannot go into details here and refer the reader to Johnston's dissertation Johnston (1994a). Apparently, the roofing requirement by an element that is an NPI-licenser has the same effect as the immediate scope constraint. This approach is shown by Johnston to explain the occurrence of negative polarity items in the main clause of negative causal constructions with narrow scope of negation with respect to because but not with wide scope of negation. This is a desirable result.

But the account fails to explain the occurrence of NPIs in the subordinate clause altogether. In order to explain such cases, he is forced to assume that there is a secondary licensing process which is responsible for the acceptability of these NPIs. He accepts Kadmon & Landman's (1993) proposal that NPIs

are licensed by metalinguistic negation if they occur in because-clauses. But this approach is problematic, as I just pointed out.

1.3 The issue

I will defend in this paper the view that NPIs generally trigger implicatures that may conflict with common knowledge, or the ordinary semantics of the sentence that contains the NPI. I propose, following Krifka (1995), that so-called weak NPIs trigger a form of scalar implicature that we are also familiar with from the interpretation of numerals and quantifiers, for example.⁵ The sentence in (27-a) is traditionally assumed to trigger the scalar implicature in (27-b).

- (27) a. Anna has THREE children.
b. Anna doesn't have FOUR children.

Expressions like three are assumed to introduce a scale of alternates of the same category that are ranked by informativeness or semantic strength. The scalar implicature is calculated on the basis of such a scale. Asserting (27-a) the speaker commits herself to the fact that no more informative proposition holds.

Analogously, NPIs like anything are assumed to introduce a partially ordered set of properties and implicatures that make reference to this ordered set.⁶

For so-called even-related NPIs or strong NPIs like a drop or a red cent, I assume, like Lahiri (1998), that an implicit even is present at the level of LF that introduces probability statements which may or may not conflict with common knowledge or the truth conditions of the sentence, again basically following the idea of Krifka (1995). However, my investigation implies that Krifka's solution (and Lahiri's solution for Hindi) does not make the correct predictions for strong NPIs in the subordinate clause of English because-clauses. In addition, I will show that we indeed do need the NPI-even triggered implicatures in the sense of Rooth (1985).

Generally, the licensing conditions of NPIs in because-clauses are a reflex of the compatibility of pragmatic and semantic information. In this respect, I am following Krifka. However, the implicatures are captured in terms of definedness conditions for some kind of NPI operator and (implicit) even, respectively. This view contrasts with Krifka's view that the relevant implicatures are a reflex of the definition of an illocutive operator.

In section 2, I will introduce truth conditions for causal constructions in the spirit of Lewis (1973a).

In section 3, I will give a summary of the basics of focus interpretation in the framework of alternative semantics originated by Rooth (1985) and revised in Rooth (1992). An extension of alternative semantics, outlined in section 4, will be shown useful for the interpretation of NPIs and for deriving the licensing conditions for the NPIs and the negative entailments that occur with negative because-clauses containing NPIs.

Section 5 gives a summary of the points raised in this paper.

2 Semantics for because

In a Lewis style semantics for the interpretation of causal constructions, a causal statement may be interpreted as a conjunction of the antecedent, the consequent, and the corresponding negative counterfactual (Lewis 1973a). In this spirit the ordinary meaning of because may be defined as in (28).

$$(28) \quad \llbracket \text{because} \rrbracket (w)(p)(q) \Leftrightarrow: p(w) \ \& \ q(w) \ \& \ \neg p \ \Box \rightarrow_w \ \neg q$$

The meaning of the counterfactual is defined as in (29).⁷

$$(29) \quad p \Box \rightarrow_w q \Leftrightarrow: \exists w'[p(w') \ \& \ q(w') \ \& \ \forall w''[p(w'') \ \& \ q(w'') \ \& \ w' \leq_w w'']]$$

Consider the example in (30) for an illustration of these definitions. This sentence is supposed to receive the Logical Form in (30-a). The denotation of this representation is built up by the denotations of the terminal nodes and by appropriate composition rules (here functional application). The result of this process is the proposition represented in (30-c).⁸

(30) Peter came because Mary was sick.

a. [IP/VP [VP Peter came] [CP because Mary was sick]]

b. [IP/VP [VP λw .Peter [V came w]]

[CP [because @] [VP λw .Mary was [AP sick w]]]]

c. $\text{because}_{@}(\lambda w'.\text{was_sick}_{w'}(\text{Mary}))(\lambda w'.\text{came}_{w'}(\text{Peter}))$

$\Leftrightarrow \text{was_sick}_{@}(\text{Mary}) \ \& \ \text{came}_{@}(\text{Peter}) \ \&$

$\lambda w'.\neg \text{was_sick}_{w'}(\text{Mary}) \Box \rightarrow_{@} \lambda w'.\neg \text{came}_{w'}(\text{Peter})$

The sentence in (30) is true in the world of utterance @ (a) if Mary was sick in @, (b) if Peter came in @ and (c) if it is true in @: if Mary were not sick, Peter wouldn't have come.

Note that this definition does not predict that because is an upward-entailing operator in the concept of Lewis' semantics.⁹ In upward-entailing

environments it is possible to substitute the predicate danced by a less informative predicate like move without changing the truth conditions for the sentence. Now (31) intuitively does not entail (32). It is possible assuming the truth of (31) that moving only does not make John happy. The conjuncts in [a-c] state the truth conditions informally.

(31) John is happy because Mary is dancing.

- a. “John is happy and
- b. Mary is dancing and
- c. If Mary weren’t dancing, John would not be happy.”

(32) John is happy because Mary is moving.

- a. “John is happy and
- b. Mary is moving and
- c. If Mary weren’t moving, John would not be happy.”

(31-a) is equivalent to (32-a), and (31-b) entails (32-b). But (31-c) does not entail (32-c). The inference pattern would be a form of strengthening the antecedent which is not valid in Lewis’ semantics for counterfactuals (Lewis 1973b: 32). The two premises would consist of the strict conditional “If Mary isn’t moving, she is not dancing” and (31-c) with (32-c) as the

conclusion. The strict conditional is obviously true. Now, assume that Mary is, in fact, dancing in a night club, that John is watching her from his soft chair and that he is delighted with her rhythmical movements to the exotic music. In such a situation (31-c) is true. What about (32-c)? Is it true in this situation? Suppose that Mary were not moving because a chandelier had fallen on the stage right next to her such that she would be afraid to cut her feet if she moved. In such a possible world, John would be happy that she wasn't hurt and not expect her to move. If the chandelier had crushed Mary, John would be unhappy, of course. However, it is sufficient to have one closest possible world in which the antecedent is true and the consequent of (32-c) is false to make the conclusion false. Therefore, we are not allowed to conclude from (31) to (32) in the Lewis framework.

What about negative because-clauses?

(33) Peter didn't come because Mary was sick.

We already mentioned in section 1.1 that negative because-clauses are ambiguous. This ambiguity may be represented by different Logical Forms. First, consider the reading with narrow scope negation represented by the LF in (34-a). Not is assumed to get the standard interpretation of negation.

- (34) a. [IP [VP not [VP Peter came]] [CP because Mary was sick]]
 b. $\text{because}_{@}(\lambda w'. \text{was_sick}_{w'}(\text{Mary}))(\lambda w'. \neg \text{came}_{w'}(\text{Peter}))$
 $\Leftrightarrow \text{was_sick}_{@}(\text{Mary}) \& \neg \text{came}_{@}(\text{Peter}) \&$
 $\lambda w'. \neg \text{was_sick}_{w'}(\text{Mary}) \Box \rightarrow_{@} \lambda w'. \neg(\neg \text{came}_{w'}(\text{Peter}))$

On this reading, the sentence in (33) is true in a world w (a) if Mary was sick in w , (b) if Peter did not come in w and (c) if it is true in w : if Mary were not sick, Peter would have come.

The wide scope reading of negation is represented by the LF in (35-a). On the basis of this LF we calculate the denotation in (35-b). The disjunction of the negations of the antecedent, consequent and the negative counterfactual may be derived applying De Morgan's Law for conjunctions.

- (35) a. [VP not [VP [VP Peter came] [CP because Mary was sick]]]
 b. $\neg \text{because}_{@}(\lambda w'. \text{was_sick}_{w'}(\text{Mary}))(\lambda w'. \text{came}_{w'}(\text{Peter}))$
 $\Leftrightarrow \neg(\text{was_sick}_{@}(\text{Mary}) \& \text{came}_{@}(\text{Peter}) \&$
 $\lambda w'. (\neg \text{was_sick}_{w'}(\text{Mary})) \Box \rightarrow_w \lambda w'. \neg \text{came}_{w'}(\text{Peter}))$
 $\Leftrightarrow \neg \text{was_sick}_{@}(\text{Mary}) \vee \neg \text{came}_{@}(\text{Peter}) \vee$
 $\neg(\lambda w'. (\neg \text{was_sick}_{w'}(\text{Mary})) \Box \rightarrow_{@} \lambda w'. \neg \text{came}_{w'}(\text{Peter}))$
 (De Morgan's Law)

On this reading, the sentence in (33) is true in a world w (a) if it is true in w that Mary wasn't sick, or (b) if it is true in w that Peter didn't come or (c) if it is true in w : that it is not the case that Peter wouldn't have come if Mary wasn't sick. To make the whole disjunction true it is sufficient to make one of the disjuncts true.

These truth conditions allow for the derivation of the fact that the because-clause is not thought to be true or false. The sequences in (36) show that the negative because-clause in (33) may very well be continued by a sentence that presupposes the truth of the because-clause, as in (36-b), or its falsity, as in (36-c). The slight oddity of both continuations of (36) is due to the fact that both sentences require for presupposition accommodation.

- (36) Peter didn't come because Mary was sick.
- a. ~~≠~~ Mary wasn't sick.
 - b. ... and everybody regretted that Mary was sick.
 - c. ... and everybody regretted that Mary wasn't sick.

Therefore the truth conditions make the correct predictions with respect to the truth or falsity of the reason for Peter's coming.

Analogously, we may account for the fact that (37-a) may be continued by (37-b) without ending up with an inconsistent text.

- (37) a. John isn't happy because Mary moved.
 b. He is happy because she danced.

(37-a) means that it is either not the case that John is happy or that Mary moved and that there is no causal relation between John's happiness and Mary's movements. So it could well be that Mary did indeed move or even dance, as claimed when uttering (37-b).

However, it is unclear whether the truth conditions in (28) make the correct predictions with respect to the truth or falsity of the effect, namely, that Peter came. The sentence in (33) seems to have the tendency to entail the truth of the main clause in the wide scope reading of negation. The complex sentences may not be continued by a sentence that presupposes the negation of the main clause, as the sequence in (38-c) shows.

- (38) Peter didn't come because Mary was sick.
 a. \Rightarrow Peter came.
 b. ... and everybody regretted that Peter came.
 c. #... and everybody regretted that Peter didn't come.

The truth conditions for causal statements alone do not explain why we tend to know the effect to be true, namely, that Peter came.

In a first step, I will introduce Rooth's framework for alternative semantics and then apply it, in a second step, to negative causal constructions. Furthermore, I will argue that the truth of the effect in certain contexts of negative causal statements (but not in all) in the wide scope reading of negation with respect to the causal operator is a reflex of context information.

3 Alternative Semantics for Focus

Mats Rooth defines an interpretation function $\llbracket \dots \rrbracket^f$ for expressions with syntactic focus features in addition to the ordinary semantic interpretation function in order to capture various focus effects. The focus interpretation function is represented by double brackets with an index f ; the ordinary interpretation function carries the index o . The two interpretation functions are defined as in (39). First, the ordinary semantic interpretation is not sensitive to the focus feature. The value of an expression with a focus feature equals the value of the expression without a focus feature. Second, the focus interpretation function assigns to a focussed expression the set of alternatives

corresponding to the focussed expression with respect to the logical type. And third, the focus value of an unfocussed expression is the singleton set containing the ordinary semantic value of this expression. The focus semantic value of complex expressions is done by pointwise application of these rules. Focus semantic values may be derived compositionally as in rule 4.

(39) Focus interpretation

1. $\llbracket_F[\alpha]\rrbracket^o = \llbracket\alpha\rrbracket^o$
2. $\llbracket_F[\alpha]\rrbracket^f =$ the interpretation domain having the logical type of α
3. $\llbracket\alpha\rrbracket^f = \{\llbracket\alpha\rrbracket^o\}$
4. Let γ be an unfocussed complex expression of the form $\alpha(\beta)$ and let P be a variable of the type of α and x a variable of the type of β , then
 $\llbracket\alpha(\beta)\rrbracket^f =$ the set of possible denotations of $P(x)$ (derived by functional application), where $P \in \llbracket\alpha\rrbracket^f$ and $x \in \llbracket\beta\rrbracket^f$.

At the level of Logical Form, Rooth introduces a variable v as a sister of a focussed expression (or a higher node) and defines a two-place operator \sim that tests the appropriateness of the variable assignments v with respect to the focus alternatives. This operator \sim is semantically defined in (40).

The ordinary semantic value of an expression including the \sim -operator is identical to the ordinary semantic value without the \sim -operator. The focus semantic value of an expression with a focus operator equals the singleton set containing the ordinary semantic value of the expression.

- (40) The interpretation of the operator \sim
1. Ordinary semantic value: $\llbracket \alpha \sim v \rrbracket^o = \llbracket \alpha \rrbracket^o$
 2. Focus semantic value: $\llbracket \alpha \sim v \rrbracket^f = \{\llbracket \alpha \rrbracket^o\}$

The values of the focus variables are assigned by a contextually given function g .

The following restrictions for the values σ , τ of v have to be met to interpret the focus operator correctly. First, σ , τ , the value of the focus variable, is a subset of the focus semantic value of an expression containing an F-marked expression α . α is assumed to be the sister of the focus operator. It contains the ordinary value of α and one other element.

- (41) Focus interpretation restrictions
- (Rooth 1992: 90; Fintel 1994: 38)
1. $\sigma, \tau \subseteq \llbracket \alpha \rrbracket^f$ or $\sigma, \tau \in \llbracket \alpha \rrbracket^f$
 2. $\llbracket \alpha \rrbracket^o \in \sigma, \tau$

3. $\exists \xi (\xi \in \alpha, \& \xi \neq \llbracket \alpha \rrbracket^o)$

What these definitions tell us about the interpretation for the sentence under (33), depends in the first place on the intonation of the sentence. From intonation it is clear that focus may be on a constituent contained in the main clause or on a subconstituent of the because-clause or even on because itself or on bigger units which contain the accented constituent. The distribution of syntactic focus features depends on intonation on the one hand and on syntactic structure on the other hand.¹⁰

- (42)
- a. Peter didn't come because Mary was SICK.
 - b. Peter didn't come because Mary WAS sick.
 - c. Peter didn't come because MARY was sick.
 - d. Peter didn't come beCAUSE Mary was sick.
 - e. Peter didn't COME because Mary was sick.
 - f. Peter DIDN'T come because Mary was sick.
 - g. PEter didn't come because Mary was sick.

Consider (42-a) in more detail. What are the suitable LFs that we can assign to this sentence? The negation may have narrow scope or wide scope. The focus feature may mark only the adjective sick or any bigger constituent

containing sick.¹¹ Let us assume additionally that the reason is F-marked. The \sim -operator can be freely adjoined to any phrases at the level of Logical Form: see the discussion on this point in Rooth (1992: 107ff).

For the narrow scope reading of the negation the \sim -operator would have scope over the whole construction. For the wide scope reading I chose to adjoin the \sim -operator at a level c-commanded by negation and still c-commanding the focussed constituent in subject position.

Under these assumptions we are allowed to assign the sentence in (42-a) the LFs in (43-a) and (43-b).

- (43) a. [IP [IP [VP not [VP Peter came]] [CP because _F[Mary was sick]]]
 \sim C₁]
- b. [IP not [VP [VP [VP Peter came] [CP because _F[Mary was sick]]]
 \sim C₂]]

(42-a) may be uttered in a context where the potential reason for Peter's coming or not coming is under debate. This intuition is derivable by the means of focus interpretation in the framework of alternative semantics.

Sentences with the LF in (43-a) in the narrow scope reading for negation are typically used as an answer to a negative why-questions. I will concen-

trate on the structure with a narrow scope negation in a first step and then elaborate on the structure with wide scope negation.

The variable C_1 in (43-a) denotes an alternative set. It is identified with some semantic or pragmatic object present for an independent reason.¹²

In the context of negative why-questions, I assume with Rooth that the appropriate antecedent for the variable introduced by the focus interpretation operator can be taken to be the ordinary semantic value of the question.

The denotation of the why-question is traditionally represented as the set of possible answers to the question, following Hamblin (1973).¹³ Let us assume for the ease of illustration that the answers to the question in (44-a) may be represented by the the set of answers in (44-b).

- (44) a. Why didn't Peter come?
 b. {Peter didn't come because Mary was sick, Peter didn't come because he had an appointment}

The interpretation restrictions of the focus interpretation operator require that the set in (44-b) be a subset of the focus semantic value of the answer. This is an application of the constraint (1) in (41). The focus semantic value of our LF in (43-a) is the set in (45). Therefore the constraint (1) of (41) is

satisfied.

$$(45) \quad \llbracket [\text{IP} [\text{VP not} [\text{VP Peter came}]] \text{ }_F[\text{CP because Mary was sick}]] \rrbracket^f \\ = \{q \mid \exists p(q = \lambda w.\text{because}_w(p)(\lambda w'.\text{not}(\text{came}_{w'}(\text{Peter}))))\}$$

Sentences with the LF in (43-b) in the wide scope reading for negation are usually rejections of previously uttered positive causal statements like Peter came because Mary was sick. The negative because-construction is a denial of such a statement and a subsequent but because-phrase like but because Sarah is sick corrects it.

I assume to model assertion-denial-congruence in analogy to question-answer-congruence. The proposition expressed by the previous assertion is a plausible candidate to identify the focus variable C_2 introduced by the focus interpretation operator and denial and assertion are congruent if this object is an element of the focus semantic value of the denial.

The set of the focus alternatives is represented in (46).

$$(46) \quad \llbracket [\text{VP} [\text{VP Peter came}] [\text{CP because } \text{ }_F[\text{Mary was sick}]]] \rrbracket^f \\ = \{q \mid \exists p(q = \lambda w.\text{because}_w(p)(\lambda w'.\text{came}_{w'}(\text{Peter})))\}$$

The restrictions are certainly met in the example discussed here. The proposition that Peter came because Mary was sick is an element of the set in

(46). And, the constraints imposed on the focus interpretation operator are again satisfied if the negation has wider scope than the focus interpretation operator. First, they require that the variable assignment for the focus variable C_2 be an element of the set of focus alternatives of the sister α of the focus operator (this is the first clause of (41)). Second, they require that the ordinary semantic value of this expression α be itself an element of the set of alternatives (this is the second clause). And third, they require that an item different from α be in the set of alternatives.

If we adjoined the focus operator in a position c-commanding the negation, we would not be able to meet the interpretation restrictions in the context of a positive causal sentence as in (47).

$$(47) \quad \llbracket [\text{VP not } [\text{VP } [\text{VP Peter came}] [\text{CP because } F[\text{Mary was sick}]]]] \rrbracket^f \\ = \{q \mid \exists p(q = \lambda w.\text{not}(\text{because}_w(p)(\lambda w'.\text{came}_{w'}(\text{Peter}))))\}$$

The focus semantic value would be a set of negative sentences! Therefore this adjunction site is not a possible adjunction site. It should be clear how the interpretation of the focus operator works for other focus structures for the sentences in (42).¹⁴

Why should it be the case that we tend to know the truth of the main clause in the wide scope reading of the negation? From the previous discussion it becomes clear that this fact is not derivable from focus interpretation. I assume here that the effect is a property of the context of denial. Let me explain what I mean here. In denial contexts the negative causal sentence is usually followed by a positive causal sentence expressed by an elliptical but because-phrase. And the interpretation of this but because-phrase asserts the truth of the main clause, that Peter came. Recall that the ordinary semantics of a positive because-construction is a conjunction and this conjunction implies the truth of the denotation of the main clause.¹⁵ This view is in accordance with the assumption that neither focus nor negation introduce an existential presupposition: see Rooth (1996: section 5) for discussion and Kratzer (1989) for a focus-sensitive definition of negation.¹⁶

4 Alternative Semantics for NPIs

To interpret the NPIs I will follow an idea that was originally raised in the literature by Fauconnier (1975) and elaborated by Heim (1984) and Krifka (1995). They propose that regular (or weak) polarity items are associated

with a scalar implicature based on informativity and that strong polarity items are associated with the presuppositions of an implicit particle meaning even that is associated with a scalar implicature based on empirical probability. A similar approach is also defended in Lahiri (1998) in order to explain the acceptability restrictions of Hindi bhii “even”.

In the remainder of the paper I will present a way to incorporate this idea into the framework of alternative semantics.

4.1 Weak NPIs

Krifka assumes any to be a weak negative polarity item. The truth conditions of any are equivalent to those of an ordinary existential quantifier.

$$(48) \quad \llbracket \text{any} \rrbracket^{\circ}(P)(Q) : \Leftrightarrow \lambda P \lambda Q \exists x [P(x) \ \& \ Q(x)]$$

If this were all we knew about the meaning of any, the sentences with any cat as in (49-a/b) would just mean the same as in examples with an indefinite a cat instead of any cat.¹⁷ This is so because the ordinary semantic values of (49-a/b) denote the existential statements in (50-a/b). (The denotation of a yes/no-question, I assume to denote the set of possible answers to it.)

$$(49) \quad \text{Did Fido notice a cat?}$$

- a. (No,) Fido didn't notice any cat.
- b. # (Yes,) Fido noticed any cat.

- (50) $\{p \mid p = \lambda w. \text{Fido noticed a cat in } w \vee$
 $p = \lambda w. \neg \text{Fido noticed a cat in } w\}$
- a. $\neg \exists x [\text{cat}(@)(x) \ \& \ \text{noticed}(@)(\text{Fido}, x)]$
 - b. $\exists x [\text{cat}(@)(x) \ \& \ \text{noticed}(@)(\text{Fido}, x)]$

But, this is intuitively wrong. The answer in (49-a) is more informative than an answer with the indefinite a cat. And, this additional information seems to be compatible only with the negative answer and not with the positive answer. According to Krifka, (49-a/b) carry a form of scalar implicature that involves a partially ordered set of propositions ordered by entailment.¹⁸

Consider the unacceptable example in (49-b) first. Being an answer to a yes/no-question, I assume the whole sentence to be focussed. In addition, I will propose that the predicate cat may be interpreted as if it were narrowly focussed. That is, we may set up propositional alternatives by replacing the predicate cat, that is, the sister of the NPI, by more informative predicates, as in (51). Suppose a situation with three domestic cats, Mimi, Mausi and Miau. Mimi has short black hair, Mausi has long black hair and Miau is a

red cat with short hair.

- (51) $\{\lambda w.$ Fido noticed a cat in \underline{w} ,
 $\lambda w.$ Fido noticed a black cat in \underline{w} ,
 $\lambda w.$ Fido noticed a red cat in \underline{w} ,
 $\lambda w.$ Fido noticed a black cat with short hair in $\underline{w}, \dots\}$

The interpretation of the negative polarity item introduces a scalar implicature with the following pattern: Fido noticed a cat is supposed to be the least informative alternative of the relevant alternatives and no alternative is equally as informative as this.¹⁹ Moreover, all propositions of the set of relevant alternatives that are more informative than Fido noticed a cat are supposed to be false in the actual world of utterance. In our situation, the scalar implicature implies that Fido didn't see a cat in the first place since he didn't notice Miau, the red cat, and he didn't notice a black cat, which would be Mimi or Mausi. There are no more relevant cats. It is easy to see that this implication of the implicature contradicts the ordinary semantics of the positive answer. In terms of context change, asserting Fido saw any cat amounts to reducing the set of candidates for the actual world to the empty set and this is not cooperative.

The acceptable negative answer may be analyzed as follows. Again, I assume that the sister cat of the NPI is focussed evoking a set of propositional alternatives that is (partially) ordered by informativity. We may calculate the alternatives on the basis of the negative proposition of the form “Fido didn’t notice a P” replacing *P* by predicates at least as informative as cat, as in (52). (51) and (52) only differ with respect to the negation.

- (52) $\{\lambda w.$ Fido didn’t notice a cat in *w*,
 $\lambda w.$ Fido didn’t notice a black cat in *w*,
 $\lambda w.$ Fido didn’t notice a red cat in *w*,
 $\lambda w.$ Fido didn’t notice a black cat with short hair in *w*, ...}

In this set, however, Fido didn’t notice a cat is the most informative proposition. The order of the propositions is reversed by negation (compare the order of alternatives in (51)). In this case the scalar implicature is trivially satisfied. The pattern requires all alternatives that are more informative than the proposition expressed by Fido didn’t notice a cat to be false. But, there is no proposition that is more informative than Fido didn’t notice a cat.

However, this is not the only choice we have. We could also calculate the alternatives on the basis of the positive proposition of the form “Fido noticed

a P” being a subconstituent of the negative answer. The relevant alternatives are the positive alternatives in (51). In this case the scalar implicature is not trivially satisfied. As in the case for the positive answer the scalar implicature implies that there is no cat that Fido noticed. But in the case of negative answers this information coincides with the ordinary semantic value of the negative answer. There is no contradiction.

In sum, no matter whether we calculate the relevant set of alternatives on the basis of the negative proposition or the positive proposition, the corresponding scalar implicature does not interfere with the semantics of the sentence.

In order to implement this idea in the alternative semantic approach, I propose that structures containing weak NPIs carry a feature *N*. We might think of this feature as a syntactic feature that is licensed by the presence of any.²⁰ The interpretation restrictions in the form of scalar implicatures are tied to an operator Δ in analogy to the focus operator \sim . The sentences in (49) may get the logical representations in (53).²¹ (53-a/b) are the LFs for the negative answer. They only differ with respect to the adjunction site of the Δ -operator. In (53-b) it is c-commanded by negation and in (53-a) it is adjoined to a position dominating negation. (53-c) is the LF for the

(unacceptable) positive answer.

- (53) a. $[\text{VP } F[\text{VP } [\text{VP } \text{not } [\text{VP } \text{Fido } [\text{VP } \text{saw any } N[\text{cat}]]]]] \Delta \text{B}] \sim \text{C}$
 b. $[\text{VP } F[\text{VP } \text{not } [\text{VP } [\text{VP } \text{Fido } [\text{VP } \text{saw any } N[\text{cat}]]] \Delta \text{B}]]] \sim \text{C}$
 c. $[\text{VP } F[\text{VP } [\text{VP } \text{Fido } [\text{VP } \text{saw any } N[\text{cat}]]] \Delta \text{B}] \sim \text{C}$

If focus is placed on the whole sentence (in the context of a yes/no-question), the presuppositional constraint, $\subseteq \llbracket (53\text{-a}) \rrbracket^f$ triggered by the interpretation of the \sim -operator is trivially satisfied. The focus semantic value of (53-a) is just the set of all possible propositions. This is not satisfactory and needs further investigation.²²

In order to interpret these representations we need additional definitions of the ordinary semantic value of expressions with N-features and of structures with the Δ -operator as well as the corresponding focus semantic values. Sets of alternatives that vary only with respect to an expression carrying an N-feature I will call NPI semantic values.

The ordinary interpretation and the alternative semantic interpretation for the function $\llbracket \dots \rrbracket^f$ are defined in (54).

- (54) Weak NPI interpretation
1. $\llbracket N[\alpha] \rrbracket^o = \llbracket \alpha \rrbracket^o$

2. $\llbracket_N[\alpha]\rrbracket^f$ = the interpretation domain having the logical type of α

The ordinary semantic interpretation function is not sensitive to negative polarity features. This is stated in the first clause of the definition in (54). The focus interpretation function $\llbracket \dots \rrbracket^f$ is assumed to assign a set of alternatives to expressions carrying the N-feature analogous to expressions carrying an F-feature. This is defined in the second clause of definition (54). Compositional interpretation is done by pointwise application (see rule 4 of the definition of focus interpretation in (39)).

The semantics of the NPI operator ‘ Δ ’ is defined in (55).

- (55) The interpretation of the operator Δ ²³
1. Ordinary semantic value: $\llbracket \alpha \Delta v \rrbracket^o = \llbracket \alpha \rrbracket^o$
 2. Focus semantic value: $\llbracket \alpha \Delta v \rrbracket^f = \{\llbracket \alpha \rrbracket^o\}$

The operator introduces an anaphor and tests the appropriateness of the variable assignments with respect to NPI alternatives. Furthermore, I stipulate that this interpretation is only defined for expressions of the propositional type.

In order to interpret the negative-polarity specific operators, the requirements in (56) must be met, analogous to the requirements on focus interpre-

tation in (41). First, the variable assignment must be a subset of the NPI semantic value. Second, the ordinary semantic value of α must be a member of the NPI semantic value. And third, the set of alternatives must not be empty.

(56) Interpretation restrictions for Δ

1. $\langle \alpha \rangle \subseteq \llbracket \alpha \rrbracket^f$
2. $\llbracket \alpha \rrbracket^o \in \langle \alpha \rangle$,
3. $\exists \xi (\xi \in \langle \alpha \rangle, \& \xi \neq \llbracket \alpha \rrbracket^o)$

The scalar implicature triggered by the Δ -operator may be captured as additional restrictions on its interpretation. These requirements are stated in (57). First, the ordinary meaning of the proposition containing the negative polarity item must be less informative or more informative than all its alternatives. The first condition expresses the fact that the alternatives are ordered and that the NPI proposition marks the top or the bottom of a scale. Second, the alternatives that are more informative than the proposition containing the weak NPI must be false. The second condition calculates the scalar implicature that is based on the scale built up in the first condition.

(57) Additional interpretation restrictions for Δ

1. $[[\alpha]]^\circ$ is the unique element $Y \in \mathcal{L}$, such that for every $X \in \mathcal{L}$, :
 $X \subseteq Y$ or $Y \subseteq X$
2. For any α of type t and \mathcal{L} , $\subseteq [[\alpha]]^f$, $\forall p[p \in \mathcal{L}, \& p \subset [[\alpha]]^\circ \Rightarrow @ \notin p]$

With these definitions at hand we may calculate the NPI semantic value of our LFs in (53), as in (58). The NPI semantic value is calculated on the basis of the sister of the NPI operator (Δ).

$$\begin{aligned}
 (58) \quad \text{a.} \quad & \llbracket [\text{VP not } [\text{VP Fido } [\text{VP saw any }_N[\text{cat}]]]] \rrbracket^f \\
 & = \{p \mid \exists P[\text{Rel}(P) \& p = \lambda w. \neg \exists x[P(x) \& \text{noticed}(w)(\text{Fido}, x)]]\} \\
 \text{b.} \quad & \llbracket [\text{VP Fido } [\text{VP saw any }_N[\text{cat}]]] \rrbracket^f = \\
 & \{p \mid \exists P[\text{Rel}(P) \& p = \lambda w. \exists x[P(x) \& \text{noticed}(w)(\text{Fido}, x)]]\}
 \end{aligned}$$

(58-a) gives us a set of negative alternatives and (58-b) a set of positive alternatives. The restriction in (57-1.) imposes an order on these alternatives.

For the positive sentence Fido noticed any cat, the second interpretation restriction for the Δ -operator is satisfied if all alternatives of the set of propositions in (58-b) that are more informative than the denotation of the sister of the NPI operator are not true in the utterance world. But in such a world, the proposition expressed by the sentence Fido noticed any cat is necessarily false. This method of explaining the unacceptability of positive

sentences with NPIs is equivalent to the method proposed by Krifka in terms of structured propositions and a pragmatic operator that construes the relevant scalar implicature.

For the negative sentence Fido didn't notice any cat we have to consider two possible adjunction sites for the NPI operator: a position c-commanding the negation and a position that is c-commanded by the negation. In the first case, the scalar implicature is based on negative alternatives (58-a). In the second case, it is based on positive alternatives (58-b). In both configurations the scalar implicature does not contradict the ordinary semantic value of the negative sentence. With (58-a) as the range of alternatives, the scalar implicature is trivially true since the ordinary denotation of the sister of the NPI operator is more informative than all other alternatives. What we are dealing with here is a universal statement with a false restriction. This variant of explaining the acceptability of the NPI with wide scope of the NPI operator with respect to negation is again equivalent to Krifka's analysis, in which the scalar implicatures are tied to an assertion operator. But there is a possible adjunction site for the NPI operator with narrow scope with respect to negation in my approach, resulting in the calculation of a set of positive alternatives (58-b). With (58-b) as the range of alternatives, the

scalar implicature is satisfied if all relevant (even remote) alternatives are false in the world of utterance. Since this requirement is compatible with the ordinary semantic value of the sentence the NPI is licensed.

It has often been observed that any-NPs are not licit in subject positions. Consider the example in (59-a) with the LF in (59-b). I assume that this negative sentence is uttered all new. So, the whole sentence is focussed. The focus semantic value is therefore trivialized to the set of all possible propositions.

- (59) a. #Any dog didn't chase Mimi.
 b. $[_{IP} F[_{IP} [_{IP} \text{any } N[\text{dog}]_1 [_{VP} \text{not} [_{VP} t_1 [_{VP} \text{chased Mimi}]]]]] \Delta B]$
 $\sim C]$

The NPI semantic value may be calculated on the basis of the LF in (59-b) as in (60). The propositions have the form “there are some P’s that didn’t chase Mimi”.

- (60) $\llbracket [_{IP} \text{any } N[\text{dog}]_1 [_{VP} \text{not} [_{VP} t_1 [_{VP} \text{chased Mimi}]]]] \rrbracket^f$
 $= \{p \mid \exists P[Rel(P) \ \& \ p = \lambda w.\exists x[P(x) \ \& \ \neg \text{chased}(w)(x, \text{Mimi})]]\}$

The scalar implicature associated with the interpretation of the Δ -operator is satisfied if all alternatives of the NPI semantic value that are more infor-

mative than the proposition “there are some dogs that didn’t chase Mimi” are false in the world of utterance. It is obvious that such a scalar implicature may not be satisfied if the sentence itself is true.

This argument presupposes that reconstruction of the quantifier any dog below negation is not possible at the level of LF. This restriction is well known in connection with the interpretation of wh-questions: see Beck (1996) and Cresti (1995) for formalizations of such a filter in terms of syntactic and semantic reconstruction, respectively.

In all the constructions I have discussed so far the NPI-operator is contained in the focus of the sentence. Furthermore, focus domain and NPI-domain are nested.

Constructions in which the focus domain and the NPI-domain are not nested appear to be instances of multiple focus, where the focus is associated to the focus operator and the N-domain is associated to the NPI-operator. The answer (61-b) to a negative who-question, as in (61-a), is acceptable because the N-feature of cat is not visible anymore at the level of focus interpretation. The N-feature is so to speak already used up by the interpretation of the NPI-operator.

- (61) a. Who did NOT chase a cat?

b. $_F$ [FIDO] didn't chase any $_N$ [cat].

(62) is a possible LF for (61-b). I assume here that the focus Fido is not reconstructed to its original deep structure position.

(62) $[_{VP} [_{VP} \textit{F[Fido]}_i [_{VP} \textit{not} [_{VP} [_{VP} t_1 [_{VP} \textit{chased any }_N[\textit{cat}]]]] \Delta B]]] \sim$
 $C]$

The NPI semantic value is the set of alternatives in (63). The trace t_1 is translated into a free variable. Its denotation depends on the variable assignment function \underline{g} .

(63) $\llbracket [_{VP} t_1 [_{VP} \textit{chased any }_N[\textit{cat}]]] \rrbracket^f =$
 $\{p \mid \exists P[\text{REL}(P) \ \& \ p = \lambda w.\exists y[P(y) \ \& \ \textit{chased}(w)(g(x_1), y)]]\}$

The scalar implicature triggered by the NPI-operator has the following pattern analogous to the previous example: All alternative propositions that are more informative than the ordinary semantic value of the proposition that is expressed by x chased any cat are false in the actual situation of the utterance. The scalar implicature does not interfere with the semantic value of the utterance in the first place. Therefore, the NPI is licensed.

The focus semantic value is the set in (64). And this is exactly the denotation of the who-question.

$$(64) \quad \llbracket [\text{VP}_F[\text{Fido}]_1 [\text{VP not } [\text{VP } t_1 [\text{VP chased any }_N[\text{cat}]]]] \Delta B] \rrbracket^f = \\ \{p \mid \exists x[\text{REL}(x) \ \& \ p = \lambda w. \neg \exists y[\text{cat}(y) \ \& \ \text{chased}(w)(x, y)]]\}$$

The analysis is reminiscent of a similar analysis that has been proposed by Rooth (1996: 288) for deriving sentences in which one focussed expression associates with more than one focus operator. It has been argued that in constructions with more than one focus feature that associate with different focus operators, one focus is moved to a position where it can safely be interpreted by one operator. The other focus is interpreted in situ by the other focus operator.

This approach is problematic for cases where the N-feature is contained in the domain of the focus feature and where the NPI-operator c-commands the focus domain, as in (65).²⁴

- (65) a. What did Fido NOT do?
 b. Fido DIDN'T $_F$ [chase any $_N$ [CAT]].

(65-b) may be represented by the LF in (66).

$$(66) \quad [_{VP} [_{VP} \text{not} [_{VP} [_{VP} \text{Fido}_F [_{VP} \text{chased any}_N [\text{cat}]]] \Delta B]] \sim C]$$

The NPI semantic value is in this case a set of propositions that varies with respect to the focus domain, as in (67).

$$(67) \quad \begin{aligned} & \llbracket [_{VP} [_{VP} \text{Fido}_F [_{VP} \text{chased any}_N [\text{cat}]]]] \rrbracket^f \\ & = \{p \mid \exists P[\text{Rel}(P) \ \& \ p = \lambda w.P(w)(\text{Fido})]\} \end{aligned}$$

This consequence is not desirable. NPI-alternatives are identical to what should be focus alternatives.

What happens if we apply the movement approach: If we follow this line of argumentation we have to assume that the NPI operator c-commands the focus operator \sim . Since the answers to a negative question have to be negative, too, the focus operator must c-command negation. This, however, forces us to assume that the NPI-operator c-commands negation. Association of the any-phrase with the NPI-operator may then be captured by movement of the NP any cat (the syntactic island containing the N-marked expression) out of the scope of negation as an instance of quantifier movement. The relevant LF is stated in (68).

$$(68) \quad [_{VP} [_{VP} \text{any}_N [\text{cat}]_I [_{VP} [_{VP} \text{not} [_{VP} \text{Fido}_F [_{VP} \text{chased } t_1]]] \sim C]] \Delta B]$$

If we assume this LF, the desired NPI semantic value and the desired focus semantic value may be derived. It is, however, important to note that the movement of the any-NP must be “undone” by semantic reconstruction in order to get the intuitively correct negative alternatives. Such a process, however, is usually prohibited for quantifiers: see again Cresti (1995) and Beck (1996) on this topic in connection with negative questions. I therefore conclude that this solution is not practicable. Moreover, such an approach has another undesired effect. The explanation for constructions with any-phrases in subject positions needs to be reconsidered.

There is still a way out of this dilemma if we assume that any in a sentence like (65-b) is not an NPI but a free choice any that denotes a universal quantifier. In such an approach (65-b) denotes the proposition that for all cats it is true that Fido didn’t chase them.

4.2 Weak NPIs in because-clause constructions

4.2.1 ... the subordinate clause

What do these new definitions tell us about the utterance conditions of the sentence in (69-a)? I will first derive the intuitively acceptable reading with wide scope for negation. In a second step, I will derive the unacceptability of

the narrow scope reading. I will assume that the sentence in (69-a) receives the Logical Form in (69-b) on the wide scope reading for negation.

- (69) a. Fido didn't bark because he saw any cat.
 b. $[_{VP} \text{ not } [_{VP} [_{VP} \text{ F. barked}]]]]$
 $[_{CP} \text{ because } _F[_{VP} [_{VP} \text{ F. saw any } _N[\text{cat}]] \Delta \text{ B}]]] \sim \text{C}]]$

This LF has the following characteristics: The sister of the NPI is marked with a feature N . The argument of because is in the scope of the Δ -operator. Being a sister of this operator, the complement of because will be the relevant constituent for calculating the alternatives with respect to the negative polarity item. The whole because-clause is marked with a focus feature F , and the whole positive causal statement is a sister of the \sim -operator and therefore relevant for checking the interpretive restriction for focus. In section 3, I argued that this is a reasonable LF for (69-a). Here it is assumed that (69-a) is uttered in the context of a positive because- clause. Therefore, the proposition expressed by the main clause is usually assumed to be true.

What does the restriction on the interpretation of the Δ -operator tell us about the appropriate context of the sentence in (69-a) in its wide scope reading for negation? The relevant set of alternatives is represented in (70).

This set only contains propositions of the form ‘Fido saw any Q’. The variable Q is thought to range over the set of individuals.

$$(70) \quad \llbracket [\text{VP F. saw any}_N[\text{cat}]] \rrbracket^f \\ = \{p \mid \exists P[\text{Rel}(P) \ \& \ p = \lambda w.\exists x[P(x) \ \& \ \text{saw}_w(\text{Fido}, x)]]\}$$

The interpretation restrictions are met if the set in (70) either contains only alternatives that are less informative than the ordinary semantic value of the expression in the scope of the Δ -operator or if it contains only alternatives that are more informative than this expression. The second restriction requires that all higher ranked propositions are not true in the actual world of utterance. All these negated propositions together imply the negation of the ordinary semantic value of the expression containing the NPI, in our case: that it is true that Fido didn’t see a cat. This reasoning shows that we are able to derive the fact that the because-clause must be false if it contains a scalar implicature triggering expression, the NPI.

It is easy to see that this implicature is compatible with the ordinary semantic value of the negated causal construction, as in (71), since it is a disjunction of negative propositions.

$$(71) \quad \lambda w.\neg \text{barked}_w(\text{Fido}) \vee \neg \exists x[\text{saw}_w(\text{Fido}, x) \ \& \ \text{cat}_w(x)] \vee$$

$$\neg(\lambda w'. \neg \exists x [\text{saw}_{w'}(\text{Fido}, x) \& \text{cat}_{w'}(x)] \Box \rightarrow_w \lambda w'. \neg \text{barked}_{w'}(\text{Fido}))$$

In the wide scope reading the proposition expressed by the sentence in (69-a) is true in a world w if a) Fido did not bark in w or if b) he did not see anything in w or if c) it is false in w : if Fido hadn't seen anything he wouldn't have barked.

Whenever the ordinary semantic value contradicts conditions imposed by the scalar implicature triggered by the NPI interpretation, the NPI is not licensed. This case is illustrated by causal constructions that are conceived with a narrow scope interpretation for negation and a weak NPI in the because-clause. The putative narrow scope reading of (69-a) may be represented by the LF in (72).

$$(72) \quad [\text{IP} [\text{IP} [\text{VP} \text{not} [\text{VP} \text{F. barked}]] \\ [\text{VP} \text{because}_F [\text{VP} [\text{VP} \text{F. saw any}_N [\text{cat}]] \Delta \text{B}]]]]] \sim \text{C}]$$

Note that this LF doesn't differ from the LF in (69-b) with respect to the adjunction site of the Δ -operator. That is, both (69-b) and (72) have the same NPI semantic value, as shown in (70). But they differ with respect to the ordinary semantic value. (72) receives the denotation in (73).

$$(73) \quad \lambda w. \neg \text{barked}_w(\text{Fido}) \& \exists x [\text{saw}_w(\text{Fido}, x) \& \text{cat}_w(x)] \&$$

$$\lambda w'. \neg \exists x [\text{saw}_{w'}(\text{Fido}, x) \& \text{cat}_{w'}(x)] \Box \rightarrow_w \lambda w'. \neg (\neg \text{barked}_{w'}(\text{Fido}))$$

In the narrow scope reading, (69-a) is true in a world w if a) Fido did not bark in w and if b) there is something that Fido saw and if c) it is true in w : if Fido hadn't seen anything he would have barked. The b)-part of the ordinary semantic value contradicts the scalar implicature, i.e., that Fido did not see anything, calculated on the basis of the NPI semantic value. Whereas the NPI specific interpretations require that it be true in the evaluation world that Fido didn't see anything, the ordinary semantic value requires that Fido saw something in the evaluation world. Therefore, the semantic value and the pragmatic interpretation restrictions may not be satisfied simultaneously.

The explanation of the unacceptability of the sentence in (74) is straightforward.

(74) #Dogs don't hear because they have any eyes.

This sentence introduces the scalar implicature that all alternatives of the form “There is an x such that dogs have x and x is P ” where we substitute P by predicates more informative than eyes (like blue eyes, lidded eyes, etc.) are false in the world of utterance. But this implicature entails that dogs do not have eyes and this entailment contradicts our common knowledge about

dogs.

Let us compare this solution to possible solutions in the framework of Krifka (1995). Krifka disregards focus information and ties the scalar implicature triggered by the NPI to a pragmatic operator that is a variant of an assertion operator. Informally, he may assume the following structures for our example in (69-a). (75-a) and (75-b) may represent the wide scope reading of the sentence. This assertion operator may operate on the negative causal construction as a whole, or it may operate on the because-clause alone.

- (75) a. Scal.Assert(not(Fido barked because he saw any cat))
 b. Assert(not(Fido barked because Scal.Assert(he saw any cat)))

I will not recapitulate Krifka's theory but will translate his assumptions into formalizations in my framework of alternative semantics: see Lahiri (1998) for a summary. The interpretation of the Scal.Assert operator is equivalent to the introduction of the Δ operator at the highest propositional level or at the level of the because-clause.

- (76) a. [VP [VP not [VP [VP F. barked]
 [CP because [VP F. saw any N [cat]]]]]] Δ B]

b. $[_{VP} \text{ not } [_{VP} [_{VP} \text{ F. barked}]]]$

$[_{CP} \text{ because } [_{VP} [_{VP} \text{ F. saw any } _N[\text{cat}]] \Delta \text{ B}]]]]]$

On the basis of the second LF we make the same predictions as previously shown in the discussion of our method of NPI interpretation. On the basis of the first LF we may calculate the set of alternatives relevant for the scalar implicature as in (77). Note that this set is a set of negative because-clauses again.

$$(77) \quad \llbracket [_{VP} \text{ not } [_{VP} [_{VP} \text{ F. barked}]] [_{CP} \text{ because } [_{VP} \text{ F. saw any } _N[\text{cat}]]]]]] \rrbracket^f \\ = \{q \mid \exists P[Rel(P) \ \& \ q = \lambda w. \neg[\text{because}(w) \\ (\lambda w'. \exists y[\text{saw}_{w'}(\text{Fido}, y) \ \& \ P(y)])(\lambda w'. \text{barked}_{w'}(\text{Fido}))]]\}$$

The ordinary semantic value of the sister of the NPI operator must be the least informative alternative of this set for the NPI to be licensed. Let us check if this is so. According to the semantics of because, the relevant set of alternatives is a set of negated conjunctions, as in (78).

$$(78) \quad \{\text{It is not the case (that Fido barked and he saw a cat and if Fido hadn't seen a cat he wouldn't have barked), It is not the case (that Fido barked and he saw a black cat and if Fido hadn't seen a black cat he wouldn't have barked), It is not the case (that Fido barked$$

and he saw a red cat and if Fido hadn't seen a red cat he wouldn't have barked), It is not the case (that Fido barked and he saw a red cat with short hair and if Fido hadn't seen a red cat with short hair he wouldn't have barked),... }

The first alternative of the set in (78) is less informative than the other alternatives if its negation is more informative than all the other alternatives. Now, the first conjunct of the first alternative, namely that Fido barked, is equally informative in all alternatives. As far as the second conjunct is concerned, the proposition that Fido saw a cat is less informative than all alternative conjuncts. And, what about the third conjunct, the counterfactual? Replacing the predicate cat by more informative predicates in a negative counterfactual results in widening of the antecedent. The negative counterfactuals are, therefore, not ordered with respect to informativeness. And the same is true for the whole set of alternatives. Therefore, the NPI is predicted not to be licensed in this configuration, contrary to the facts.

With narrow scope for the Scal.Assert operator with respect to the because-operator in these constructions we may derive the falsity of a because-clause containing any. But, it is unlikely that there is independent evidence for the fact that the because-clause contains an assertion in the wide scope reading

of negation if it hosts an NPI. On the contrary, linguists that support the idea that the because-clause may express its own assertion deny this possibility for the wide scope reading of negation.²⁵

This reasoning shows that Krifka's approach does not make plausible predictions for the licensing of weak NPIs in the subordinate clause of because-constructions. In the next step, I will discuss the occurrence of weak NPIs in the main clause of such constructions.

4.2.2 ... the main clause

Constructions with any in the main clause may be interpreted in a similar way in my framework without further assumptions. Consider the sentence in (79). I already mentioned that weak NPIs in the matrix clause may occur in both the wide scope reading for the negation and the narrow scope reading. I assume that the relevant LFs have to look like (79-a) for the wide scope reading of negation and like (79-b) for the narrow scope reading of negation. As in the previous cases, I consider only cases where the whole because-clause is the focus domain.

(79) I didn't cut any classes because I disagreed with the lecturer.

a. $[_{VP} \text{not } [_{VP} [_{VP} [_{NP} \text{any } N[\text{classes}]]_1] [_{VP} [_{VP} [_{VP} \text{I cut } t_1]]] [_{CP}$

- because_F[_{VP} I disagreed with the lecturer]]] ~ C]] Δ B]]
- b. [_{IP} [_{IP} [_{VP} not [_{VP} [_{VP} I cut any_N[classes]] Δ B]] [_{VP} because_F [_{VP} I disagreed with the lecturer]]] ~ C]

The main characteristics of the wide scope reading for negation are (a) that the any-NP is moved out of the main clause in order to associate with the Δ-operator, following Linebarger (1981), and (b) the Δ-operator c-commands the focus operator. At the point of its interpretation, the focus information associated with the focus operator will already be interpreted. Let us look at the derivation of the sentence.

In a first step, the focus semantic value may be generated. I assume it to be the set of alternatives in (80). The variable that translates the trace of the any-phrase is interpreted as a free variable.

$$(80) \quad \begin{aligned} & \llbracket [\text{VP } [\text{VP } I \text{ cut } t_1] \\ & \quad [\text{CP } \text{because}_F [\text{VP } I \text{ disagreed with the lecturer}]]]] \rrbracket^f \\ & = \{q \mid \exists p [Rel(p) \ \& \ q = \lambda w. \text{because}(w)(p)(\lambda w'. \text{cut}_{w'}(I, g(x)))]\} \end{aligned}$$

What about the NPI-interpretation? The set of NPI-alternatives is represented in (81). Note that the NPI-phrase has wide scope with respect to the because-operator.

scope with respect to the NPI-operator as in (79-a), would consider the construction to be a multiple focus construction. In a simple context of denial the utterance of the negative because-clause would not be licit. Furthermore, the interpretation of the Δ -operator would have no effect anymore.

If the NPI operator had narrow scope with respect to the focus operator and wide scope with respect to the because-operator, the interpretation of the focus operator would have no effect anymore and it would be predicted that a sentence with the focus structure in (79-a) could be uttered all new. This is intuitively false and must be excluded for independent reasons.

We may also adjoin the NPI operator at the level of the main clause VP with narrow scope with respect to the because- operator, as in (82), without moving the any-phrase.

$$(82) \quad [_{VP} \text{not} [_{VP} [_{VP} [_{VP} \text{I cut} [_{NP} \text{any } N[\text{classes}]]] \Delta B] [_{CP} \text{because } F \\ [_{VP} \text{I disagreed with the lecturer}]]] \sim C]]$$

The NPI semantic value is the set in (83).

$$(83) \quad \llbracket [_{VP} \text{I cut} [_{NP} \text{any } N[\text{classes}]]] \rrbracket^f = \{p \mid \exists P[Rel(P) \ \& \\ p = \lambda w'. \exists y[P(y) \ \& \text{cut}_{w'}(I, y)]]\}$$

In this case, however, the scalar implicature triggered by the NPI implicates the negation of all alternatives higher ranked than the least informative alternative. That is, it implicates that I didn't cut any classes.

Note that this method of NPI-interpretation is also compatible with the ordinary semantic value of the sentence. The proposition represented by the LF in (82) may be true in the world w if I either didn't cut any classes in w or if I didn't disagree with the lecturer in w or if there is no counterfactual relation in w between my not cutting the classes and my disagreement with the lecturer.

But the scalar implicature is not compatible with a subsequent correction in form of an (elliptical) but because-phrase. Such a phrase would imply that I, indeed, cut some classes causing an inconsistency. Therefore, the configuration in (82) is not licit.

The interpretation of the narrow scope variant for negation is straightforward. (79-b) means that it is a reason for me not to cut classes that I disagreed with the lecturer. In this case adjunction of the NPI operator is assumed to be the proposition that immediately c-commands the main clause as represented in (79-b). The focus semantic value is assumed to be the set in (84).

$$\begin{aligned}
(84) \quad & \llbracket [\text{VP} [\text{VP} [\text{VP} [\text{VP} \text{not} [\text{VP} \text{I cut any }_N[\text{classes}]]] \Delta \text{B}]] \\
& \quad [\text{CP} \text{because }_F[\text{VP} \text{I disagreed with the lecturer}]]] \rrbracket^f \\
& = \{q \mid \exists p [Rel(p) \ \& \\
& \quad q = \lambda w. \text{because}(w)(p)(\lambda w'. \neg \exists y [\text{class}(w')(y) \ \& \text{cut}_{w'}(I, y)])]\}
\end{aligned}$$

Intuitively, there are possible reasons not to cut the lecturer's classes under discussion. The restrictions on the interpretation of the NPI operator do not contradict the ordinary meaning of the sentence. (85) is the NPI semantic value of the LF in (79-b).

$$\begin{aligned}
(85) \quad & \llbracket [\text{VP} \text{I cut any }_N[\text{classes}]] \rrbracket^f \\
& = \{p \mid \exists P [Rel(P) \ \& \ p = \lambda w'. \exists x [P(y) \ \& \ \text{cut}_{w'}(I, x)]]\}
\end{aligned}$$

For all alternatives in this set it is required that they are not true in the evaluation world. In fact, this requirement is trivially fulfilled by the denotation of the sentence.

4.3 Strong NPIs

So far, we have only demonstrated how to handle weak NPIs. How could we handle strong NPIs? Our mechanism should allow us to derive the relative acceptability of (4), repeated here in (86-a), and the unacceptability of our

example in (7), repeated here in (86-b), in the wide scope reading for the negation. Obviously, it is not a general property of strong NPIs that they do not occur in negative because-clauses. The sentences do not differ with respect to their syntactic properties.

- (86) a. Trade and industry do not prosper because the government contributed a red cent.
- b. #Marty didn't sell his bike because it was worth a red cent.

Furthermore, the analysis should predict that a because-construction, as in (86-a), does not have a reading with narrow scope for the negation with respect to the causal operator and that it entails the negation of the proposition expressed by the because-clause.

Then, the theory should predict that constructions with NPIs in the main clause are not ambiguous. (9), repeated in (87), is only acceptable if the negation has a narrow scope reading with respect to the because-operator.

- (87) He didn't budge an inch because he was pushed.

It is characteristic of strong NPIs that they are easily combined with even (Schmerling 1971) without changing the semantic and pragmatic meaning of the sentence. The sentences in (88) are assumed to have the same ordinary

meaning.

- (88) a. Mary didn't drink a drop of alcohol.
b. Mary didn't drink even a drop of alcohol.

Traditionally, even is not thought to have any effect on the truth-conditional meaning of a sentence, but rather on its conventional implicatures (= pre-suppositions). Explicit even is thought to trigger an existential implicature and a scalar implicature.

The ordinary meaning of both sentences in (88) is that Mary didn't drink a drop and both sentences are associated with the implicature that the speaker expected that Mary would drink at least one drop of alcohol. This intuitive implicature may be calculated in two different ways. Usually, these two approaches are called (a) the regular analysis of even and (b) the NPI-analysis of even. In both approaches it is assumed that even is a focus sensitive particle, i.e., the calculation of the even-related implicatures depends on the assignment of focus features.

Supporters of the regular analysis (like Horn (1969), Karttunen & Peters (1979), and most recently Wilkinson (1996) and Lahiri (1998) for Hindi bhi) argue that even is associated with an implicature that is twofold. A negative

sentence like (89) is thought to imply roughly that (a) there are other people x that John didn't invite and (b) for all relevant alternatives x besides John's girlfriend, the likelihood that John didn't invite his girlfriend is smaller than the likelihood that John didn't invite x .

(89) John didn't even invite his girlfriend.

This analysis presupposes that even has wide scope with respect to the negative particle. The LF of example (89) is represented in (90).

(90) [_{VP} even [_{VP} not [_{VP} John invited his girlfriend]]]

This analysis has the advantage that even in positive and negative sentences means the same thing. Consider the positive sentence in (91). According to the same pattern, (91) may implicate (a) there are other people x that John invited and (b) for all relevant alternatives x besides the pope, the likelihood that John invited the pope is smaller than the likelihood that John invited x .

(91) John even invited the pope.

Supporters of the NPI-analysis of even (like Rooth (1985) and von Stechow (1990)) propose handling even in negative sentences differently from even

in positive sentences. Basically, these linguists assume a lexical ambiguity between regular even and an NPI-variant of even.²⁶

I will illustrate Rooth's solution informally with the example in (89).

(89) is true in a world w if John didn't invite his girlfriend and it is associated with the implicatures (a) that some proposition of the form 'John invited x ' different from the proposition 'John invited his girlfriend' is false and (b) that 'John invited his girlfriend' is the most likely proposition of this form.²⁷ The LF of the sentence in (89) in this view is represented roughly as in (92).

(92) [VP not [VP even_{NPI} [VP John invited his girlfriend]]]

For negative sentences, the NPI-analysis for narrow scope of even and the regular analysis for wide scope of even make intuitively alike predictions in simple negated sentences as far as the scalar part of the implicature is concerned, but they differ with respect to the existential part in other downward-entailing environments. This is exactly the point where Wilkinson's criticism of the theory of ambiguous even applies.

Wilkinson (1996) rejects the ambiguity analysis and shows how to incorporate focus information that is not associated with even in the truth

conditions of regular even and argued that the hypothesis of the wide scope analysis may be maintained with this move. Furthermore, she investigates examples with be sorry and be glad that favor the original scope analysis of Karttunen & Peters (1979). However, she does not consider even in negative because-constructions. I will argue in this paper that only an ambiguity hypothesis in the sense of Rooth or von Stechow is suitable to explain the pragmatic effects of even in these constructions. Problematic is not the existential part of the presuppositions triggered by even (as in Wilkinson's counterexamples to the ambiguity hypothesis), but the scalar part.

In the following I argue that NPIs in negated because-clauses come together with an implicit even and this even introduces implicatures that we are familiar with from the implicatures of NPI-even. Furthermore, I show that strong NPIs are associated with an additional quantitative scalar implicature based on informativity in analogy to their weak relatives. In other words, even has three kinds of (conventional) implicatures: (a) an existential implicature, (b) an implicature based on probability statements, and (c) a scalar implicature that is a reformulation of a condition on correct assertions based on Grice's maxims.

In order to implement the ambiguity hypothesis in the present framework, I will assume the following lexical entries for (explicit or implicit) even. The regular variant as well as the NPI-variant of even are assumed to be partial functions that relate a world variable, a set of alternatives (in analogy to the focus operator) and a proposition to give a truth value. The definedness conditions introduce the implicatures of the expressions. For regular even I propose the lexical entry in (93).²⁸ The first two clauses of the definedness conditions state that the focus anaphor that is associated with even is a subset of the focus semantic value of the proposition even operates on and that this proposition is included in the extension of the focus anaphor. (93-c) captures the existential part of the even-implicature and (93-d) the part that introduces the probability statements. (93-e) adds the scalar implicature that more informative alternatives than the proposition modified by even are false, if the alternatives are ranked by semantic strength. This restriction follows the pattern of quantity implicatures we are familiar with from pragmatic inferences (in the sense of Grice).

$$(93) \quad \llbracket \text{even} \rrbracket^o = f : D_{\langle s, \langle \langle s, \langle s, t \rangle \rangle, \langle \langle s, t \rangle, t \rangle \rangle \rangle}$$

For all $w \in W$, set of alternatives $\mathcal{B} \in D_{\langle s, \langle s, t \rangle \rangle}$ and propositions

$p \in D_{\langle s, t \rangle}$: f is defined in w iff:

- a. $\mathcal{B} \subseteq ALT(p)$
- b. $p \in \mathcal{B}$
- c. $\exists q[q \in \mathcal{B} \ \& \ q \neq p \ \& \ q(w) = 1]$
- d. $\forall q[[q \in \mathcal{B} \ \& \ q \neq p] \Rightarrow Prob(p) <_w Prob(q)]$
- e. If p is the unique element q such that for every $r \in \mathcal{B}$, $r \subseteq q$ or $q \subseteq r$, then: $\forall q[q \in \mathcal{B} \ \& \ q \subset p \Rightarrow q(w) = 0]$

if defined in w :

$$f(w)(\mathcal{B})(p) = 1 \text{ iff } p(w) = 1$$

The lexical entry for NPI-even is similar to the lexical entry of regular even. The existential part is different. Whereas one alternative has to be true in (93) in order to satisfy the interpretation restrictions, one alternative has to be false in (94). And, the entries differ with respect to the comparison relation. Whereas it is the smaller-than-relation in (93), it is the greater-than-relation in (94).

$$(94) \quad \llbracket \text{even}_{NPI} \rrbracket^o = f : D_{\langle s, \langle \langle s, \langle s, t \rangle \rangle \rangle, \langle \langle s, t \rangle, t \rangle \rangle \rangle}$$

For all $w \in W$, set of alternatives $\mathcal{B} \in D_{\langle s, \langle s, t \rangle \rangle}$ and propositions

$p \in D_{\langle s, t \rangle}$: f is defined in w iff:

- a. $\mathcal{B} \subseteq ALT(p)$

- b. $p \in \mathcal{B}$
- c. $\exists q[q \in \mathcal{B} \ \& \ q \neq p \ \& \ q(w) = 0]$
- d. $\forall q[[q \in \mathcal{B} \ \& \ q \neq p] \Rightarrow Prob(p) >_w Prob(q)]$
- e. If p is the unique element q such that for every $r \in \mathcal{B}$, $r \subseteq q$ or $q \subseteq r$, then: $\forall q[q \in \mathcal{B} \ \& \ q \subset p \Rightarrow q(w) = 0]$

if defined in w :

$$f(w)(\mathcal{B})(p) = 1 \text{ iff } p(w) = 1$$

Prob is that function that maps propositions to empirical probabilities. And *ALT* is thought of as a function that assigns focus related alternatives to its argument.

In all cases, I discussed so far, the interpretation restriction in the form of a quantity implicature is trivially satisfied since in those cases the relevant alternatives are not ordered by semantic strength. On the contrary, the relevant alternative proposition to constructions with NPIs are ordered by semantic strength. Let us calculate the impact of the definedness restrictions on these constructions step by step.

For constructions with NPIs that associate with even, we have two choices for the adjunction of implicit even. We either adjoin implicit even at a position dominating negation or we let even be c-commanded by negation.

Moreover, we may choose in each position either the regular interpretation or the NPI-interpretation of even. Consider our example in (88-a) repeated in (95). (95) accordingly gets four different possible LFs.

even is always assumed to introduce a variable that refers to contextual alternatives dependent on some variable assignment g , in analogy to the focus operator. The focus operator is assumed to have narrow scope with respect to the negation since a sentence like (95) is typically uttered as a denial of a previous positive sentence that names a different amount of alcohol that Mary drank. This view forces me to assume that the NP containing drop, the accented expression, carries two focus features that associate with different operators by movement of the inner shell to some higher node in the scope of even but outside the scope of the focus operator \sim .²⁹

(95) Mary didn't drink a drop of alcohol.

- a. $[_{VP} \text{ even } B [_{VP} \text{ not } [_{VP} [_{NP} \text{ a } N[\text{ drop}]] \text{ of alcohol}]_1 [_{VP} [_{VP} \text{ Mary drank } F[t_1]] \sim C]]]]]$
- b. $[_{VP} \text{ not } [_{VP} \text{ even } B [_{VP} [_{NP} \text{ a } N[\text{ drop}]] \text{ of alcohol}]_1 [_{VP} [_{VP} \text{ Mary drank } F[t_1]] \sim C]]]]]$
- c. $[_{VP} \text{ not } [_{VP} \text{ even}_{NPI} B [_{VP} [_{NP} \text{ a } N[\text{ drop}]] \text{ of alcohol}]_1 [_{VP} [_{VP} \text{ Mary drank } F[t_1]] \sim C]]]]]$

- d. $[[[_{VP} \text{even}_{NPI} B [_{VP} \text{not} [_{VP} [_{NP} \text{a } N[\text{drop}] \text{ of alcohol}]_1 [_{VP} [_{VP} \text{Mary drank } F[t_1] \sim C]]]]]]]$

In all configurations the assignment of C is supposed to be some subset of the set of alternatives in (96). But this set is not relevant for the calculation of the even-implicatures in this approach: see Rooth (1995) for a simpler but less general view.

$$(96) \quad \begin{aligned} & \llbracket [_{VP} \text{Mary drank } F[t_1]] \rrbracket^f = \\ & \{p \mid \exists x[Rel(x) \ \& \ p = \lambda w.\text{Mary drank } x \text{ in } w]\} \end{aligned}$$

The LFs in (95) differ with respect to the definedness conditions imposed by the interpretation of even.

For (95-a) and (95-d), the set of alternatives relevant for the calculation of the implicatures is (97-a). Since the negation is in the scope of even the alternatives are negative. The pattern of the implicatures of (95-b) and (95-c) is based on the (positive) alternatives in (97-b).

$$(97) \quad \begin{aligned} \text{a.} \quad & \llbracket [_{VP} \text{not} [_{VP} [_{NP} \text{a } N[\text{drop}] \text{ of alc.}]_1 [_{VP} \text{Mary drank } t_1]] \rrbracket^f = \\ & \{p \mid \exists P[Rel(P) \ \& \ p = \lambda w.\neg\exists x[P_w(x) \ \& \\ & \text{alcohol}_w(x) \ \& \ \text{Mary drank } x \text{ in } w]]\} \\ \text{b.} \quad & \llbracket [_{VP} [_{NP} \text{a } N[\text{drop}] \text{ of alcohol}]_1 [_{VP} \text{Mary drank } t_1]] \rrbracket^f = \end{aligned}$$

$$\{p \mid \exists P[Rel(P) \ \& \ p = \lambda w.\exists x[P_w(x) \ \& \\ alcohol_w(x) \ \& \text{Mary drank } x \text{ in } w]]\}$$

Note that the existential operator introduced by the indefinite a drop of alcohol has narrow scope with respect to negation in (98-a).³⁰

Now, it can be shown that only the even-NPI-interpretation in the narrow scope position and the implicatures associated with regular even with wide scope meet our intuitions. The even-implicatures triggered by the other two configurations are not compatible with common knowledge. Let us first consider the probability implicatures. On the basis of negative alternatives we compare the probabilities of negative propositions and on the basis of positive alternatives we compare the probabilities of positive propositions. NPI-even reverses the comparison relation of regular even.

(98) Probability implicatures

- a. “Mary didn’t drink (at least) a drop of alcohol” is less likely than
“Mary didn’t drink (at least) some greater amount of alcohol”
- b. # “Mary drank (at least) a drop of alcohol” is less likely than
“Mary drank (at least) some greater amount of alcohol”
- c. “Mary drank (at least) a drop of alcohol” is more likely than

“Mary drank (at least) some greater amount of alcohol”

- d. # “Mary didn’t drink (at least) a drop of alcohol” is more likely than “Mary didn’t drink (at least) some greater amount of alcohol”

Informally, (97-a), the configuration with wide scope regular even, triggers the implicature in (98-a). This probability statement is equivalent to the probability statement in (98-c), the probability implicature calculated on the basis of (97-b) with NPI-even. Since it is so that we drink a drop with every higher amount of liquid, it is at least as likely that we drink the minimal amount than every higher amount. Krifka captures this intuition by means of the principle of involvement of parts.

(99) The Principle of Involvement of Parts (Krifka 1995: 238)

“If someone drinks something, he also drinks every part of it.”

If one drinks every part of some greater amount of liquid one also drinks the minimal amount. This follows from this principle.

In structures with NPI-even (with narrow scope with respect to the negation) and regular even (with wide scope to negation) the interpretation restrictions are therefore met as far as the probability statements are concerned.

The implicatures triggered by narrow scope regular even (98-b) and by wide scope NPI-even (98-c) contradict the principle of involvement of parts and, therefore, the interpretation restrictions for even are not satisfied in these structures. In these structures the NPI a drop of alcohol is not licensed.

The scalar implicatures are either trivially satisfied if we compare negative NPI-alternatives (it is not the case that Mary drank a drop in the set in (97-a) is the most informative alternative) or do not interfere with the ordinary semantics of the sentence.

If the interpretation of even is defined, the sentence Mary didn't drink a drop of alcohol denotes "it is not the case that there is (at least) a minimal amount of liquid which is alcohol such that Mary drank it".

Positive sentences with NPIs denoting minimal entities like a drop are not well formed. Consider the sentence in (100). Again, we have two possible LFs to consider. (100-a) is a construction with regular even and (100-b) is a construction with NPI-even.

(100) #Mary drank a drop of alcohol.

- a. $[_{VP} \text{ even B } [_{VP} [_{NP} \text{ a } N[\text{drop}] \text{ of alcohol}]_1 [_{VP} [_{VP} \text{ Mary drank } F[t_1]] \sim C]]]$

- b. $[_{VP} \text{ even}_{NPI} \text{ B } [_{VP} [_{NP} \text{ a } _N[\text{ drop}] \text{ of alcohol}]_1 [_{VP} [_{VP} \text{ Mary drank } _F[t_1]] \sim \text{C}]]]$

(100-a) implicates that for all relevant alternatives Q of alcohol besides a drop, the likelihood that Mary drank a drop is smaller than the likelihood that Mary drank Q -much alcohol. This implicature, however, contradicts our common knowledge that it is more likely that one drinks (at least) a drop of alcohol than that one drinks a bigger quantity of alcohol. This is so because we drink a drop with each sip or glass or gallon and because it is very unlikely that we only drink the minimal amount and nothing else. This is again an instance a violation of the principle of involvement of parts. And, since the interpretation restrictions for implicit even are not defined, the interpretation of the the sentence in (100-a) is not defined and the NPI is not licensed.

The interpretation of (100-b) does not conflict with the principle of involvement of parts. It presupposes that it is more likely for Mary to drink at least a drop of alcohol than a bigger amount. Since this implicature does not conflict with our knowledge about the correlation between parts and wholes of liquids, the sentence is predicted to mean that Mary drank (at least) a minimal quantity of alcohol. This is the point where the quantity

implicature comes into play. The interpretation restriction on even in form of a quantity implicature requires all alternatives of the form “Mary drank at least Q-much alcohol” to be false in the utterance situation. And we are entitled to conclude that Mary didn’t drink some higher amount of alcohol but exactly the minimal amount.³¹

However, Krifka (1995) argues that the assertion of the proposition that Mary drank (exactly) a drop of alcohol is in conflict with a second principle that he calls the “principle of extremities”.

(101) Principle of Extremities (Krifka 1995: 239)

“That someone drinks a minimal quantity of liquid is less probable than that he or she drank a more substantial quantity of liquid.”

His reasoning goes as follows: That someone drinks a minimal amount of some liquid and nothing else is highly improbable.³² The principle of extremities with respect to negative polarity a drop is assumed to state that it is less probable that one drinks exactly a minimal amount of liquid and nothing else than some slightly bigger amount. Now, if we claim the proposition that Mary drank a minimal amount of liquid and not more, we assume it to have the probability 1, whereas the probability that Mary drank some

slightly bigger amount is 0. But this contradicts the principle of extremity.

Therefore, I conclude that neither the regular nor the NPI-variant of even makes the correct predictions for the denotation of positive sentences containing the NPI-variant of a drop. The NPI is not licensed. It is of course still possible to interpret drop in its literal meaning without associating it with an implicit even. In such a case Mary drank a drop means “Mary drank at least a minimal amount”.³³

In the following, I will assume that an implicit even is present at surface structure in constructions with strong NPIs like a drop or a red cent and I will show that the NPI-even denotation makes the correct predictions for the acceptability of NPIs in negative *because*-clauses.

4.4 Strong NPIs in *because*-clause constructions

4.4.1 ... the subordinate clause

Let us apply this analysis informally to our negative causal examples. (102) would be true in a world w according to the truth conditions formulated for because in (28) if either trade and industry do not prosper in w or if the government didn't contribute a red cent in w or if it were false in w that trade and industry wouldn't prosper if the government didn't contribute a

red cent. Note that even may be optionally added to the potential NPI a red cent without changing the meaning of the sentence.

- (102) Trade and industry do not prosper because the government contributed (even) a red cent.

The denotation of red cent I assume to be a predicate, as in (103).

- (103) $\llbracket \text{red cent} \rrbracket = \lambda w \lambda x . \text{amount_of_money}_w(x) \ \& \ \neg \exists y [y \subset_w x]$

Basically, we have three possibilities to adjoin the implicit operator even at the level of LF. In (104-a) even is adjoined locally and has narrow scope with respect to because and not, and in (104-b) even c-commands because and is c-commanded by negation, thus having intermediate scope. In (104-c), even takes wide scope with respect to the other operators. Furthermore, even may be interpreted as the NPI-even or as the regular even.

- (104) a. $[\text{VP not } [\text{VP } [\text{VP } [\text{VP trade and industry prosper}] [\text{CP because }_F [\text{VP even } [\text{VP the gov. contributed a }_N [\text{red cent}]]]]]] \sim \text{C}]]$
- b. $[\text{VP not } [\text{VP even } [\text{VP a }_N [\text{red cent}]_I [\text{VP } [\text{VP } [\text{VP trade and industry prosper}] [\text{CP because }_F [\text{VP the gov. contributed } t_1]]]] \sim \text{C}]]]]$

- c. [VP even [VP not [VP a _N[red cent]₁] [VP [VP [VP trade and industry prosper] [CP because _F[VP the gov. contributed t₁]]]] ~ C]]]]

In all cases I assume that the sentence is uttered in an assertion-denial-context. This assumption motivates the adjunction site of the focus operator in a position that c-commands *because* and is c-commanded by negation and the F-marking.

The movement of the element a red cent in the intermediate or wide scope analysis is necessary in order to make sure that even can properly associate with the N-marked constituent. Without movement the N-marked constituent would be invisible for even.

Let me demonstrate how only the narrow scope solution for implicit NPI-even meets the intuitions in the understanding of the sentence in (102). I will start considering the implicatures associated with regular even and NPI-even in the narrow scope position, and then proceed with even in the intermediate scope position and the wide scope position. The NPI red cent will only be licensed if all relevant presuppositions (the existential presupposition, the probability presupposition and the quantity presupposition) meet our intuitions (in form of the “principle of involvement of parts” and “the principle of

extremities”) and if they confine with the ordinary meaning of the negative because-construction.

The even-related presuppositions are calculated on the basis of positive alternatives if even has narrow scope with respect to all other quantifiers. The relevant set is the one in (105).

$$(105) \quad \llbracket \llbracket_{VP} \text{ the government contributed a }_N[\text{red cent}] \rrbracket \rrbracket^f = \\ \{p \mid \exists P[Rel(P) \ \& \\ p = \lambda w.\exists x[P_w(x) \ \& \text{ the government contributed } x \text{ in } w]]\}$$

The sentence in (102) with the LF in (104-a) an regular even is assumed to carry the presupposition that the likelihood that the government contributed (at least) a red cent is smaller than the likelihood that the government contributed every other amount of money. But in every world where it is true that the government contributed any amount of money that is higher than a red cent the government contributed a red cent, too. With Krifka (1995: 238) we capture this intuition by postulating the principle of involvement of parts: see the discussion above on page 74. This means that the likelihood that the government spent some amount higher than a cent is smaller than the likelihood that the government contributed a cent. But the even-related

implicature requires the relation to be the other way around. With the interpretation of regular even the triggered implicature contradicts therefore common knowledge.

NPI-even triggers an implicature that the likelihood that the government contributed a red cent is greater than the likelihood that the government contributed another amount of money. This implicature meets our intuitions, since the government contributes the minimal amount of money with each contribution. The principle of involvement of parts is therefore satisfied. The existential implicature states that there is a higher amount that the government didn't contribute. And this information is compatible with the quantity implicature. The quantity implicature requests (informally) that all more informative alternatives than the proposition expressed by the because-clause in the set in (105) are false in the utterance situation. From this reasoning it follows that the government either contributed no amount at all or exactly a red cent, the minimal amount of money. The principle of extremities allows us to derive that most probably the government didn't contribute the minimal amount of money of a cent. If it were true that the government contributed a red cent and nothing more, we would violate the principle of extremity. (See the discussion in the last section on this point on

the comparison relation.

Intuitively, only a reasonable contribution (we are speaking of millions) by the government may help trade and industry to prosper. But the probability that trade and industry prosper because the government contributed one or two dollars is equal to the probability that trade and industry prosper because the government contributed a cent only. Therefore, not all alternatives decrease or increase the probability of the causal relation and therefore the NPI a red cent is not licensed.

An analogous argumentation may show that the wide scope analysis does not make the correct predictions. The only difference between the intermediate scope analysis and the wide scope analysis is that the scale for the probabilities of the causal relations is reversed due to negation.

Therefore, neither the regular analysis of even nor the NPI-analysis can capture the wellformedness of our example (102) in the intermediate or the wide scope analysis.

Analogous arguments may reveal that the sentence is not acceptable in the narrow scope reading for negation. In such a case we assert that the government contributed exactly a red cent and this assertion is not compatible with the principle of extremities.

In this light, the unacceptability of (86-b), repeated here in (107), could be derived as an effect of the fact that the implicatures of even may not be satisfiable in the relevant selling context.

(107) #Marty didn't sell his bike because it was worth (even) a red cent.

In the wide scope reading of the negation, (107) may mean in the utterance world that Marty either didn't sell his bike or that his bike wasn't worth a red cent or that there is no connection between Marty's selling his bike and its value of a red cent. I will skip the discussion of the narrow scope reading of negation with respect to because.

Interpreting the implicit even as an instance of NPI-even with narrow scope with respect to because we are forced to assume that (107) implicates that it is more likely that the bike is worth at least a red cent than any other amount. This again coincides with a corollary of the principle of involvement of parts. The quantity implicature leads us to the conclusion that the bike was not worth more than a red cent. Therefore the bike is may either have the value of exactly one cent and not more or it is not worth anything. The principle of extremity forces us to assume that it is improbable that the bike was worth exactly a minimal amount of money. So we may conclude that the

bike is not worth anything. This is compatible with the semantics of the sentence. But, selling the bike involves the transfer of money in exchange for the bike. Therefore, the bike must have a value that is expressible in terms of money at least for the buyer. And this is sufficient to invoke a contradiction between the conveyed meaning of the implicatures triggered by NPI-even and the meaning of the main clause. The unacceptability of (107) is therefore not derivable from a conflict of even-implicatures with common knowledge but from a conflict with the ordinary meaning of the main clause.

Krifka (1995) does not handle negative because-clauses in his article. If we attempt to extend his proposal to these sentences we are forced to make the wrong predictions. First, the illocutionary operator *Emph.Assert* that triggers the relevant implicatures is unlikely to have narrow scope with respect to the causal operator. I already discussed and rejected the plausibility of illocutions within because-clauses in the wide scope reading of the negation in section 4.2.1 and I will not go into details here. Second, this operator triggers the implicatures of regular even. But I just showed that the implicatures triggered by regular even in because-clauses contradict Krifka's principle of involvement of parts.

The proposed analysis in terms of a narrow scope NPI-even gets independent comparative evidence from German. In German, so-called strong NPIs like eine müde Mark may occur in negated weil-('because')-clauses, as in (108), the German translation of (102).

- (108) Der Handel blüht nicht, weil der Staat (auch_nur/
 the trade prospers not because the government (even_{NPI}/
 *sogar) eine müde Mark beigetragen hätte
 *even) a tired Deutsche-mark contributed has(conj)

However, it is not acceptable to modify the NPI by sogar, which is considered to be the translation of regular even. These considerations support the ambiguity analysis for even by Rooth (1985).

If it is true as Lahiri (1998) argues that bhii in Hindi triggers the same implicatures as regular even, we predict negative causal constructions in Hindi to be unacceptable with bhii in the subordinate clause. This prediction is, in fact, correct. The examples in (109) containing bhii have neither a wide scope reading for negation nor a narrow scope reading with respect to the causal operator. Omitting bhii makes the sentences acceptable.³⁴

- (109) Ramaa isliye nahiiN aayii kyuNkii us-ko kisii-se
 Rama for-this-reason not came because she-DAT someone
 (*bhii) milnaa thaa, lekin isliye kyuNkii us-ko
 EMPH meet-INF aux but for-this-reason because she-DAT

yehaaN kaam thaa.
 here work aux

- (110) “Rama didn’t come because she had to meet anyone but because she had work here.”

- (111) Raam-ko sar dard isliye nahiiN hua kyuNkii
 Ram-DAT headache for-this-reason not happened because
 us-ne zaraa-saa (*bhii) paRhaa, lekin isliye kyuNkii
 he-ERG little-bit EMPH read but for-this-reason because
 us-ne khaanaa nahiiN khaayaa thaa.
 he-ERG food not eat-PERF aux

- (112) “Ram didn’t get a headache because he read even a little but because he hadn’t eaten.”

English and German therefore differ from Hindi in that they allow NPI-even.

4.4.2 ... the main clause

A parallel line of argumentation has to be followed for even-related NPIs in the main clause. Negative because-clauses with strong NPIs are not thought to occur in the main clause if the negation has widest scope. An example from Linebarger (1987: 338) illustrating this point is stated in (113).

- (113) The car didn’t budge an inch because it was pushed.

sentence becomes acceptable.

The narrow scope reading of NPI-even in (114-a) implicates that the car didn't move a minimal amount of distance according to (a) the principle of involvement of parts (it is more likely that the car moves the most minimal distance than that it moves some greater distance, since with every greater distance it also moves the minimal distance), (b) according to the quantity implicature (that the car moved further than the minimal possible distance is required to be false), and (c) according to the principle of extremities (it is less likely that the car moves exactly the minimal distance and not some greater distance than the minimal distance).³⁵ That the car didn't move at all is in principle compatible with the ordinary semantics of our sentence. But a but because-phrase, which is typical for causal denial contexts is not possible anymore. Such a but because-phrase would (implicitly) presuppose the truth of the unnegated main clause, in our case, that the car indeed moved a minimal distance provoking a contradiction with the implicature induced information. This reasoning shows that the NPI-even is not acceptable if we want to provide the hearer with a reason for the car's moving.

The regular even triggers an implicature that contradicts the principle of involvement of parts. The reader is invited to calculate this prediction by

himself.

In the intermediate as well as in the wide scope reading of NPI-even or regular even the implicatures are intuitively wrong. The causal relation between the proposition that the car moved a minimal distance and its being pushed is equally as likely as the causal relation between the car's moving of a greater distance and its being pushed. The implicature triggered by the instances of even requires the comparison relation to be smaller or greater.

By now, it should be clear how the acceptability of the narrow scope reading captured in the LF (115) may be derived.

$$(115) \quad [VP [VP [VP not [VP even [VP the car_N[budged an inch]]]]] \\ [CP because_F [VP the car was pushed]]] \sim C]$$

In this configuration the sentence is true if and only if the car didn't budge an inch and if the car was pushed and if there is a causal relation between the pushing of the car and its moving. Assume that the car is standing on an inclined plane and has no brakes. By the law of gravity the car would move if nobody pushed it.

It is convenient that even has narrow scope with respect to the negation in the main clause. The relevant alternative semantic value is stated in (116).

$$(116) \quad \llbracket \llbracket_{\text{VP}} \text{the_car} \llbracket_{\text{N}} [\text{budged_an_inch}] \rrbracket \rrbracket \rrbracket^f = \\ \{p \mid \exists P[\text{Rel}(P) \ \& \ p = \lambda w'. P_{w'}(\text{the_car})]\}$$

I take it for granted that the alternatives in this set are contextually restricted to variants of moving some distance. The interpretation restrictions on NPI-even are met if it is less likely for the car to move some other distance than the minimal distance and the interpretations on regular even are met if it is more likely for the car to move some other distance than the minimal distance. Only the implicatures of the NPI-even meet the requirements of the principle of involvement of parts. I will not discuss other adjunction sites for even, but just postulate that the implicatures triggered by these configurations do not meet our intuitions.

5 Conclusion

The licensing conditions for weak and strong NPIs are derived by a theory in which the truth conditions of a negative because- construction interact with NPI-related scalar implicatures and common knowledge. A negative polarity item is licensed if the scalar implicatures that it triggers do not contradict the truth conditions of the sentence and common knowledge (the so-called

principle of involvement of parts and the principle of extremity). In this respect I follow the argumentation of Krifka (1995).

In section 2, I argue for a counterfactual analysis following Lewis (1973b) of the causal relation induced by because. This theory predicts that constructions with because are not upward-entailing.

In section 3, I introduced an alternative semantics for focus and I discuss possible focus structures of negative because-clauses.

Phrases that contain a weak or strong NPI are assumed to be marked by an N-feature that has a purely pragmatic interpretation (but not necessarily a phonological interpretation in analogy to the focus feature F). N-feature interpretation is identical to F-feature interpretation. That is, constructions containing a phrase that is F-marked and a phrase that is N-marked are multiple focus constructions. And, F-feature marking and N-feature marking may be nested and interpreted by different focus-sensitive operators.

The scalar implicatures associated with weak any are argued to be interpretation restrictions on an NPI operator Δ that is introduced at any sentential level of Logical Form. This operator is modeled in analogy to the focus operator \sim of Rooth's alternative semantics for focus.

The implicatures associated with strong NPIs like a red cent are argued

to be interpretation restrictions on implicit even in accordance with Lahiri (1998) for Hindi bhii. However, negative because-clauses in English require (in contrast to Hindi) an account in which even is assumed to be lexically ambiguous in the sense of Rooth (1985) between a regular even and an NPI-even. Whereas implicit even (triggering the scalar implicatures of NPI-even) is possible in negative because-clauses in English, explicit bhii (triggering the scalar implicatures of regular even) is not possible in negative because-clauses in Hindi.

In formalizing the implicatures I follow basically Krifka (1995). But unlike Krifka, the implicatures are not triggered by an assertion operator (at the highest sentence level) but by implicit operators that may adjoin freely at any level of LF.

References

- Beck, Sigrid (1996): ‘Quantified Structures as Barriers for Movement’,
Natural Language Semantics **4**, 1–56.
- Büring, Daniel (1998): Drinking, Accents and Negation. In:
Proceedings of the Amherst Focus Workshop. Vol. 21 of

- University of Massachusetts Occasional Papers, UMass: GLSA Publications, pp. 37–50.
- Cresti, Diana (1995): ‘Extraction and Reconstruction’, Natural Language Semantics **3**, 79–122.
- Dretske, Fred I. (1972): ‘Contrastive Statements’, Philosophical Review **81**, 411–437.
- Drubig, Bernhard (1994): ‘Island Constraints and the Syntactic Nature of Focus and Association with Focus’. Arbeitspapiere des Sonderforschungsbereichs 340: 51.
- Fauconnier, Gilles (1975): ‘Pragmatic Scales and Logical Structure’, Linguistic Inquiry **6**, 353–375.
- Fintel, Kai von (1994): Restrictions on Quantifier Domains. PhD thesis, University of Massachusetts, Amherst.
- Geilfuß-Wolfgang, Jochen (1996): Über gewisse Fälle von Assoziation mit Fokus. Tübingen: Max Niemeyer Verlag.
- Hajičová, Eva (1994): Topic, Focus, and Negation. In: P. Bosch & R. van der Sandt, eds, Focus and NLP. Vol.2: Semantics. Heidelberg: IBM, pp. 323–331.
- Hamblin, C.L. (1973): ‘Questions in Montague English’, Foundations of Language **10**, 41–53.

- Heim, Irene (1984): A Note on Negative Polarity and Downward Entail-
ingness. In: C. Jones & P. Sells, eds, Proceedings of NELS 14. UMass:
GLSA Publications, pp. 98–107.
- Horn, Lawrence (1969): Presuppositional Analysis of only and even. In:
Proceedings of CLS 5. Chicago Linguistic Society: Chicago, pp. 97–108.
- Johnston, Michael (1994a): The Syntax and Semantics of Adverbial Ad-
juncts. PhD thesis, University of California. Santa Cruz.
- Johnston, Michael (1994b): Because Clauses and Negative Po-
larity Licensing. In: A. Kathol & M. Bernstein, eds,
ESCOL '93: Proceedings of the Tenth Meeting of the Eastern States
Conference on Linguistics. Ithaca, NY: Cornell University, Department
of Modern Languages and Linguistics, pp. 163–174.
- Kadmon, Nirit & Fred Landman (1993): 'Any', Linguistics and Philosophy
16, 353–422.
- Karttunen, Lauri & Stephen Peters (1979): Conventional Implicature. In:
C. Oh & P. Dinneen, eds, Presupposition. Vol. 11 of *Syntax and Seman-
tics*, New York: Academic Press, pp. 1–56.
- Kratzer, Angelika (1989): 'An Investigation of the Lumps of Thought',
Linguistics and Philosophy **12**, 607–633.

- Krifka, Manfred (1995): 'The Semantics and Pragmatics of Polarity Items', Linguistic Analysis **25**, 209–257.
- Ladusaw, Bill (1979): Polarity Sensitivity as Inherent Scope Relations. PhD thesis, University of Texas, Austin.
- Ladusaw, William A. (1992): Expressing Negation. In: C. Barker & D. Dowty, eds, *Proceedings of SALT II*. Vol. 40 of Ohio State University Working Papers in Linguistics, Columbus: Ohio State University, pp. 1–23.
- Lahiri, Utpal (1998): 'Focus and Negative Polarity in Hindi', Natural Language Semantics **6**, 57–123.
- Levinson, Stephen C. (1983): Pragmatics. Cambridge: Cambridge University Press.
- Lewis, David (1973a): 'Causation', *Journal of Philosophy* **70**, 556–567.
- Lewis, David (1973b): *Counterfactuals*. Oxford: Blackwell.
- Linebarger, Marcia (1981): The Grammar of Negative Polarity. PhD thesis, Indiana University, Bloomington.
- Linebarger, Marcia (1987): 'Negative Polarity and Grammatical Representation', LaPh **10**, 325–387.
- Meier, Cécile (1998): Presuppositions and Allegations under Negation in Causal Contexts. In: Proceedings of the Amherst Focus Workshop.

Vol. 21 of University of Massachusetts Occasional Papers, UMass: GLSA Publications, pp. 160–173.

Partee, Barbara (1996): Presupposition and Local Accommodation. In: B. Partee & P. Sgall, eds, Discourse and Meaning: Papers in Honor of Eva Hajičová. Amsterdam; Philadelphia: John Benjamins.

Rooth, Mats (1985): Association with Focus. PhD thesis, University of Massachusetts, Amherst.

Rooth, Mats (1992): ‘A Theory of Focus Interpretation’, Natural Language Semantics **1**, 75–116.

Rooth, Mats (1996): Focus. In: S. Lappin, ed., The Handbook of Contemporary Semantic Theory. Oxford, UK; Cambridge, Mass.: Blackwell, pp. 272–297.

Schmerling, Susan F. (1971): ‘A Note on Negative Polarity’, Papers in Linguistics **4**, 200–206.

Schwarzschild, Roger (1999): ‘Givenness’, *Natural Language Semantics* **7**, 141–177.

Vlk, Tomas (1988): Topic/Focus Articulation and Intensional Logic. In: D. Vargha, ed., Proceedings of COLING 88. ACL: Budapest, pp. 720–725.

von Stechow, Arnim (1990): Status Government and Coherence in German.

In: G. Grewendorf & W. Sternefeld, eds, Scrambling and Barriers. Amsterdam: Benjamins, pp. 143–198.

von Stechow, Arnim (1991): Current Issues in the Theory

of Focus. In: A. von Stechow & D. Wunderlich, eds,

Semantik/Semantics: An International Handbook of Contemporary

Research. Berlin: de Gruyter, pp. 804–825.

Wilkinson, Karina (1996): ‘The scope of even’, Natural Language Semantics

4, 193–215.

Zwarts, Frans (1998): Three Types of Polarity. In: F. Hamm & E. Hinrichs,

eds, Plurality and Quantification. Dordrecht: Kluwer.

Footnotes

¹ The work reported here was first presented at the Conference on Negation at the University of Groningen in August 1996. I would like to thank the audience for discussion and an extremely helpful reviewer of an earlier version of the paper for his comments. Thanks also to the participants of a SURGE meeting at Rutgers University in February 2001, especially Karina Wilkinson, Veneeta Dayal, and Roger Schwarzschild. They gave me the opportunity to test the predictions of the new version. Above all, I am thankful to Kirsten Brock for correcting my English.

¹ I will use GB style Logical Forms as representations throughout this paper. Generally, I assume that negation is a sentence operator and is adjoined to VP at the level of LF. This view presupposes the so-called VP-hypothesis. At the level of LF, the subject may be reconstructed from a case position to its base position within the VP. Following Johnston (1994a), I assume that the because-clause is IP-adjoined in the reading with narrow scope negation and VP-adjoined in the reading with wide scope negation.

² Zwarts (1998) investigates the different licensing conditions of NPIs of the strong and weak types in the scope of nominal quantifiers. Weak NPIs like (unfocussed) any-NPs, ever and need are licensed in downward-entailing

contexts. Strong NPIs like (focussed) any, lift a finger, etc. require a so-called anti-additive context. Whereas downward-entailing contexts allow for substitution of an expression by a more specific expression, anti-additive contexts are in addition closed under (finite) unions. Strong negative polarity items like a red cent or a sound, etc. not only have the NPI-meaning that may be characterized by minimal entities of a certain kind, but usually also have a literal meaning. They are fully productive. And they have an even-related meaning (Schmerling 1971).

³ The first to see this was Dretske (1972).

⁴ It has been argued by exponents of the Prague School (e.g. Vlk 1988) that *because*-clauses in negative environments may have the status of so-called allegations (in the terminology of Hajičová (1994) and Partee (1996)) if the *because*-clause is part of the focus of the sentence. See also Meier (1998) for discussion.

⁵ See Levinson (1983) for the relevant discussion.

⁶ In this paper, I will only investigate any-NPs. For ever, I refer the reader to Krifka's article. However, I am not so sure about how this approach may be applied to need, for example. This point needs further investigation.

⁷ For the details of the interpretation of the counterfactual operator " $\Box \rightarrow$ "

I refer the reader to Lewis (1973b).

⁸In the following I will use a lambda-notational version of intensional semantics in which the implicit world arguments appear as subscripts. The brackets representing the ordinary interpretation function $[[\dots]]^o$ are omitted in the formulas. “@” is a designated variable that refers to the world of utterance.

⁹The reviewer of the previous version assumed that the proposed semantics for *because* predicts *because* to be an upward-entailing operator. But this is false.

¹⁰See Drubig (1994) and others for a clarification of this interdependence.

¹¹I cannot go into details here.

¹²I am following closely Rooth (1995: 279).

¹³It has been argued in the literature that negative why-questions only have a reading where the causal operator has wide scope with respect to negation: see, for example, Cresti (1995) for an explanation in terms of semantic reconstruction (λ -conversion) and Beck (1996) for an explanation in terms of syntactic reconstruction (lowering), as well as the discussion of other proposals in the literature there.

¹⁴Note also that these considerations may not capture the fact that pos-

itive because-clauses are focus sensitive. In order to incorporate this idea, we have to incorporate focus information in the meaning of because: see Geilfuß-Wolfgang (1996) for a solution.

¹⁵ If it is the subordinator because that is the target of the denial, the truth of the main clause depends on the truth conditions for the substituted subordinator.

¹⁶ In Meier (1998) I defend a less general approach by introducing an existential presupposition associated with focus structure. Büring (1998) assumes that one of the alternatives must be informative (i.e. adding one of the propositions which the alternatives express to the relevant context must not lead to an empty context).

¹⁷ I assume here that the sentences in (116) are answers to a yes/no-question.

¹⁸ See also the discussion in Rooth (1992: 82). Rooth already argued that the Gricean maxime of quantity may be captured by using focus alternatives.

¹⁹ This excludes alternatives of the form Fido noticed a dog, for example.

²⁰ Some subconstituent of the constituent containing any carries the N-feature. And, any may carry this feature, too.

²¹ I assume here that the sentences in (49) are answers to a yes/no-

question. This assumption justifies the assignment of the F-feature to the whole sentence and the adjunction of the \sim -operator to the highest VP.

²² See Schwarzschild (1999) for an alternative analysis in terms of “givenness”.

²³ The values of the variables induced by the NPIs are again assigned by a contextually given function *g*, omitted here for simplicity.

²⁴ There might be concerns that this dialog sequence is not fully acceptable.

²⁵ Heide Wegener, for example, argues for German that the position of the verb in a sentence with weil “because” is an indicator for the illocutionary force of the subordinate clause. Weil-verb-second-clauses have their own illocution. The verb position disambiguates the meaning of negative sentences. Whereas the German variant of (i) in (i-a) has a wide scope reading and a narrow scope reading for negation, the verb-second construction (i-b) only has a narrow scope reading.

(i) He didn’t drive home because he had a headache.

- a. Er ist nicht nach Hause gefahren, weil er Kopfweh hatte.
he is not to home driven because he headache had
- b. Er ist nicht nach Hause gefahren, weil er hatte Kopfweh.
he is not to home driven because he had headache

²⁶ This view may be corroborated by the fact that in languages like German both variants are translated differently. Sogar triggers the same implicatures as regular even, and auch nur triggers the implicatures associated with NPI-even von Stechow 1991: 811. But Wilkinson (1996) rejects this evidence with the argument that auch nur may still have widest scope at the level of LF. Her argument, however, poses a conceptual problem. Auch nur is an NPI and is restricted to occurring at the level of S-structure within the scope of the licenser. In Wilkinson's approach, it must have scope over this licenser at the level of LF. Hotze Rullmann, p.c., made this argument in connection with either and Dutch zelfsmaar/ookmaar. The same problem arises with sogar.

²⁷ See Rooth (1985: 153) for the formalization of this idea. This formalization requires that an alternative set be introduced by the focus operator \sim . The definition of even then produces probability statements that are calculated on the basis on those focus related alternatives. This solution is problematic for all-new sentences with even in which even does not c-command a focus marked constituent.

²⁸ In association with strong NPIs the alternatives are comparable in their semantic strength: see Krifka (1995: 228) for discussion on this issue. The

probability statement in (93) may be expressed in terms of set inclusion in this case.

²⁹I do not consider structures with wide scope of the constituent a drop of alcohol with respect to negation at this point. But I refer the reader to the discussion of NPIs in positive sentences with strong NPIs below. The implicatures calculated on the basis of such structures are not consistent with common knowledge.

³⁰Drop of alcohol denotes the predicate $\lambda w \lambda x. \text{liquid}_w(x) \ \& \ \neg \exists y [y \subset_w x] \ \& \ \text{alcohol}_w(x)$. I follow here Krifka (1995: 237).

³¹We might exclude that the sentence means that Mary drank more than the minimal amount of liquid also by Griceian reasoning. If a speaker knows that Mary drank more than exactly the minimal amount he is not informative enough in saying that Mary drank the minimal amount. Such an utterance would violate the Maxim of Quantity.

³²This reasoning presupposes an atomistic view on mass terms.

³³Krifka (1995) has a slightly different view on the facts. He assumes that the positive sentence containing the phrase a drop may have a successful interpretation even in the exactly a drop-reading violating the principle of extremities.

³⁴I am thankful to Veneeta Dayal for providing me with the relevant examples and discussion on this matter. Isliye doubles the causal expression kyuNkii and seems to be some kind of a scope marker. In the wide scope reading of negation isliye is necessary.

³⁵It is important to keep in mind that an inch does not have its literal meaning as part of a polarity item. It rather means in combination with budge the property of moving the minimal distance.