Why *Even* Ask?
On the Pragmatics of Questions and the Semantics of Answers

by

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M.A. Philosophy
Università degli Studi di Milano
1997

Submitted to the Department of Linguistics and Philosophy
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy in Linguistics

at the

Massachusetts Institute of Technology

[September 2003]
July 2003

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Abstract

This work investigates the semantics-pragmatics and syntax-pragmatics interface of interrogatives, focusing on the effect of presupposition-triggering expressions like *even* and Negative Polarity Items (NPIs). In exploring these cases, I aim is to contribute new empirical evidence and theoretical insight pertinent to the general issue of how presuppositions project in interrogative environments.

Although the phenomenon of presuppositions has received considerable attention in previous work, very little is understood about how precisely presuppositions project in the domain of questions. My main goal is to establish what processes generate presuppositions in questions, starting from what we know about the semantics of questions and about the contribution of expressions introducing presuppositions in declaratives.

The strategy I pursue in this investigation consists in looking at cases where presuppositional material affects the interpretation of a question in ways that go beyond the mere introduction of a presupposition. *Even* and certain NPIs (so called 'minimizers') provide a rich and constrained testing ground in this sense, as they can be exploited to signal that a questioning act is meant to be *biased* towards a negative answer. This thesis argues that this otherwise puzzling property of questions with minimizers and *even* can be understood as a product of (i) the way the presuppositions of *even* project in a question and affect the question denotation; and (ii) the way general pragmatic principles governing what it means to ask a question regulate how the resulting denotation can be used by speakers in a given context.

More specifically I show that the anomalous properties of biased questions with *even* are the product of the presuppositions *even* introduces in their possible answers and the felicity of these answers in a given context. The general conclusion this result allows me to draw is that a theory of projection in questions must reduce their presuppositions to answerability conditions of a question in a context.

The theory of bias and presuppositions of questions developed in this thesis leads to a number of interesting implications regarding on the one hand *even* and its variants across languages and, on the other hand, the semantics and syntax of constituent questions.

Thesis Supervisor: Irene Heim
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Acknowledgments

There is no way I can even imagine having reached the completion of my graduate studies at MIT and of this dissertation in particular if it wasn't for the generous help I received from the people I will mention here. Their stimulating advice, support and friendship have made the entire experience of writing this thesis not only endurable but also often very pleasant and exiting.

First among all, I wish to thank the four members of my thesis committee: Irene Heim, Kai von Fintel Danny Fox and Utpal Lahiri.

Irene and Kai definitely made the deepest intellectual impact on my Graduate education ever since, back in my first year at MIT, I took their *Introduction to Semantics* class. Irene and Kai have been since then the most terrific teachers I have ever met. Their classes have been for me the most interesting, clear and engaging; the appointments with them the most fruitful. Both of them always had an extraordinary capacity to see through the most confused expositions of my ideas and helped me see how to develop them more explicitly and precisely, how to test their soundness, how evaluate their implications and how to convey them clearly, honestly and yet convincingly. Over these years, their advice has always been the most helpful and precious at every single stage of my work and their support the most encouraging.

I owe an enormous debt of gratitude to Irene for having been an incredibly generous advisor for the entire duration of my graduate studies at MIT. I can hardly start enumerating the reasons why I feel so extremely fortunate and privileged to be her student. Irene never missed an opportunity to find for me a word of encouragement. The sharp, careful, precise and extremely detailed comments on my research I received from her and her fair evaluation of my ideas have always been a fundamental source of motivation and help for improving my work and my teaching in every single respect. What Irene taught me goes well beyond formal semantics or even linguistics for that matter. Her incredible commitment to teaching, her loyalty to the field and to the scientific enterprise, her honesty, generosity, fairness and respect towards students and colleges will always be a model for me. I am happy to know that people like her exist, in this field and in general.

I am very lucky that also Kai has been advising me ever since he was a member of my generals papers committee. Like Irene, Kai never missed any of my practice conference and job talks, read just about everything I wrote and in all these occasions he had tremendously knowledgeable and insightful comments to offer. Talking to him helped me enormously to improve my work, my teaching, my writing, my presentational skills and many times even my mood. Kai also helped me see how important it is to be able to recognize and be confident in the contribution of my own work and still receive comments and criticisms in the most positive and constructive way. I am especially grateful to Kay for the incredible intellectual and emotional support he provided me with during my job search and my thesis writing.

Utpal's writing on questions and on Negative Polarity has been the greatest source of inspiration for this thesis. In the Spring of 2002, when Utpal was teaching here at MIT, I had the fortune to talk to him about my thoughts on rhetorical questions and minimizers. I feel much honored that he has been interested in my work since then and very glad that he accepted to be on

my thesis committee. Ever since, Utpal put at my disposal his incredible knowledge through his careful comments.
I am very lucky I had the opportunity to work with Danny Fox. Danny has always understood the gist of any of my ideas, located their contribution within a bigger picture, expressed intelligent criticisms and asked me the hardest questions. Talking to Danny also often forced me seeing things from perspectives I had not even imagined. While, at first, I found this exhausting and at times demoralizing, I soon realized how helpful it was for clarifying and organizing my own thoughts and my writing and for finding the courage, despite my own natural resistance to this, to entertain more radical and unconventional hypotheses. Our discussions have probably represented the most intellectually provoking and yet stimulating stages of this work.

A heart felt thank you to Gennaro Chierchia for eleven years of continuous encouragement, precious advice and generous friendship. Gennaro introduced to me the world of Linguistics in such a stimulating and exiting way to make it impossible for me to resist the temptation of wishing to become myself a linguist one day. In addition, without Gennaro's trust in my work I would probably not even dared to apply to the program. He made my intense and enriching experience at MIT possible by patiently helping me even with the tedious intricacies of the application process and by guiding me, yet without any pressure, in my decision to come to the US. Since then he never deprived me of his friendly and helpful support.

I am tremendously grateful to Morris Halle for accepting to help me with my phonology and morphology generals paper four years ago. Morris tried to patiently educate me, read an uncountable number of drafts of my paper, helped me improving each single one of them and supported my project with incredible enthusiasm. Each and every appointment with Morris gave me a boost of motivation, encouragement and optimism (besides phonology, of course). During nights like this one, very few things have kept me awake: A mug full of cold coffee, a smoking ashtray and Morris command on my mind: "Elena, don't give up!". Even if what he taught me didn't make it directly into this dissertation, if tomorrow this thesis is filed and I catch my flight it is for a good part due Morris.

Various people, besides my thesis committee, helped me with this work on *even* in question over the last two years.

What I learnt from Bernhard Schwarz about *even* and from Yael Sharvit about wh-questions has been of great help; thanks to both of them for the time they spent sharing with me their precious expertise in such complicated areas of semantics. Thanks also to Scott Shank for talking to me about his exiting discoveries about Samish *only*. This work also benefited a lot from occasional conversations with Rajesh Batt, David Beaver, Silvan Bormberger, Daniel Büring, Gennaro Chierchia, Noam Chomsky, Sabine Iatridou, William Ladusaw, Roumyana Pancheva, David Pesetsky, Norvin Richards, Yael Sharvit, and Barry Shein. My thanks also to Michelle De Graff, Michael Kenstowitz, Shigeru Miyagawa, Wayne O'Neil and Cheryl Zoll.

I heard that some people prefer to be left alone when they work and that some others work hard not to feel too lonely. I, myself, never knew how to live and work without my friends.

Among all, my first and deepest thanks go to my colleague, roommate, office mate and dearest friend Jon Gajewski. Thanks for the long linguistics discussions, for listening to all my practice talks and putting at my disposal your amazing linguistics knowledge and smart insight so many times. Thanks for patiently proof reading just about all my papers, most of my handouts and parts of this thesis and for the tantalizing amount of English judgments you gave me. Thanks for all the books and papers you ever lent me, and for those I borrowed without asking. Thanks for the dinners and the parties, for watching movies and Buffy with me, for our short walks in the snow and our long chats in the kitchen. Thanks for being there for me and putting up with me in the craziest occasions. Thanks for being the greatest colleague and the most pleasant and helpful roommate. Above everything else, thanks for being the most wonderful friend, Jon. I wish you a life full of happiness, love and success.

I feel very lucky to have been one of Ling '98 and have classmates like Cristina Cuervo, Jessie Little Doe Fermino, Daniel Harbour, Shin Ishihara, Zhiqiang Li, Tatjana Marvin, Ora Matushansky, Olga Vaysman, who all have been there for me in many ways since my very first day of Graduate School. Special thanks to Crisitina and Tatjana for being such incredible and fun friends and to Olga and Shin for being, in addition, my patient and supportive officemates for three long years. All the best luck for your future.

Many, many thanks to my new friend Yael Sharvit. I already mentioned her name above, but I want to mention her again among my friends. One day, back in November, when she asked me to work together on a paper she created the occasion for what has become for me a very important friendship. Hanging out with Yael has been always an incredibly pleasant, educating and fun experience. I'd also like to thank her because she has been patient and understanding with me beyond any stretch of imagination, when, too many times, I had to leave our project on the side; and because her enthusiasm for semantics gave me the strength to keep up with my work an uncountable amount of times.

A big thank you to my good friend from UMass Luis Alonso Ovalle for the fun time spent together writing our paper and for his positive attitude and always encouraging words, to Diana Cresti for having been an endless source of valuable advice, fun and Buffy episodes, to Ivano Caponigro, Luisa Meroni and Andrea Gualmini for keeping me company with their friendly e-mails and to Marco Nicolis also for keeping me smiling with his humoristic ones.

I am grateful also to all my previous and current roommates in the 'linguistics apartment': Rajesh Batt, Aniko Csirmaz, Franny Hshiao, Meltem Kelepir, Cornelia Krause, Shogo Suzuki, Lisa Matthewson, and Marchelo Ferreira.

I am very happy that I had the chance to meet and become friends with the 'ex-lingfamily' as well. Jonathan Bobaljik, Susi Wourmbrand, Uli Sauerland, Kazuko Iatzushiro Kai and Lina are amazing people. Thanks to all six of them for the very nice time together.

Thanks to all fellow students, visitors and friends I met in the department of Linguistics. Especially I'd like to thank Calixto Agüero-Bautista, Carlos Arregui, Bridget Copley, Michela

Ippolito, John Nissenbaum, Joey Sabbagh, Gianluca Storto, Michael Wagner. Thanks also to Ling'01 for transforming my TAing obligation in such a pleasant experience.

Thanks to Jen Purdy, Mary Graham and Dan Giblin, who, back in the head quarters pulled the administrative strings of the department and kept it always standing and in a good mood. Thanks to Chris Naylor for rescuing my work from the flames of my fancy i-body in more than one occasion.

If this acknowledgements will ever make it all the way to the other side of the Ocean, I want my friends Chiara, Cinzia and Andrea Tettamanzi to know how grateful I am that, despite the distance, they made me part of their lives and always made a big effort to keep being part of mine as well.

My loving gratitude to the four strongest women I ever met: my grandmother Luigi, my sister Maria, her little daughter 'la Tatina' and my mother. Thanks to my grandmother Luigi for having always been my most supporting fan; to my sister for never missing the opportunity to express encouragement, trust and love; and to la Tatina for the happiness she brought in our lives.

My gratitude, admiration and love for my mother go far beyond what words can convey. Despite how harsh life has been to her, she never, ever quit taking the best imaginable care of me and the rest of our family for the last 16 years. I cannot even imagine how scary and miserable life could have been if I had to grow up without your warm love, your ability to understand me and to be close to me, your wisdom, your irony and without you reminding me to put things into perspective. I would certainly not have survived the last 5 years without you being there to remind me that there is much more than linguistics in my life.

My deepest love and gratitude belong without any doubt to Martin Hackl who has been my mentor, my coach and my home for 4 years, 8 months and 2 days of my life. Behind his humble and shy attitude, Martin hides the gist of a unique intelligence, a genuine curiosity for about everything that falls under his eyes and an incredible talent for science, but most importantly the most generous and true heart. Thank you Martin for holding my hand and guiding me through every time it was dark, scary, painful and lonely; for always finding a way to make me smile; for accepting, trusting and forgiving me; for having let me into your life. Getting to know has been a rare privilege, being with you is the most precious gift I ever received.

Many people I know who wrote a dissertation tell me that when they started they would not dare to believe they would ever finish. Many who haven't yet, tell me they think it is impossible for them to even start. I belonged to both categories and I am sometimes still incredulous. This is why I'd like to dedicate this thesis to my little niece Tatina. Her survival is what made me believe in miracles.

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Chapter 1

Presuppositions and Questions

The aim of this work is to contribute new empirical evidence and theoretical insight pertinent to the general issue of how presuppositions project in interrogative environments. An understanding of the effects of presuppositions in questions is crucially contingent on an understanding of the semantics and pragmatics of questions, on the one hand, and of those linguistic phenomena that involve presuppositions on the other. This thesis does not attempt to provide an extensive review and discussion of all that has been proposed in these two areas. Instead, some assumptions regarding questions and presuppositions will be made and motivated on very general grounds to provide a frame for the discussion of the empirical phenomena the thesis is concerned with.

In the first part of this chapter (sections 1.1-1.4), I introduce these assumptions partly justifying my choices from the perspective of a truth-conditional view of meaning, and partly on the basis of expository purposes. Further empirical motivation for the choices made here as opposed to some of the alternative views on questions and presuppositions will come from exploring the effects of presupposition in questions in the following chapters. When the occasion presents itself, a more detailed comparison between the frameworks adopted here and others will be provided.

In the second part of the chapter (section 1.5) I show that the theories of questions and of presuppositions introduced in the first part narrow down the possible analyses of presupposition projection in question to two types of approaches. For reason that will be clarified there I will refer to them as Question-basedand Answer-basedApproach.

The chapter is structured as follows. We start by pointing out how both presuppositions and interrogatives at first present a challenge to a compositional and truth-conditional view of meaning. We then review what type of proposals have been made in order to provide an understanding of these two aspects of natural language without giving up the main principles of the truth-conditional approach. Finally I will indicate which of these proposals will be adopted in the coming discussion on presuppositions in questions.

1.1 Two Challenges for Truth-Conditional Perspectives on Meaning

One of the main goals of the study of meaning in natural language is to come to an understanding of how the meaning of expressions that a sentence contains contributes to what the whole sentence conveys. One of the most influential and successful approaches is based on the *Fregean* principle stating that the meaning of complex linguistic expressions is fully determined by the meaning of their immediate parts and the way they are combined in the syntax (*Principle of Compositionality*). This view has proven to be extremely insightful in that, together with an explicit theory of syntax, it constrains in a principled way our working hypotheses concerning the structural properties of complex expressions and syntactic operations that generate them, the types of corresponding semantic operations and the types of the semantic objects we can attribute to simple and complex expressions in all natural languages.

An important feature of most compositional approaches to meaning is the view that when we understand what a sentence of natural language conveys, we are capable to judge how the world should look like for the sentence to be true or false, i.e. we can understand its truth-conditions, without being trained to judge the truth of that sentence in each possible situation (see Larson&Segal 1995 Heim&Kratzer 1998 and Chierchia&McConnell Ginet 2000 for discussion). Within an approach to meaning that is both compositional and truth-conditional, determining the meaning of single expressions boils down to establishing their systematic contribution to the truth conditions of the sentences in which they can appear in the most general way. Moreover, understanding how the meaning of bigger units is generated involves an understanding of which modes of semantic composition correspond to syntactic operations generating these units.

At least two types of considerations have challenged this view since its very origins in Frege's work (cf. Frege 1891). The first challenge comes from the existence of types of utterances other than declaratives. How could one maintain that the meaning of expressions is their contribution to truth-conditions, when these same expressions obviously have the same meaning in, for instance, interrogatives or exclamations, for which it seems to make no sense to even ask whether they are true or false?

The second challenge was presented by the existence of expressions and constructions that seem to somehow contribute to what a sentence conveys in ways that do not (only) affect its truth-conditions in a fully compositional way. On the face of it, the existence of such expressions undermines a truth-conditional theory of meaning as well as the principle of compositionality: there seems to be more to the meaning of a sentence's components than their contribution to its truth-conditions, and therefore more to the meaning of that sentence as a whole than its truth-conditions. In addition, the latter non-truth-conditional aspects of a sentence's meaning emerge in ways that are not completely compositional. Let's consider these two challenges in turn, starting with the latter.

1.2 Logical Presuppositions and Partiality: Extending the Fregean Analysis

By studying meaning under a truth-conditional perspective, it became immediately clear that we need to distinguish different components of what we think, intuitively, a sentence conveys (i.e. truth-conditions, presuppositions and implicatures), because sometimes part of what seems to be conveyed appears to somehow escape the Fregean principle. Notorious examples of expressions whose contribution is not merely truth-conditional are definite determiners, predicates like *quit, fail, manage,* focus particles like *only,* and syntactic configurations like it-clefts in English (see Soames 1989, for a more exhaustive list of relevant expressions and constructions). Consider, as an illustration, the case of the English predicate *quit.* The meaning of this predicate appears to involve two components: one which interacts in a fully compositional way with the other expressions in the sentence (e.g. negation) to determine its truth-conditions, another one that does not:

(1) *Mary has quit smoking* ≈ Mary used to smoke and she does not smoke right now[1]

(2) *Mary hasn't quit smoking* ≈ Mary used to smoke and she does smoke right now

[1] "≈" can be read as "conveys."

The only difference between the two sentences (1) and (2) is the presence vs. absence of negation. Assuming that negation has sentential scope and its meaning reverses truth-values. Then, according to the principle of compositionality, we would expect (2) to be the negation of everything that (1) conveys. It turns out that this is not the case: part of what (1) seems to convey is, in fact, NOT negated but rather conveyed in (2) as well, i.e. *that Mary used to smoke.* Furthermore, speakers of English share the intuition that in sentences like (1), this latter component is actually not straightforwardly asserted but rather presented by the speaker as taken for granted.

Similarly, Frege, contra Russell, argues that the existential and uniqueness component of the meaning of definite descriptions is not part of the assertion, as they do not get negated in negative sentences:

(3) a. The king of France is bald

b. The king of France isn't bald.

That there is a unique king of France is an information that is presented as taken for granted by the speaker, rather than being part of the asserted proposition.

Expressions like *even, as well, also, too* (so called 'additive' focus particles) challenge a truth-conditional view on meaning even more radically. This is so because these particles do not seem to contribute to the truth-conditions at all, although speakers share the intuition that their presence in a sentence makes a clear difference in what is conveyed. Let me illustrate this point with an example containing *even.* Compare (4)a and (4)b. On the one hand, a speaker uttering (4)a, but not (4)b, appears to also be committed to the truth of something like (6). On the other hand, both linguists and philosophers (c.f. most notably Stalnaker 1974 and Karttunen&Peters 1979) have suggested that the contribution of *even* (e.g., (6) in our example) is not part of the truth-conditions of the hosting sentence at all but is presented as background uncontroversial information.

(4) a. Even Mary came to the party

b. Mary came to the party.

(5) truth-conditions: (4)a and (4)b are true iff Mary came to the party.

(6) There is somebody other than Mary that came to the party

Among all the relevant people Mary was the least likely to come.

Once it was established that there are clear cases of expressions whose semantic import is not (only) truth-conditional, two questions emerged: What precisely is the nature of this import and how we can maintain, against this apparent piece of counterevidence, that something like the principle of compositionality FULLY determines the way meaning is expressed and interpreted in natural language.

Frege's take regarding the first question (further elaborated in work by Strawson, Karttunen, Gazdar and Stalnaker and many others) was already that there are at least two components to what a sentence coveys: **assertion and presuppositions**. Understanding the assertion amounts to the ability of determining what it takes for the sentence to be true or false (our old truth-conditions); the presuppositions of a sentence are distinct from what is asserted in that they are instead, conditions that must be satisfied in a given state of affairs for that sentence to be attributed a denotation at all (as Frege has it) or conditions that must be satisfied in the utterance context for the utterance of a sentence to be felicitous (cf. Austin 1962). [2]

In addressing the second question, it's important to keep in mind that, although non-truth-conditional, the import of at least some presupposition-triggers (such as e.g. *even*) is sensitive to the (truth-conditional) meaning of the other elements in the sentence and to its structural properties (scope relations and focus structure), in ways that invite a compositional treatment for the contribution of this expressions as well (see Karttunen&Peters 1979, Rooth 1985). [3] Therefore, particles like *even* seem to teach us that sometimes compositionality extends beyond the mere truth-conditional component of meanings, and, furthermore, that similar operations that derive truth-conditions combine the import of such expressions with the truth-conditional meaning of portions of the sentence that are in their scope and in their focus. Given this, answering the questions above requires that our understanding of the nature of the import of

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[2] Stalnaker further clarifies the notion of felicity conditions with respect to a context and its relation with definedness conditions in a world. This issue is addressed in section 1.3.

[3] For example, if instead of *Mary, even* was associated with *party,* by intonational prominence of this word or by structural contiguity to it, what the resulting sentence would imply would be very different from (5).

these words involves compositionality and even a systematic relation with the notion of truth-conditions.

There is at least one approach to presuppositions (Logical Presuppositions) that places this relation in the lexical meaning of the expressions that trigger presuppositions in a very straightforward way. This approach finds its origins in Frege's semantics of definite determiners (formally further developed in much work since then) according to which the connection between truth-conditions and definedness conditions is transparently established by introducing the possibility of partial (truth-conditional) meanings. The core insight of this type of analysis is that the presuppositions imposed by definite determiners can be treated as definedness conditions they impose on the derivability of truth-conditions of the hosting sentence. An explicit execution of this idea can be given in form of the lexical entry in (7). [4]

(7) $[\![\textit{The}]\!] = \lambda p_{<et>}$: there is exactly one $x \in C$ such that $p(x) = 1$. the unique $y \in C$ s.t. $f(y)=1$
where C is a contextually salient subset of D_e. (H&K 1998, p.81)

Let us see how a partial meaning of this kind can help accounting for the above mentioned presuppositions of sentences containing a definite. The first step towards this goal is to make sure that the definedness conditions in the lexical entry above project so as to become definedness conditions of the whole sentence. Heim&Kratzer's (1998) propose the semantic composition rule of functional application (FA), given below, which is crafted for this very purpose:

(8) FA: If α is a branching node and $\{\beta, \gamma\}$ is the set of its daughters then α is in the domain of $[\![\ ]\!]$ iff β and γ are in the domain of $[\![\ ]\!]$, and $[\![\gamma]\!]$ is in the domain of $[\![\beta]\!]$ or $[\![\beta]\!]$ is in the domain of $[\![\gamma]\!]$.
If defined, $[\![\alpha]\!] = [\![\beta]\!]([\![\gamma]\!])$ or $[\![\alpha]\!] = [\![\gamma]\!]([\![\beta]\!])$ (H&K 1998 p. 76)

[4] The lexical entry in (7) above is sufficient for a treatment of Logical Presupposition in a purely extensional system. When intensionality is added to the system the intension of a definite description should look as follows:
(i) $[\![\textit{The king of France}]\!]^{¢} = \lambda w: \exists!\, x$ s.t. $[\lambda w'. [\![\textit{king of France}]\!]^{w'}]\,(w)=1$. ιx s.t. $[\![\textit{king of France}]\!]^{w}(x)=1$
Where $[\![\ ]\!]^{¢}$ is a function from object language expressions to their intension.
The way the partiality of this denotation ultimately expresses felicity conditions on the context of utterance will be clarified in the next subsection.

In order to see how this analysis works consider the two sentences in (9).

(9) a. The staircase in the department is dirty.

b. The staircase in the department isn't dirty

c. **Presupposition of a and b:** There is a unique staircase in the department.

Native speakers of English share the intuition that an utterance of (9)a and (9)b (under unmarked intonation) is infelicitous in a context where (9)c is false. The above approach captures this intuition in a fully compositional fashion by imposing that the existence of a unique (contextually salient) individual satisfying the predicate in the definite description (*staircase in the department,* in our example) is a condition that needs to be satisfied for each constituent containing this description to have a denotation and therefore for the whole sentence to be attributed a truth value (i.e. a denotation) at all. Given this, when the presupposition fails to be true the sentence is meaningless and therefore infelicitous.

Notice that partiality is a property of semantic values; therefore viewing presuppositions as a product of partial lexical entries amounts essentially to viewing them as a semantic phenomenon (hence the terms 'logical presupposition' and 'semantic presupposition').

Conclusions

In this section I introduced the semantic approach to presuppositions of definite descriptions proposed in Frege (1891). Although far from uncontroversial (cf. Stalnaker 1974-99 Gazdar 1979 and Soames 1989), the semantic approach to presuppositions is appealing in at least two related and important respects. Encoding presuppositional import as part of the definition of the lexical import of words like *the,* allows us to maintain both compositionality and a truth-conditional approach to meaning.

The semantic approach is compatible with a truth-conditional view of meaning because expressions introducing semantic presuppositions contribute, although indirectly, to the truth-conditions of a sentence by introducing further conditions that determine whether we can derive these truth-conditions at all. It preserves compositionality because definedness conditions are computed in a fully compositional way. This latter aspect of the analysis will prove to be crucial when we will turn our attention to the effect of *even* in questions.

It is worth at this point to step back and establish how far we have gotten in accounting for the speaker's intuition about sentences containing a definite description or some other presupposition trigger. These intuitions are always relative to a conversational context and boil down to the following: an utterance of a sentence in a context where its presupposition is false sounds awkward. Notice that the semantic approach, as presented so far, derives only undefinedness of the sentence in a state of affairs where the presupposition is false (see ft. note 6), but no reference is made to a conversational context. Therefore what still needs to be clarified, in order to account for the intuition described above, is the relation between definedness conditions with respect to a world and the conditions a context has to satisfy in order for a sentence containing a presupposition trigger to be uttered felicitously in that context. This ultimately amounts to establishing a connection between possible worlds and conversational context. Stalnaker's (1974) formal definition of conversational context introduced in the next section allows us to draw this connection.

1.3 Pragmatic Presupposition, Context Set and the Bridge Principle.

Stalnaker (1974) offers a notion of context that allows us to establish a direct relation between definedness in a world and felicity in a context. The intuition behind this notion is that a conversational context can be viewed as a state of affairs where the participants to the conversation cannot precisely identify the actual world among possible alternatives to it, but share a number of assumptions regarding it, which restrict the possible options to only those where these assumptions are true. According this view, the context can be defined as that set of possible worlds (the 'context set') in which all the propositions that are taken to be true by the participants of the conversation (i.e. the Common Ground) are true.

In the picture Stalnaker offers both meaning and presuppositions are viewed as related to the conversational context. First, Stalnaker identifies the meaning of sentences with their contribution to the already existing conversational record.. Specifically, each utterance, if compatible with the Common Ground, increases it with the addition of the proposition it expresses. As an effect of this, the context set is reduced to the set of possible worlds in which that proposition is true. Technically, this operation is one of intersecting the context set c with the newly conveyed proposition. However, since the latter can be a partial proposition, instead of regular intersection, one needs to introduce the operator +, defined as shown below (cf. Heim 1982):

(10) For every set of worlds set c and every, possibly partial proposition p,

$c + p = c \cap p$ if p is defined in every world in c, undefined otherwise.

The meaning of a sentence is then defined on the basis of its effect on c, along the following lines:

(11) The speaker utters S.

S denotes p.

p is not controversial (i.e. $c + p \neq \varnothing$)

p provides new information (i.e. $c + p \neq c$)

==> A new context set : $c' = c + p$

Second, presuppositions are taken to be the propositions that are taken for granted by the participants to the conversation, and therefore true in every world in the context set (Pragmatic Presupposition). A sentence S that presents a certain proposition p as uncontroversial or taken for granted by all the participants of the conversation, is therefore subject to specific felicity conditions: only in contexts where p is in fact part of the CG, i.e. true in all the worlds in the context set, is an utterance of S felicitous.

Although this system does not identify presuppositions with logical presuppositions, partiality is taken to be one way the speaker can signal what (s)he is taking for granted. Specifically Stalnaker proposes that the relation between definedness conditions with respect to a possible world and felicity conditions with respect to a set of worlds is as established by the following principle (this formulation is Soames 1989, p.581):

(12) Bridge Principle If S logically presupposes *P* relative to a context C, then an utterance of S in C pragmatically requires that the conversational background entails *P*.

In other words, a sentence that receives a denotation only in worlds where a certain proposition q is true, is felicitous only when q is true in every world of the relevant context set.

Let me illustrate with an example how precisely, according to Stalnaker's approach, partial meanings do indeed generate pragmatic presuppositions. Consider the following sentence:

(13) Mary brought the cake

Given what we saw above, the intention of *the cake* is the following. (The notation $[\![\ ]\!]^{\not c}$ indicates a function from expressions of the object language to propositions):

(14) $[\![\textit{The cake}]\!]^{\not c} = \lambda w\!: \exists!\, x \text{ s.t. } [\lambda w'.\ [\![\textit{cake}]\!]^{w'}]\,(w)=1\ .\ \iota x \text{ s.t. } [\![\textit{cake}]\!]^{w}(x)=1$

Thus, (13) expresses the following partial proposition:

(15) $\lambda w\!: \exists!\, x \text{ s.t. } [\lambda w'.\ [\![\textit{cake}]\!]^{w'}]\,(w)=1$. Mary brought in w the unique cake in w.

Now suppose that one of the participants of a conversation utters (13) at a stage of the conversation in which the Common Ground contains the information that there is just one salient cake. In this case the context set c will have the following property:

(16) $c \subseteq \lambda w.\ \exists!\, x \text{ s.t. } [\lambda w'.\ [\![\textit{cake}]\!]^{w'}]\,(w)=1$

This means that in all the worlds in c the logical presupposition of the sentence is satisfied and therefore the sentence is felicitous because the context satisfies what it pragmatically requires to be felicitous, according to the bridge principle.

What if c does not entail the information that there is just one cake?

(17) $c \not\subseteq \lambda w.\ \exists!\, x \text{ s.t. } [\lambda w'.\ [\![\textit{cake}]\!]^{w'}]\,(w)=1$

This happens when the definedness condition of the sentence is true only in some of the worlds in c or when it is false in all. According to the above principle, though, the sentence under consideration is infelicitous in both cases.

Sometimes, however, a speaker might exploit a presupposition to convey new information, i.e. information that is compatible with but not entailed by what is already taken for granted. For example, even if the participants of a conversation are not aware of the marital status of the speaker, he can still utter the following sentence:

(18) My wife is always late.

By doing so the speaker achieves the goal of informing his interlocutors that he has a wife, without explicitly saying so. The possibility of using presuppositional expressions for the purpose of conveying new information relies on a process called **accommodation** that can be characterized within this framework in the following way. If sentence is uttered that signals that the speaker takes a certain proposition p for granted, in a context where actually it is not (i.e. $c \not\subseteq p$) but it is incompatible with the commonly shared information (i.e. $c \cap p \neq \emptyset$) and none of the addresses has objections against p being added to the CG, then the context set c is first updated with p (p is added to the CG) and then the sentence in question is evaluated with respect to the new context set resulting from this operation.

In light of the possibility of accommodation, the above generalizations regarding sentences like (13) need to be better qualified: if the sentence is evaluated with respect to a context set that entails its definedness condition, the sentence is felicitous, if not, then the sentence is infelicitous, unless accommodation is possible.

Stalnaker's Bridge Principle above, so named as it links a semantic property of propositions (i.e. partiality) to a pragmatic aspect of sentences expressing them, builds on the following rational. When sentence is defined in all the worlds in c, it is possible to divide up c into two sets, the set containing the words where the sentence is true, which are retained, and the set containing those where it is false, which are then excluded from the resulting context set c'. Since narrowing c down is precisely the function of an utterance of a declarative sentence, the sentence is felicitous. In a case where a sentence is not defined in all the worlds in c, the above bipartition is not possible because while the participants to the conversation will know what to do with the worlds in c, where the sentence is either true or false, i.e. retain the ones where it is true and exclude those in which it's false, they will not know what to do with the worlds where the sentence lacks a truth value.[5] As a consequence, Stalnaker claims, the process of context updating gets stuck

In the following chapters, which focus on presuppositions of *even* in questions, I will adopt Stalnaker's view on presuppositions. Moreover, in the absence of evidence to the contrary, I will also assume that *even* has a partial meaning and that it induces a pragmatic presupposition as prescribed by the Bridge Principle in (12).

1.4 The Meaning of Questions: Answerhood Conditions

We can now turn to our second challenge for a truth-conditional view of semantics. As mentioned above, the notion of truth-conditions is not suitable for all the types of utterances to begin with. Questions and exclamations are simply neither true nor false, and still we would like to describe their meaning in terms of their structural properties and the expressions they involve. The motivation for this latter requirement is not just a theoretical matter, but also, and more importantly, an empirical one. In fact, if a speaker understands the meaning of both (20)a and (20)b and of (19)a he also automatically understand (19)b.

(19) a. Is Mary blond?
     b. Is Mary blond and tall?

(20) a. Mary is blond.
     b. Mary is blond and tall.

Given this, a criterion of adequacy for a semantic theory of questions is that it should be able to explain differences like the above in the same terms in the two cases (thus ultimately in terms of

[5] According to Stalnaker, this rational confers conceptual necessity to the Bridge Principle. Soames (1989), however, points out that the kind of motivation one can find for the bridge principle is only empirical and not conceptual, contrary to what Stalnaker assumes. We could in fact imagine that language worked differently, and, e.g., that when a sentence is uttered that denoted a partial proposition, we would just eliminate all the worlds in the context set where the sentence is not true (i.e. either false or undefined) or all those worlds where the sentence is false (thus keeping the worlds where it is either true or undefined). Language does not work like this, but it could very well work this way, as there is nothing conceptually wrong about any of these two options.

the difference between the import *blond* and of *blond and tall*).

Thus a semantic analysis of questions needs to achieve at least the two following goals: first it needs to establish what kind of objects (if not truth-conditions) questions denote, second it needs to derive this denotation compositionally from the semantic import that the expressions in a question can have in general, i.e. in all the kinds of utterances they can occur in.

Insofar as the same expression should make the same contribution to the meaning of a declarative and of a question, if we endorse the Fregean view on meaning, then we are committed to assume that expressions contribute to questions their typical truth-conditional import in declaratives. But how can smaller expression contribute their truth-conditional import to the meaning of questions, which are neither true nor false?

One way to solve this problem is by viewing the meaning of questions as a function of the meaning of declarative linguistic entities semantically related to them: their answers. Two main currents of thought regarding the semantics of questions (the Hamblin and Karttunen tradition (H/K, henceforth) and the more recent tradition started by Groenendijk and Stokhof (G&S)) build precisely on this hypothesis. Let's briefly consider these two approaches in turn.

1.4.1 Questions as Sets of Propositions: Hamblin & Karttunen (H/K)

The main intuition behind H/K's approach is that what characterizes the meaning of a question are the conditions that would make a reply to that question a semantically adequate answer to it, i.e. its Answerhood Conditions. H/K's semantics of questions encodes straightforwardly the correlation between Answerhood Conditions and the notion of truth-conditions: an interrogative denotes the set of propositions that represent its possible answers.[6] Since the elements in this set are propositions, i.e. truth-conditions, those elements are determined in a fully compositional

[6] Unlike Hamblin (1973), Karttunen (1977) actually proposes that the denotation of a question in a world is a smaller set, i.e. the set of its TRUE answers in that world. This difference however is not substantial as it is possible to systematically derive, from a Karttunen set a Hamblin set, containing all the possible partial answers (besides the empty set), and vice versa, from a Hamblin denotation we can always determine the true answers at a given index (as first pointed out in Groenendijk & Stokhof 1984, Ch1 ft. 38, cf. also Berman 1991, Lahiri 1991 and Rullmann & Beck 2000). Following a very common practice, in this work I will assume an analysis of questions that shares properties of both systems. On the one hand I will adopt Karttunen's assumptions regarding the structural properties of questions and the way a question denotation is derived from its structure. I will however depart from Karttunen's, and follow Hamblin, in taking the denotation of a question to be the set of all possible partial answers, rather than just the true ones, for reasons that will become clear in ch.2.

fashion on the basis of the truth-conditional import of the expressions the question contains and the way they are combined in the syntax.

Specifically in Karttunen's system the meaning of a part of the structure of an interrogative has the same semantic type of the meaning of a declarative, i.e. a proposition. What allows the system to get from propositions to question denotations (i.e. sets thereof) is the additional assumption that questions, as opposed to declaratives, contain in their complementizer position a silent question morpheme (here referred to as *?*) whose semantic function is precisely to allow this transition. Let's see how.

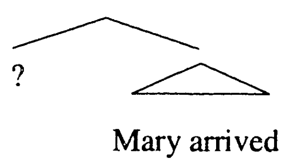
Here I will illustrate Heim's (1994) rendition of Karttunen's analysis (cf. also Heim & von Fintel 2000 and Heim 2001).[7] Reinterpreting Karttunen's insight within Heim and Kratzer's compositional system, Heim takes the ?-morpheme to denote a function that takes a proposition (i.e. functions of type type <s,t>) and returns the singleton set containing that proposition (or, equivalently the characteristic function of this set, whose type is type <st,t>).

(21) a. $[\![?]\!] = \lambda p.\{p\}$

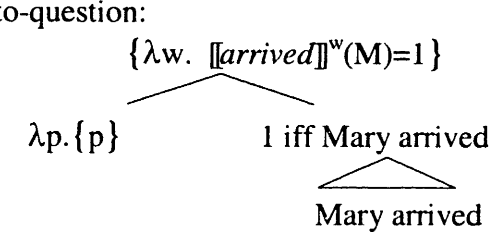
Given this, the constituent headed by the ?-morpheme (also called 'proto-question' after Karttunen 1977) will always denote a singleton, as illustrated in (22):

(22) a. Did Mary arrive?

b. Proto-question:



c. Interpreted LF of the proto-question:



[7] C.f. also Bittner (1994) and Dayal (1996) for variants of Karttunen's semantics of questions.

Notice that in (22)c the meaning of the ?-morpheme, a function of type <st,<st,t>>, is combined with an argument of type t. Given this, the compositional rule that applies in this case is Intentional Function Application (IFA), defined Heim and Kratzer (1998) and reported in (23):

(23) Intensional Function Application (IFA):

If α is a branching node and $\{\beta, \gamma\}$ the set of its daughters then for any possible world w and assignment function g, if $[\![\beta]\!]^{w,g}$ is a function whose domain contains $\lambda w'.\ [\![\gamma]\!]^{w',g}$, then $[\![\alpha]\!]^{w,g} = [\![\beta]\!]^{w,g}(\lambda w'.\ [\![\gamma]\!]^{w',g})$ (Heim&Kratzer 1998, p.308)

Now, how do we get from a singleton to a set of all possible alternative answers to the question? In the case of a y/n question the formation of a set of alternatives is due to the presence of a (possibly silent) *whether,* whose denotation is a function that takes the singleton set $\{p\}$ as an argument and transforms it into the set containing the same proposition AND its negation:

(24) a. $[\![$ *whether (or not)* $]\!] = \lambda Q_{<st,t>}.\ \{$ p: p $\in$ Q or ~p $\in$ Q$\}$ (for every p, ~p = λw. p(w) = 0)

(25) a. Did Mary Arrive?

b. $[\![$ *whether (or not) Mary arrived* $]\!] = [\![$ *Did Mary arrive?* $]\!]$

The result of applying the meaning of *whether* to the above singleton set is the set of possible answers to the question. i.e. the propositions *that Mary arrived* and *that Mary didn't arrive*:

(26)

$\{\lambda w.\ [\![arrived]\!]^{w}(M)=1,\ \lambda w.\ [\![arrived]\!]^{w}(M)=0\}$

$\lambda Q_{<st,t>}.\ \{$ p: p $\in$ Q or ~p $\in$ Q$\}$ $\quad$ $\{\lambda w.\ [\![arrived]\!]^{w}(M)=1\}$

$\lambda p.\{p\}$ $\quad$ 1 iff Mary arrived

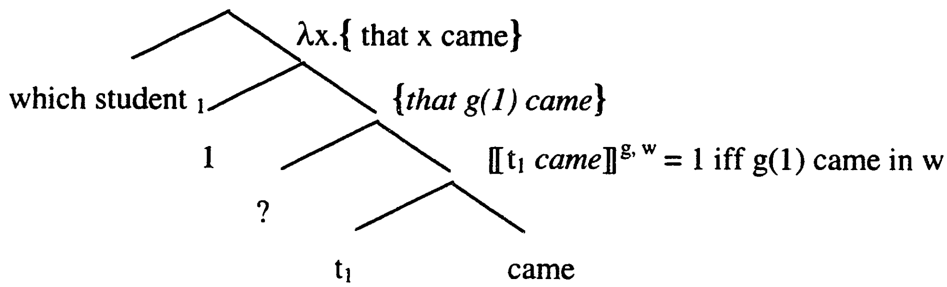
Mary arrived

Other *wh*-phrases different from *whether*, are instead analyzed as question existential quantifiers, as shown in (27)b and c, that move above ? and are then 'quantified' into the singleton set containing an 'open proposition.'[8] The result of this quantification is a set of possible answers as shown in (27)d:[9,10]

(27) a. $[\![\textit{who}]\!] = \lambda Q_{<e,<st,t>>}. \{ p: \exists x\, [\text{student}(x)\ \&\ p \in Q(x)] \}$

b. $[\![\textit{which student}]\!] = \lambda Q_{<e,<st,t>>}. \{ p: \exists x\, [\text{student}(x)\ \&\ p \in Q(x)] \}$

c. $\{p: \exists y\, [\text{student}(y)\ \&\ p \in [\lambda x.\{\text{that } x \text{ came}\}](y)\} = \{p: \exists y[\text{student}(y)\ \&\ p = \text{that } y \text{ came}]\}$



The above set contains propositions of the form *That Mary came, That Bill came, etc....* These propositions are possible answers to the question. Notice, though, that each one of these propositions that is true in a given state of affairs doesn't per se constitute a completely satisfying answer to the question in that state of affairs. In fact, a speaker that utters *which student came* will be satisfied only by a complete list of students that came (**complete true answer**). Uttering a sentence that expresses just one of the true propositions in the set above is providing only part of the information requested by the questioner. Given this I will refer to the elements of H/K denotation as **instantial answers.** Once the set of all instantial answers is provided, the notion of complete true answer can easily be defined as the conjunction of the **true**

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[8] Karttunen originally proposed that wh-words denote ordinary existential quantifiers (type <et,t>):

(i) $[\![\textit{who}]\!] = \lambda Q_{<e,t>}. \exists x\, [\text{person}(x)\ \&\ Q(x)=1$

These quantifiers combine with their argument via the rule of wh-quantification given in (ii)

(ii) <u>Wh-quantifying Rule:</u>

For every world w and assignment function g

If α has daughters β and γ, then for every world w and assignment g if $[\![\beta]\!]^{w,g}$ is of type <<e,t> t> and $[\![\gamma]\!]^{w,g}$ is of type <e,<st,t>>, then $[\![\alpha]\!]^{w,g} = \{p: [\![\beta]\!]^{w,g} (\lambda x_e.\ p \in [\![\gamma]\!]^{w,g}(x))=1\}$

This definition of Karttunen's rule original was provided in Heim ad von Fintel (2001).

[9] For time being I am ignoring the issue of *de dicto/de re ambiguities*. The above simplified analyses, in fact, derives only the *de re* reading of the question under consideration. I will return to *de dicto* readings in Ch3.

[10] The motivation for dividing the labor of creating the semantic object of an adequate type (i.e. a set of propositions) on the one hand and of quantifying into this set to generate alternative propositions on the other, becomes clear when multiple wh-questions come into the picture (see Karttunen 1997 and Heim 2000).

instantial answers.

We can now return to our examples in (19) and (20) and see how H/K-system achieves our desideratum. The H/K denotation of our question in (19)a is the set in (28), while the denotation of (19)b is the set in (29). The difference between the two sets is a difference between their members, which ultimately depends, as desired, on the truth-conditional difference between *blond* and *blond and tall:*

(28) $\{p : p = \lambda w.\ [\![\textit{blond}]\!]^{w}(M) = 1 \text{ or } p = \lambda w.\ [\![\textit{blond}]\!]^{w}(M) = 0\}$

(29) $\{p : p = \lambda w.\ [\![\textit{blond and tall}]\!]^{w}(M) = 1 \text{ or } p = \lambda w.\ [\![\textit{blond and tall}]\!]^{w}(M) = 0\}$

Thus, by taking very seriously the idea that the very property of the meaning of a question is to provide a set of alternative answers, H/K's semantics of questions allows us to maintain the two abovementioned corner stones of truth-conditional theories of semantics: compositionality and the view that meaning is ultimately definable in terms of truth-conditions.

1.4.2 Questions as Partitions: G&S's Semantics

The main difference between H/K and Groenendijk and Stokhof's (G&S) semantics of question lies on what notion of answer is taken to be primitive: in K/H **instantial possible answer** is the primitive notion and **complete true answer** is a derived one; G&S build their system by taking as primitive the latter notion of answer.

Specifically, in G&S's view (the intension of) a question uniquely identifies a partition of the set of all (contextually relevant) possible worlds into equivalence classes with respect to what is being questioned. Each of these sets of worlds is the proposition corresponding to a possible complete answer to the question. The extension of a question in a given world, e.g the actual world, is the one class of worlds among them that contains that world, i.e. the true complete answer in that world.

For example, the intension of a constituent question like *Who came?* is a partition of W into classes each containing all and only those worlds that are equivalent with each other with respect to the extension of the predicate *come.* This partition is the same as the partition in classes where each class is a complete possible answer to the question:

(30) *Who came?*

{w: ⟦*came* ⟧^{w} = ∅}
{w: ⟦*came* ⟧^{w} = {Bill}}
{w: ⟦*came* ⟧^{w} = {Bill, Sue}}
{w: ⟦*came* ⟧^{w} = {Bill, Sue, Mary}}
...
{w: ⟦ *came* ⟧^{w} ⊆ { x: :x is a person} }

W

=

That nobody came
That Bill and nobody else came
That Bill and Sue and no one else came
That Bill, Sue, Mary and no one else came
...
Everybody came

W

A polar question like *Did Mary come?* partitions the set of worlds so that two worlds are in the same cell iff in those worlds the proposition *that Mary came* has the same truth value, thus two cells are created one being the proposition *that Mary came* and the other cell being the set of worlds corresponding to the proposition *that Mary didn't come.*

That Mary came	*That Mary didn't come*

W

The ultimate result in both cases is a partition of the set of (contextually relevant) possible situations into mutually exclusive and jointly exhaustive cells each representing a complete possible answer to the question.

The way a question identifies a partition is by denoting an equivalence relation between worlds (type <s,st>), that holds between two worlds iff the extension of what is questioned is the same in both of them. Thus the G&S-intension of (31)a and(32)a is (31)b. and (32)b respectively.

(31) a. Who came?

b. $\lambda w . \lambda w'. [\![come]\!]^{w} = [\![come]\!]^{w'}$

(32) a. Did Mary come?

b. $\lambda w. \lambda w'. [\![Mary\ came]\!]^{w} = [\![Mary\ came]\!]^{w'}$

How exactly do we arrive at a partition of W from a relation between elements of W? Given any equivalence relation between worlds we can always define a set of propositions, say $PART_R$, that for each world contains the set of worlds that are in the R relation with it:

(33) DEFINITION: For each R, s.t. R is an equivalence relation in W (cf. appendix)

$$PART_R = \{p \in \mathcal{P}(W): \exists\, w \in W \,\&\, w \in dom(R) \,\&\, p = \{ w': wRw'\}\}$$

It is easily provable that each $PART_R$ is a partition of W into jointly exhaustive and mutually exclusive sets of worlds (i.e. a partition).

(34) THEOREM: For each R, that is an equivalent relation in W, $PART_R$ is a partition of W

In fact one can prove that there is a one to one correspondence between the set of all possible equivalence relations in W and the set of all partitions of W (see appendix). Therefore we can safely switch back and forth between relation-talk and 'partition-talk'. (See appendix for a formal proof, cf. also Landman 1991).

(35) THEOREM: There is a one to one correspondence between the set of all equivalence relations and the set of all partitions of W

Given all this, a G&S-question intension uniquely identifies a partition of W into complete possible answers to it. Its extension in a world is the complete true answer in that world.

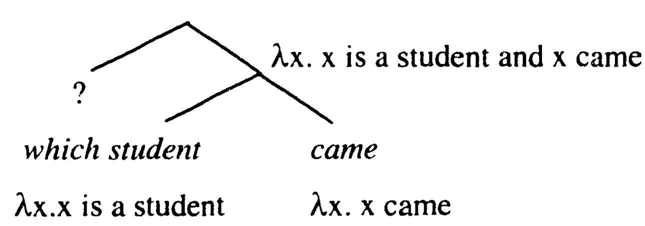
Although G&S differ from H/K in what notion of answer is taken to be basic, it is pretty obvious that also in this theory the meaning of questions is directly connected to the notion of truth-conditions via the notion of Answerhood Conditions: A question extension is the truth-condition of its true and complete answer in the world of evaluation, the question intension is the partition into sets of the truth-conditions of its possible complete answers.

As mentioned above, establishing a relation between question denotation and truth-conditions of the answers is not sufficient. An adequate theory of questions should also predict this relation on fully compositional terms.

Before concluding this section, I will illustrate how G&S system can satisfy this requirement as well. Specifically, I will show that partitions are derived compositionally from the LF structure of questions by applying standard semantic operations (intensional function application, predicate modification and predicate abstraction) to the standard truth-conditional import of the various subparts of these structures. In doing so, since the present purpose is mainly a comparison between the two theories of questions, rather than illustrating G&S's original formulation itself, I will follow Heim's (1994) and provide a rendition of G&S in terms of the semantic system developed in Heim&Kratzer (1998)..

Let us start by considering the constituent question *Which student come?*. According to Heim's version of G&S this question has the structure given in (36)a. The question ?-morpheme in this structure is assigned the denotation in (36)b. and the wh-phrase is taken to be equivalent to the predicate in its restrictor.

(36) a.



b. $[\![?]\!] = \lambda P_{<s,et>}. \lambda w.\lambda w'$: w and w' $\in$ W. P (w) = P(w')

The desired partition is obtained by combining the two predicates in the question via predicate restriction and the result with the meaning of the meaning of ? by IFA, as in (37):

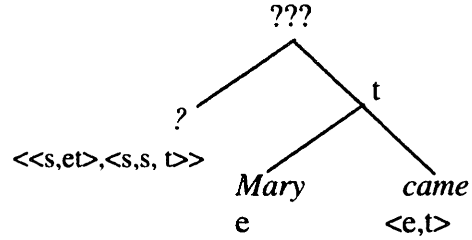
(37) $[\![?]\!](\lambda w.\ [\![\text{student and come}]\!]^{w}) =$

$\lambda w.\lambda w'.\ \{x\text{: is a student in } w \ \&\ x \text{ came in } w\} = \{x\text{: } x \text{ is a student in } w \ \&\ x \text{ came in } w'\}$

This much is sufficient to compositionally derive the denotation of a single-wh question, from its LF structure. When we turn to multiple-wh questions and y/n questions, however, the semantic type of the lexical entry of the ?-morpheme in (36) ceases to match its argument, which is of type t in the case of polar questions and of an *n* place relation for multiple wh-questions containing *n* wh-phrases:

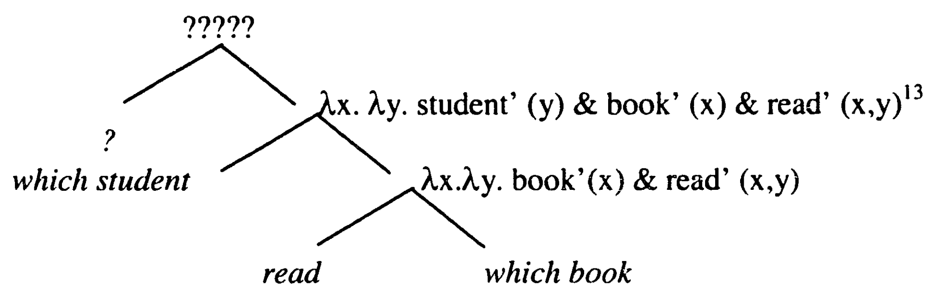
(38) a. Did Mary come?

b.



(39) a. Which student read which book?

b.



What is needed, in order to interpret a structure like (38)b, is the proposition taking operator as the value of ? given in (40)a, while for a structure like (39)b. to be interpretable the ?-morpheme should be a function from two place relations to partitions, as given in (40)b:

[13] In order to combine n place relations (where n>1) with one place predicates we need the following generalized version of the PM rule:

PM (modified): If α has daughters β and γ, s.t. $[\![\beta]\!]$ is of type $<e_1,<..,<e_n, t>>..>$ and $[\![\gamma]\!]$ is of type $<e,t>$ then $[\![\alpha]\!] = \lambda x_1. \ldots.\lambda x_n.\ [\![\beta]\!]\ (x_1) = 1$ and $[\![\gamma]\!]\,(x_1) = 1$

In G&S's (1985) system this is also achieved with a generalized compositional rule (see G&S 1985, p. 111)

(40) a. $[\![?]\!] = \lambda P_{<st>}. \lambda w.\lambda w'$: w and w' $\in$ W. P (w) = P(w)

b. $[\![?]\!] = \lambda P_{<s<e,<e,t>>>}. \lambda w.\lambda w'$: w and w' $\in$ W. P (w) = P(w)

Given this, the G&S system needs to assume either a family of meanings as defined in (41), or one meaning that is underspecified for the type of its argument as in (42), rather than just one fully specified semantic value:[15]

(41) Family of ? :[16]

$[\![?]\!] = \lambda P_{<s<e1,\ldots<en,t>\ldots>>}. \lambda w.\lambda w'$: w and w' $\in$ W. P (w) = P(w')

n = 0 ==>Yes/No questions

n = 1==> Single wh-questions

n >1 ==> Multiple wh-question

(42) Underspecified ?:

$[\![?]\!] = \lambda P_{\sigma}. \lambda w. \lambda w'$: w and w' $\in$ W. P(w)=P(w')

where $\sigma = <s, <e_1,<\ldots<e_n, t>\ldots>>>$ for $n \in N_0$

We can now return to our cases in (19) once more and see how also G&S meet our criterion of adequacy. The G&S intensions of (19)a and (19)b are given in (43) and (44), respectively. It is immediately clear that we can easily define the difference between the two on the basis of the difference between the truth-conditional import of the two predicates involved in the two questions.

(43) $\lambda w. \lambda w'. [\![\text{blond}]\!]^{w}(M) = [\![\text{blond}]\!]^{w'}(M)$

(44) $\lambda w.\lambda w'. [\![\text{blond and tall}]\!]^{w'}(M) = [\![\text{blond and tall}]\!]^{w'}(M)$

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[15] This is true of the present rendition of G&S's system. In the original version of the system, a construction specific semantic composition rule is assumed instead, that turns any n-place relation in a partition (see G&S 1985, p. 108).

[16] Entries of underspecified or polymorphic types are exploited elsewhere. Cf. the analysis of *only* Rooth 1985 Ch. III and the semantics of *and, or* and *not* (cf. von Stechow 1974, Keenan&Faltz 1978 and Heim&Kratzer 1998).

1.4.3 Conclusions

To sum up, in the last two sections I have shown how presupposition triggering expressions and questions appear to represent a challenge for a truth-conditions-based theory of meaning. We then saw how it was possible to formulate analyses of these two phenomena where truth-conditions and compositionality still play a central role. Specifically, we considered a view of presuppositions as definedness conditions on the derivability of truth-conditions and two views on questions that compositionally relate, in somewhat different ways, the meaning of questions to the truth-conditions of their possible (partial or complete) answers. Given these premises, many questions arise at this point, both at an empirical and at a theoretical level: what happens when presupposition-triggers appear in questions? Do questions convey presuppositions? If so can we maintain a view on presuppositions as definedness conditions on truth-conditions and can we still derive these pragmatic effects compositionally also in questions?

1.5 (Logical) Presuppositions in Questions: Partiality and Answerability

The empirical question above is easily addressed: questions containing presupposition triggers do carry presuppositions. Specifically, they retain the presuppositions of their declarative counterparts. For example, the question in (45)b implicitly suggests (45)c, just like the declarative sentence in (45)a:

(45) a. Mary brought the cake.
 b. Did Mary bring the cake?
 c. Presupposition: There is exactly one (contextually relevant) cake

Therefore the case of questions is completely parallel to the case of negation. Uniqueness and existence of an object satisfying the predicate *cake*, conveyed by the definite description *the cake*, are conveyed in questions as well, rather than being questioned. In fact, much work on presuppositions shows that their persistence in questions is one of the characteristic features of presuppositions. Because of this, questions have often been taken as reliable heuristic to establish whether the meaning of a given expression is partly presuppositional (cf. Karttunen 1973, Soames 1989, Chierchia &McConnell Ginet 1990, Beaver 2001).

Why and how presuppositions project in questions the way they do, however, is much less straightforward an issue. In fact an explicit and (where necessary) compositional understanding of the effect of presupposition-triggers in question has not yet been provided.

As we saw in sections 2 and 3, the notion of presupposition has been traditionally tied to the notion of truth. What makes the task of understanding presuppositions in questions particularly hard is, again, that questions do not directly denote truth-conditions. Indeed, when we turn to questions, it is not immediately clear how definedness conditions on expressions that contribute to truth-conditions should affect question meanings. In this respect, a truth-conditional semantics of questions proves particularly helpful. This picture connects the semantics of questions to the semantics of declaratives in a very straightforward way, so that we can reuse all that we understand about presuppositions in declaratives to understand their properties in the domain of questions.

Even when we limit our attention to semantic presuppositions and to truth-conditional analyses of questions, however, there are at least two possible options for a treatment of presuppositions projection in questions, which on the surface appear to be equally correct. In this section I will sketch these two options and show that, indeed, for simple cases they both seem to capture the speaker's intuitions regarding the effects of presupposition triggers on questions they are part of. For completeness, here I will illustrate how the two options work in both H/K and G&S's theories of questions. In the remainder of the thesis in addressing the puzzle of *even* in questions I will then adopt the former framework for reasons that will become clear only at the end of Chapter 3, and I will leave to the appendix a discussion of how G&S's view copes with the same facts.

1.5.1 The facts

Let's consider once more the question in (46)a.

(46) a. Did Mary bring the cake?

b. There is exactly one cake in the context.

As mentioned above, a question of this sort is commonly believed to carry the presupposition that (46)b is true. As it is common practice in linguistics, this claim is based on speakers' intuitions regarding a question of this sort. We can actually try to be more precise about the kind of intuitions involved in this case by considering the effects of uttering this question in the three different types of hypothetical contexts that are suitably constructed to test our hypothesis. These contexts are the same ones considered above when we were looking at the correspondent declarative sentence (i.e. *Mary brought the* cake).

In investigating the different judgments about our question in these contexts, it will be useful to relate them to the function of a question in a conversation. At this preliminary stage we might safely assume the following. According to H/K view on questions, uttering an interrogative means presenting a set of alternative propositions and requesting that the addressee chooses among these propositions those that he or she believes to be true in the actual situation, if (s)he can, and, otherwise, that (s)he signals that (s)he has no opinions on the matter. Given this, when a question is uttered, the only way the conversation can proceed is that the addressee(s) complies with the speaker request.

With this very general notion in mind, let's turn to our three types of conversational contexts. Recall that the difference between them lay in the amount and kind of knowledge the participants to the conversation share with respect to the uniqueness of a cake in the context.

One conversational context we considered was such that both speaker and addressee believed that there are two cakes, and they both know about each other's knowledge. For example we can imagine the conversation to be taking place at a party where the speaker and the addressee are standing in front of a table where two cakes are sitting. Let's call such a context C1. In a context like C1, uttering a question like (46)a would be very awkward, if not impossible.

(47) C1: The conversational CG entails that (46)b is false.

The second type of context we focused on was one where the context set does not entail (46)b but does not entail its negation either. This situation can arise in various ways. One case is when only the speaker believes that there is just one cake, because he is facing the table while the addressee has no opinion one way or another on the matter, because she is standing with the table behind her back.

(48) C2: The conversational CG entails neither (46)b, nor its negation

For the conversation to be continued accommodation has to take place, before the addressee can address the speaker's request in one of the two above mentioned ways. In fact, the intuitions of speakers of the language is that all her possible responses (*Yes, no* or *I don't know*) will carry the presupposition that there is exactly one cake. Given this, the only way the addressee can comply with the speaker's request for information is by first updating her own assumptions regarding how many cakes there are, with the information that there is exactly one. Only after doing so, she will be able to address the question in the most cooperative way she can.

Another type of situation where the context set doesn't entail (46)b or its negation is a case in which the addressee believes that there are two cakes (the negation of (46)b), because she sees in a corner of the table, hidden to the speaker, something that she believes to be another cake. Silent accommodation in this case is obviously impossible. And, indeed, in this situation presumably the addressee will try to correct the speaker's assumption that (46)b is part of the shared informational background, rather than answering her question directly which would signal that the speaker's question was infelicitous for her. In case speaker and addressee do not reach an agreement regarding this matter, because, say, they disagree on the nature of the object in the corner, the conversation on the topic raised by the question would be stuck. In case the agreement is met in favor of what the speaker was taking for granted, accommodation takes place and the addressee is probably expected to answer the question. Otherwise the question is commonly recognized as inappropriate and dropped.

Finally consider a context where both speaker and addressee believe that there is exactly one big cake at the party and that this, again, is part of their mutual knowledge. In this case the addressee can straightforwardly comply with the speaker's request.

Summing up, an utterance of (46)a, is perceived to be felicitous only if the conversational CG already entails (46)b or can be accommodated so as to do so.

1.5.2 Felicity Conditions of Questions and Partiality

In this and the following two subsections I will illustrate two natural ways in which the above intuitions can be captured in K/H and G&S's systems respectively. Specifically I will introduce two hypotheses on how the definedness conditions of sub-constituents of a question project so that the whole question is felicitous only in contexts where these conditions are met.

The first and most natural hypothesis, which I will refer to as **Answer-based Approach**, is that it is sufficient for the semantic presuppositions introduced by presupposition triggers like *the* to be inherited as such by the possible answers to a question for the question as a whole to carry a pragmatic presupposition of the type described in the previous section. According to this view the question as a whole is always semantically well-defined irrespective of the whether a given context set entails that presupposition, but turns out pragmatically infelicitous if it doesn't.

On the other hand, in the second approach, which I will refer to as **Question-based Approach**, a question semantically presupposes all the presuppositions of its sub-constituents. Therefore a question turns out denotation-less in contexts where these presuppositions are not satisfied.

I will illustrate the details of these two options by discussing example (46) repeated below:

(49) Did Mary bring the cake?

Recall that, our lexical entry for the definite determiner is the one repeated in (50) (cf. ft. note 6):

(50) $[\![\textit{The cake}]\!]^{¢} = \lambda w{:}\ \exists!\, x \text{ s.t. } [\lambda w'.\ [\![\textit{cake}]\!]^{w'}](w)(x)=1\ .\ \iota x \text{ s.t. } [\![\textit{cake}]\!]^{w}(x)=1$

Where $[\![\ ]\!]^{¢}$ is a function from object language expressions to their intesion.

In Heim&Kratzer's system, definedness conditions of this sort are inherited at every node of the structure that contain an expression introducing them, according to the way the rule of function application (FA) is defined:

(51) FA:

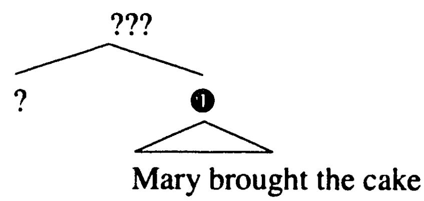
If α is a branching node and $\{\beta, \gamma\}$ is the set of its daughters then α is in the domain of $[\![\ ]\!]$ iff β and γ are in the domain of $[\![\ ]\!]$, and $[\![\gamma]\!]$ is in the domain of $[\![\beta]\!]$.

If defined, the $[\![\alpha]\!] = [\![\beta]\!]([\![\gamma]\!])$ (H&K 1998 p. 76)

This rule guarantees that the definedness conditions introduced by *the cake* are inherited by all the constituents of a question whose meaning is computed by FA, i.e. up to the node labeled as ❶ in the figure below:

(52) a. Did Mary bring the cake?

b. Proto-question



c. For any possible world w and assignment function g

$[\![$ ❶ $]\!]^{w,g}$ is defined iff $\exists!x$ s.t. $[\lambda w'. [\![\textit{cake}]\!]^{w'}](w)(x)=1$

if defined then $[\![$ ❶ $]\!]^{w,g} = 1$ iff Mary brought the unique cake in w

d. $[\![?]\!] = \lambda p.\{p\}$

The next step in the computation, however, requires an application of IFA (repeated in (53)), since the meaning of ? is a function defined for propositions (type <s,t>) but its argument, when defined, is a truth value (type t).

(53) Intensional Function Application (IFA):

If α is a branching node and $\{\beta, \gamma\}$ the set of its daughters then for any possible world w and assignment function g, if $[\![\beta]\!]^{w,g}$ is a function whose domain contains $\lambda w'. [\![\gamma]\!]^{w',g}$, then $[\![\alpha]\!]^{w,g} = [\![\beta]\!]^{w,g}(\lambda w'. [\![\gamma]\!]^{w',g})$. (Hem&Kratzer 1998, p.308)

Once partiality is added into the system, however, the above rule of IFA needs to be slightly modified. To see why, notice that in (52), the argument of $[\![?]\!]$ is partial. The IFA rule, as it is, does not cover cases of this sort. While Heim&Kratzer don't give a version of IFA that would cover cases of this sort, they do address the issue of how the semantic rules need to be modified when partiality is added to the system. The cases they discuss is the rule of Predicate Modification (cf. Heim&Kratzer (1998), p. 83. ft. note 4) and of λ-abstraction (ibidem, p. 129, ft. note 12). One natural adaptation of the rule to IFA, in the same spirit, is given in (54):

(54) Itensional Function Application revised (IFA*):

> If α is a branching node and $\{\beta, \gamma\}$ the set of its daughters then for any possible world w and assignment function g, $\alpha \in \text{dom}\ ([\![\ ]\!]^{w,g})$ iff $\beta \in \text{dom}([\![\ ]\!]^{w,g})$ and if $[\![\beta]\!]^{w,g}$ is a function whose domain contains $\lambda w': \gamma \in \text{dom}([\![\ ]\!]^{w' g}). [\![\gamma]\!]^{w',g}$, then $[\![\alpha]\!]^{w,g} = [\![\beta]\!]^{w,g} (\lambda w': \gamma \in \text{dom} ([\![\ ]\!]^{w',g}). [\![\gamma]\!]^{w',g})$

The output of this revised rule will inherit the definedness conditions of the intensional functor (i.e. $[\![\beta]\!]^{w,g}$ above), but not necessarily those of its argument. In fact, whether the definedness conditions of γ, will be inherited or blocked (or have some other effect on the output)[17] depends on the semantics of the functor itself.

This is what allows us to entertain either the two hypothesis on presupposition projection in questions mentioned in the introduction to this section. Indeed, these two options depend on what semantics we decide to attribute to the question morpheme The null hypothesis is that the meaning of the ?-morpheme is as given above and repeated in (55)a, but we can also entertain an alternative hypothesis: that this morpheme denotes a function that inherits the definedness conditions of is argument (55)b.

(55) a. Option 1:

For any index w and assignment function g $[\![?]\!]^{w,g} = \lambda p_{<s,t>}.\{p\}$

---

[17] Here what I have in mind is Karttunen's (1973) distinction between *filters, plugs and holes* for presuppositions. In the system above the distinction is encoded in the lexical entries of the functor in terms of presence or absence of definedness conditions of the functor that depend on the definedness conditions of its argument. The two lexical entries I hypothesize for the ?-morpheme exemplify of how plugs and holes are distinguished here.

b. Option 2:

For any index w and assignment function g

$[\![?]\!]^{w,g} = \lambda p_{<s,t>}: w \in \text{dom}(p). \{p\}$

Both these options prove equally satisfactory to account for the intuitions regarding our simple example in (46) above. Option one leads to an Answer-based approach to presupposition projection in questions, option one to a Question-based approach. The next subsection illustrates this from the perspective of H/K framework. Subsection 1.5.4 illustrates the same point form the perspective of G&S's system.

1.5.3 Answer and Question-based Presuppositions in H/K Questions

We can start by endorsing Option 1 for the meaning of ?. The resulting denotation of the proto-question in (52) is as in (56):

(56) $[\![?]\!]([\![❶]\!]) = \{\lambda w: \exists! x \text{ s.t. } [\![\textit{cake}]\!]^{w}(x)=1. \text{ M. brought in w the unique x s.t. } [\![\textit{cake}]\!]^{w}(x)=1\}$

When the meaning of *whether* is applied to this set, the result is a set containing two partial propositions, one being the affirmative answer and the other the negative answer to the question, and both carrying the same definedness condition, i.e. *that there is a unique cake.* Let's see how we obtain this result.

First, recall that the relevant lexical entry for *whether* is repeated in (57):

(57) $[\![\textit{whether (or not)}]\!] = \lambda Q_{<st,t>}. \{ p: p \in Q \text{ or } \sim p \in Q\}$

where for every propositions p, $\sim p = \lambda w. p(w) = 0$

Notice that the negative operator that is contained in this lexical entry (i.e. ~) was crafted for cases where its argument is non-partial. Once the option of partiality becomes available, the definition of this operator needs to be also modified as to extend to cases like the present one. Since negation is an environment where presuppositions project quite systematically (i.e. it is a *hole* for presuppositions)[18], as we saw above, I will assume the following:

(58) $\sim(p) = \lambda w: w \in \text{dom}(p).\ p(w) = 0$

Once this much is assumed, the result of applying the meaning of *whether* to its argument is as given in (59)

(59) $[\![\textit{whether}]\!]([\![?]\!]([\![❶]\!])) =$

$\{\lambda w: \exists! x \text{ s.t. } [\![\textit{cake}]\!]^w(x)=1.\ \text{M. brought in w the unique x s.t. } [\![\textit{cake}]\!]^w(x) = 1,$

$\lambda w: \exists! x \text{ s.t. } [\![\textit{cake}]\!]^w(x)=1.\ \text{M. didn't bring in w the unique x s.t. } [\![\textit{cake}]\!]^w(x) = 1\}$

The definedness conditions introduced by *the* are inherited as such only by the propositions representing the answers to the question, while the denotation of the question as a whole is always defined, whether these conditions are satisfied or not. In other words, under this view, only the answers to the question can end up being semantically undefined, but the question as a whole always receives a denotation. Yet, this can account quite straightforwardly for the intuition that the question itself is felicitous only if those conditions are satisfied. Let us see how.

The problem we are dealing with here is very reminiscent of one addressed by Stalnaker's (1978) bridge principle (see section 1.3), i.e. one of connecting partiality of the answers (a semantic feature) to its pragmatic effects on the question. The connection is easily identified on the basis of the following general principle:

(60) **Question Bridge Principle**[19, 20]

A question is felicitous in c, ONLY IF it can be felicitously answered in c.

(I.e. if at least one of its answers is defined in c)

[18] Karttunen's (1973) terminology.

[19] In Higginbotham (1996) a process of conditionalization (adding a presupposition to each answer) and factorization (eliminating infelicitous answers) together with an exhaustivity condition on partitions (at least one answer should be non-empty) achieves the same result as our bridge principle. My proposal departs from Higginbotham's in that it allows different answers to carry different presuppositions, thus predicting that the factoring process spares, in some cases, some but not all the answers. The importance of this will become clear in Ch.2.

[20] According to this principle all it is required for a question to be felicitous is that at least ONE of its answers is defined in the context. Other answers can be undefined. This aspect will turn out to be a crucial in the understanding of the difference between infelicity and another effect sometimes triggered by presuppositions in questions, i.e. bias.

Here I named the principle after Stalnaker's principle as to signal that the two have the same functions: determining how partiality influences pragmatic adequacy. It's worth pointing out, however, that the two Principles are different in one important respect. While the rationale Stalnaker's principle referes ultimately to the possibility vs impossibility for an utterance to modify the context set, the above question bridge principle does not need to refer to context change. This is so because under the current hypothesis the function of a question is not to directly affect the context but consists in presenting a number of propositions and requiring the addressee to point out those that are true. Because of this, the rational behind the Question Bridge Principle, unlike Stalnaker's, does confer it conceptual necessity: If all the answers are undefined, the question is unfit to its function, as one cannot request someone else to indicate the true propositions in a set of propositions none of which can be true, because all are undefined.

We can now return to our example. Based on the Question Bridge Principle, and given the denotation we derived for our example, we predict correctly that the question is felicitous only if the context set entails that there is a unique cake at the party. Let me illustrate why.

Recall that the two answers to the question semantically presuppose that there is a unique cake (P).

(61) *yes* = λw: $\exists!x$ s.t. $[\![cake]\!]^{w}(x)=1$. M. brought in w the unique x s.t. $[\![cake]\!]^{w}(x) = 1$

no = λw: $\exists!x$ s.t. $[\![cake]\!]^{w}(x)=1$. M. didn't bring in w the unique x s.t. $[\![cake]\!]^{w}(x) =1$

Presupposition (P) = λw. $\exists!x$ s.t. $[\![cake]\!]^{w}(x)=1$

In a situation (say C) where c does not entail P, both answers will be undefined (modulo accommodation) and therefore, unless accommodation can take place, there is no way the question can be answered felicitously. If the question cannot be answered felicitously in C, then it is infelicitous in C, according the Question-Bride Principle. On the other hand, if the question is uttered in a situation where c does entail P, then both answers are felicitous and the question is also felicitous, because it is answerable. Given this, if both speaker and addressee believe P, and mutually know this, (46) can be uttered felicitously.

In this analysis, the felicity conditions of a question are directly derived from the definedness conditions of the possible answers, just like the denotation of the question is derived from the truth-conditions of its possible answers. In this sense, this approach to projection is an **Answer-Based Approach**.

Let us now turn to our second option. According to this option, the question as a whole inherits the definedness conditions of its argument.

(62) For any index w and assignment function g

a $[\![?]\!]^{w,g}$ ($[\![$Mary brought the cake$]\!]^{w}$) is defined iff

$\exists!x$ s.t. $[\![cake]\!]^{w}(x) = 1$

b. If defined, then $[\![?]\!]^{w,g}$ ($[\![$Mary brought the cake$]\!]^{w}$) =

$\{w: \exists!x$ s.t. $[\![cake]\!]^{w}(x)=1$. M. brought in w the unique x s.t. $[\![cake]\!]^{w}(x)=1\}$

The denotation of the entire question is obtained by combining *whether* with this partial object by the Heim&Kratzer rule of FA. Since this rule is crafted so as to project the definedness conditions of each constituent to the next bigger constituent containing it, the result is also a partial denotation:

(63) $[\![$*whether*$]\!]^{w,g}$ ($[\![$*? Mary brought the cake*$]\!]^{w,g}$) is defined iff P(w)=1

a. $P = \lambda w. \exists!x$ s.t. $[\![cake]\!]^{w}(x)=1$

b. If defined then, $[\![$*whether*$]\!]^{w,g}$ ($[\![$*? Mary brought the cake*$]\!]^{w,g}$) =

$\{\lambda w: \exists!x$ s.t. $[\![cake]\!]^{w}(x)=1$. M. brought in w the unique x s.t. $[\![cake]\!]^{w}(x) = 1$,

$\lambda w: \exists!x$ s.t. $[\![cake]\!]^{w}(x)=1$. M. didn't bring in w the unique x s.t. $[\![cake]\!]^{w}(x) = 1\}$

This option accounts quite straightforwardly for our felicity-judgments regarding the question. The question as a whole semantically presupposes P, thus, according to Stalnaker's Bridge Principle, in every context C it pragmatically presupposes that the context set c in C entails P. No additional felicity principle for questions is needed.[21]

[21] Stalnaker's principle is indeed defined for 'sentences' in general, therefore it should extend to interrogative sentences as well. One problem with this extension, however, is that Stalnaker's rationale does not apply

1.5.4 Answer-basedand Question-based Presuppositions in G&S's Questions

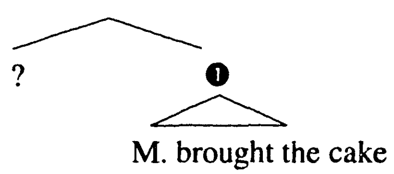
In this subsection I will show how also G&S's system explains the facts discussed in section 1.5.1 regarding (64)a.

Before comparing the two approaches to presuppositions from the perspective on questions given in G&S, let me clarify how the pragmatic function of a question can be defined in this system. First, a feature of G&S system that can help us defining this function is that that in order to account for phenomena of context dependency, they assume that questions denote partitions of the relevant context set (c) rather than the entire set of all possible worlds (W). Given this, the pragmatic function of a question relative to the context is to provide a partition of c in mutually exclusive and jointly exhaustive cells representing its possible complete answers and require the addressee to indicate which of these cells is a true proposition.

With this general pragmatic definition in mind let us see how a Question-basedanalysis and an Answer-basedanalysis of presuppositions can be expressed in partition semantics.

If a question contains a presupposition trigger, the argument of the ?-morpheme is partial, just like in K&H system, as shown in (64)b.

(64) a. Did Mary bring the cake?



b. For any possible world w and assignment function g

[[❶]]^{w,g} is defined iff $\exists!x$ s.t. [[*cake*]]$^{w}(x)=1$

if defined then [[❶]]^{w,g} $=1$ iff Mary M. brought the unique cake.

Recall that the lexical entry for this morpheme we introduced above is as repeated in (65).

---

straightforwardly to questions, given the difference between the pragmatic function of a question and of a declarative mentioned above. The way the function of a question can be defined within a G&S's perspective will allow extending Stalnaker's reasoning to questions as well. On the other hand, within that perspective, the Question Bridge Principle will loose its plausibility.

(65) $[\![?]\!] = \lambda p_{<s,t>}. \lambda w.\lambda w'$: w and w' $\in$ W. p () = p(w)

Notice that here, again, we encounter a problem similar to what we faced above with our original meaning for ~. Specifically, the lexical entry above cannot be applied to partial arguments, as is, since the identity relation (=) in its truth-conditions requires p to be a total relation.

Given this, in order to cover also cases in which partiality is involved, the lexical entry of ? must be modified. Here as well there we have two possible options, which I illustrate in (66):

(66)Option 1:

$[\![?]\!] = \lambda p_{<s,t>}.\lambda w$: w $\in$ dom (p). $\lambda w'$: w' $\in$ dom (p). p (w) = p(w')

Option 2:

$[\![?]\!] = \lambda p_{<s,t>}. \lambda w.\lambda w'$: w $\in$ dom (p) and w' $\in$ dom (p). p (w) = p(w')

The first entry above leads to a Question-basedview of presuppositions, while the second entry leads to an Answer-basedone. Let us see why.

I will start by considering option 1. If applied to a partial proposition and to a given worlds w, the first entry above does not even generate an output at all, if the argument if the proposition is not defined in w. In the example under discussion, the result is the following:

(67) For any possible world w and assignment function g

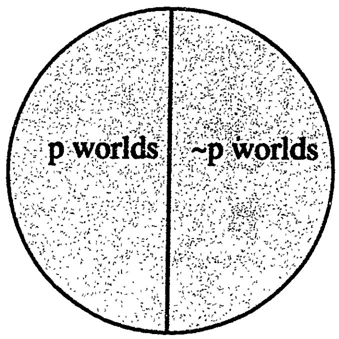
a. $[\![?]\!]$ ($\lambda w'.[\![$ ❶ $]\!]^{w',g}$) (w) is defined iff ❶ $\in$ dom$[\![]\!]^{w,g}$

❶ $\in$ dom$[\![]\!]^{w,g}$ iff $\exists!$x s.t. $[\![cake]\!]^{w}$(x)=1 (P is true in w)

b. if defined then $[\![?]\!]$ ($\lambda w'.[\![$ ❶ $]\!]^{w',g}$) (w)= $\lambda w'$: $\exists!$x s.t. $[\![cake]\!]^{w'}$(x)=1. Mary brought the cake in w iff Mary brought x in w'.

Given this, the question inherits the definedness conditions of its argument and therefore semantically presupposes that there is a unique cake (i.e. P). This accounts for the fact that this presupposition must be true in all worlds in c for the question to be felicitous. Here is how. Suppose c does entail that there is a unique cake (i.e. that in all the worlds in c there is a unique cake). As a consequence, for every two worlds in c the relation in (67)b. is defined. This situation is one in which the question does exhaustively partition c:

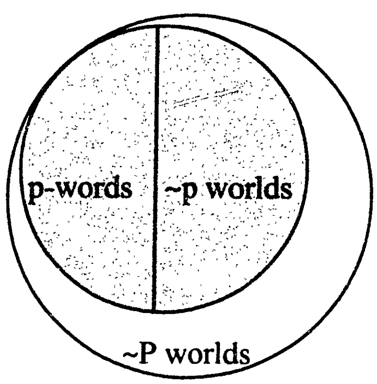
Figure 1: $c \subseteq \lambda w.\ \exists!\ x$ s.t. $[\![\textit{cake}]\!]^{w}(w)(x)1$



p=*that Mary brought the cake*

On the other hand, if c does not entail P then there are some worlds that are neither p nor non-p worlds, as show in figure 2:

Figure 2: $c \not\subseteq \lambda w.\ \exists!\ x$ s.t. $[\![\textit{cake}]\!]^{w}(w)(x)1$



□ = subset of c that is partitioned

□ = subset of c that is not partitioned

$P = \lambda w.\ \exists!\ x$ s.t. $[\![\textit{cake}]\!]^{w}(w)(x)1$

p = *that Mary bought the cake*

This means that the equivalence relation is defined only on a subset of c and that the remaining portion of c is not partitioned.

As mentioned above the function of a question in a context is to exhaustively partition the context set into cells representing its possible complete answers. In a situation as the one described above, however, the context set is not fully portioned. Extending Stalanker's rationale for the bridge principle to questions we can speculate that this is what makes the question infelicitous, as the addressee will not know what to do with the worlds that are neither p nor non-p worlds. Since P is not entailed by c, it is not entailed by the addressee believe-worlds either, therefore as far as he knows the actual world could well belong to the non partitioned area of the question, which makes it impossible for him to answer it, without accommodating the presupposition first.

Since the pragmatic presupposition of a question, under this analysis, is the product of aspects that pertain the effect of the question itself on the context set, this analysis belongs to the **Question-basedapproach** to presuppositions in questions.

Let us now turn to option 1, repeated below:

(68) Option 1:

$[\![?]\!] = \lambda p_{<s,t>}. \lambda w.\lambda w': w \in \text{dom}(p) \text{ and } w' \in \text{dom}(p).\ p(w) = p(w)$

If this is lexical entry is adopted, then for every p, and every w, the result of applying the meaning of ? to p and its result to w is always defined no matter whether w is or is not in dom(p). The output though is a partial proposition, which inherits the definedness conditions of p, as desired:

(69)For any possible world w and assignment function g

$[\![?]\!] (\lambda w'.[\![❶]\!]^{w',g}) (w) =$

$\lambda w': \exists! x \text{ s.t. } [\![cake]\!]^{w}(x)=1\ \&\ \exists! x \text{ s.t. } [\![cake]\!]^{w'}(x)=1.\ [\![❶]\!]^{w,g} = [\![❶]\!]^{w',g}$

This amounts to saying that questions containing presuppositional expressions are always semantically defined but their answers are partial objects. As we saw above, we can understand the presuppositions of such questions as pragmatic presuppositions coming from their answers. The case is fully parallel to the result we obtain when we applied Option 1 to a K/H type semantics repeated below for comparison.

(70) $[\![?]\!] (\lambda w'.[\![❶]\!]^{w',g}) (w) =$

$\{\lambda w$: $\exists!x$ s.t. $[\![cake]\!]^w(x)=1$. M. brought in w the unique x s.t. $[\![cake]\!]^w(x) = 1$,

λw: $\exists!x$ s.t. $[\![cake]\!]^w(x)=1$. M. didn't bring in w the unique x s.t. $[\![cake]\!]^w(x) =1\}$

Recall that in G&S system the question denotation in a given world is the proposition representing the complete true answer in that world, while in K/H system it is the set of possible answers. Given this, as far as root questions are concerned, Option 1 in G&S system is just like option 1 in H/K system: the question has a denotation, and therefore an answer, in every world. However in each world, the proposition representing the true answer in that world has a presupposition. Since it is part of the function of a question to require the addressee to pick up the cell of the partition representing a true proposition, P must be entailed by at least one cell of the partition for the question to be felicitous (Question-bridge Principle).

On the other hand, we expect different results in intensional embedded contexts, since the G&S answers carry the presupposition that P is true in the evaluation world as well.

1.5.5 Conclusions

In this section I explored different ways in which some basic facts about presuppositions in questions can be derived in each of the two systems considered in the previous section, i.e. K&VH and G&S.

I did so by focusing on just one example, i.e. a yes/no question containing the *definite determiner* and I have shown that as far as this example is concerned, the two systems make the same predictions.

Specifically I hypothesized two theories of projection of presuppositions in question: one that projects the definedness conditions of the sub-constituents of a question all the way up to the whole question, the other projecting them only up to the denotation of the possible answers and then deriving the felicity condition on the question on the basis of a pragmatic principle of answerability. I have shown that these two situations obtain under the following conditions: irrespective of whether we endorse K/H semantics of question or G&S's: (i) if the meaning of the ?-morpheme is world independent and therefore does not inherit the definedness conditions of its argument, questions containing presuppositional expressions do not semantically presuppose the presuppositions of their arguments, but presuppose them pragmatically; (ii) If the meaning of the ?-morpheme is world dependent and inherits the definedness conditions of its argument, then the question as a hole semantically presupposes the semantic presuppositions of its answers. As far as these two projection mechanisms are concerned, we will soon see that the latter turns out to be preferable as it comes with enough flexibility to directly account for cases that the former theory cannot address, without incurring in redundancy.

1.6 Summary and Conclusions

It is commonly recognized that one of the characteristic properties of presuppositions is that they 'project' in interrogative sentences. Since this phenomenon is fully systematic it must be the case that natural language is equipped with specific semantic and pragmatic mechanisms that make it possible. Moreover, these mechanisms ought to be related to the semantics of questions and the way presuppositions work in general. Given this, in order to contribute some insight pertinent to the general issue of how presuppositions project in interrogative environments, the first task is to decide which theory of question is better equipped for addressing the issue of projection.

Presuppositions have been traditionally tied to **truth** and **assertion**: the presuppositions of an utterance have to be (or believed in a conversation to be) true for the uttered sentence to be true or false (or felicitous). Given this, the theories that prove to be most adequate for the task of addressing the issue of presupposition projection are Hamblin and Karttunen's and Groenendijk and Stokhof in that they directly define the meaning of questions in terms of the meaning of their possible answers. This picture connects the semantics of questions to the semantics of declaratives in a very straightforward way, so that we can reuse all that we understand about presuppositions in declaratives to understand their properties in the domain of questions

As for those presuppositions that can be accounted for in terms of partiality of meaning, I proposed that there are at least two natural ways to derive their projection in a question within a truth-conditional semantics of question: a Question-based approach and an Answer-based approach. Here is a brief schematic summary of how the two approaches work:

QUESTION-BASED APPROACH'

The meaning of a question containing presuppositional expressions is a PARTIAL semantic object. If the presuppositions of the questions are false the question has no denotation (or, in G&S system its denotation is not what it is supposed to be). Given this the pragmatic presuppositions of a questions are fully determined by its semantic presuppositions.

'ANSWER-BASED APPROACH' (cf. Higginbotham 1996, p. 375)

The meaning of a question is always defined. The felicity conditions imposed by presuppositional expressions on a question are systematically determined by **the partiality conditions** those expressions impose on the possible (semantically congruent) **answers**.

(71) a presupposes (71)d BECAUSE the effect of *the cake* on the meaning of the question is such that both its possible answers carry this presupposition:

(71) a. Did Mary bring the cake?
b. Yes (Mary brought the cake)
c. No (Mary didn't bring the cake).
Both presuppose: d. There is a unique relevant cake.

Presuppositions then 'project from the answers to the question', according to the following principle which connects partiality (a semantic feature of the answers) to the pragmatics of the question (Stalnaker 1978).

(72) **Felicity Bridge Principle**

A question is felicitous ONLY IF it can be felicitously answered.
(I.e. only in contexts where at least one answer is defined)

While the difference between the two approaches is obscured in cases like the one discussed in this chapter, the relevance of the presuppositions of the answers for the felicity of a question becomes clear when we turn to our case study in the next Chapter.

Chapter 2

Even and NPIs in Y/N-questions: A Case Study

This chapter investigates in further detail how precisely presuppositional expressions affect the presuppositions and the meaning of questions in which they occur. The strategy I pursue in this investigation consists in looking at cases where presuppositional material affects the interpretation of a question in ways that go beyond the mere introduction of a presupposition. *Even* and a certain subclass of Negative Polarity Items (those called 'minimizer-NPIs like *lift a finger* or *bat an eyelash*) in interrogatives provide a rich and constrained testing ground in this sense. This is so because the presupposition of *even* determines the interpretation of the question itself as neutral information seeking question or negatively biased question, depending on the nature of the focused expression it is associated with.

This phenomenon, I will argue, is related to a long standing puzzle regarding minimizers in questions. The puzzle, first observed in Ladusaw (1979, Ch. 8), is that minimizers, unlike other NPIs of the *any* and *ever* variety, induce obligatory negative bias on questions in which they occur. An understanding of the effect of the presuppositions of *even* in questions will provide us with a straightforward solution of the minimizers puzzle.

Specifically, I will show that we can understand the bias effect of *even* and of minimizers in questions in terms of: (i) the way that the presuppositions introduced by *even* affect the question denotation in a compositional way; and (ii) the way that the resulting denotation can be used by speakers in the context of a conversation, given the pragmatic principles governing what it means to ask a genuine question.

The phenomena studied in this Chapter will offer some insight on how presuppositions project in questions: We will see that the Answer-based Approach described in Chapter 1 turns out to be the most adequate to explain the facts regarding *even* and minimizers.

Moreover my analysis of these phenomena sheds some light on the following peculiar feature of questions with minimizers. These questions belong to the set of exceptions to the generalization that linguistic form (e.g. interrogative form) maps into conversational function (expressing lack of opinion on the subject matter and seeking information about it) by the mediation of semantics (question denotation). This is so because, questions with minimizers, while exhibiting all the linguistic properties of interrogative sentences (i.e. subject-auxiliary inversion, rising intonation, wh-movement), display a conversational function somehow different from what interrogatives are typically used for because they convey the speaker's expectation for a negative answer. However, the proposal in this chapter shows that once the effect of the presuppositions of *even* on the question denotation are taken into account, this type of apparent counterevidence to the form-function mapping generalization represented by questions with *even* can be fully derived from those same semantic and pragmatic mechanisms that lead us to that generalization.

The content of this chapter is structured as follows. I will start by presenting the basics of the semantics of *even* that I assume (section 2.1). Sections 2.2 and 2.3 introduce my case study. Specifically, in sections 2.2.1 and 2.2.2 I illustrate the puzzle of minimizers in questions and then in sections 2.2.3 and 2.2.4 I show how it relates to the behavior of *even* in questions. The parallelism with *even* will allow me in section 2.2.5 to restate the puzzle as a more general phenomenon of ambiguity of questions with *even*. In section 2.3, I will propose a solution to the puzzle in terms of how the scope of *even* in questions determines the presuppositions of their answers. Section 2.4. shows how the case of questions bears on the choice between two competing views on *even*: Karttunen&Peters' scope theory and Rooth's (1985) lexical ambiguity view.

In section 2.5, I return to the problem of presupposition projection in questions and clarify how the case study I proposed in this chapter is relevant with respect to this more general issue.

Before concluding this chapter, given the central role the focus particle *even* plays in my investigation of presuppositions in questions, it will be worth to pointing out some yet unresolved issues concerning its properties and my position regarding them. Specifically, since some of the assumptions I endorse here are a matter of a current debate, in section 2.5 and 2.6, I will present an overview of that debate and justify, where necessary, my choices. First I will focus on the already mentioned controversy between the supporters of a scope theory of *even* and the ambiguity theory (section 2.5). Then, in section 2.6, I will turn to the remaining aspects of the semantics of *even* endorsed here that have been argued to be controversial in the recent literature on this expression.

2.1 *Even*

Before introducing my case study on the behavior of *even* in questions, it's worth starting with my basic assumptions regarding the meaning of this particle. A number of aspects of the semantics of *even* I will assume here are uncontroversial, while others are still under debate. As for the latter, a comprehensive discussion will be provided in sections 2.4, 2.5 and 2.6.

It is uncontroversial that *even* doesn't contribute to the truth-conditional aspect of meaning, but only introduces a presupposition.[1] One way to capture this is to attribute to *even* a denotation with the effect of an identity function (as proposed in Rooth 1985), but a partial one that in each world returns the truth value of its own argument as a value only if the conditions imposed by the presuppositional content of *even* are met in that world. Assuming with Rooth (1985) that *even,* like other focus sensitive operators, always takes propositional scope and ignoring for the moment the issue of focus association, here is how this partial identity function would look:

(1) $[\![\textit{even}]\!]^{w} = \lambda p\!: \varphi(w)=1.\ p(w)$

[1] Karttunen & Peters 1979 actually argue that *even* introduces a Conventional Implicature rather than a Presupposition. The term Conventional Implicature was coined by Grice (cf. Grice 1975), where it was meant to be contrasted with Conversational Implicature, rather than with Presupposition. The distinction between this notion and the one of presupposition is less clear and whether they differ at all depends on what theory of Presuppositions one adopts.

The way CI's are defined in Grice's paper implies at least a distinction between this notion and the notion of Logical Presupposition, which I assume here to be relevant for *even.* A logical presupposition is computed together with the truth conditions and is always an entailment of the assertion, while CI is *logically and compositionally independent from what is said* (Grice 1975, p.45, cf. also discussion in Potts, to appear). In the same spirit, in K&P, Conventional Implicatures are taken to be a distinct layer of meaning that is computed in parallel but independently from truth conditions. The importance of this distinction, however, is far from obvious. Neither Grice nor K&P provide compelling argument for choosing a two dimensions system over the one dimension system like the one adopted here. Moreover, such a system fails to properly derive presuppositions in the scope of existential quantifiers, as noted by K&P themselves in an endnote to their paper. One dimension systems appear to fare better in this respect (cf. Heim 1993 p.224, Beaver 2001, p 232). In a second respect CIs differ from Pragmatic Presuppositions in the sense of Stalnaker's 1998. While the latter must be present in the CG (i.e. true in all the worlds of the relevant context set), the former, according to K&P, don't have to, but must be simply compatible with it (i.e. true in some worlds in the context set). Also for this distinction it is hard to test. Since theory of presuppositions always involve also a notion of accommodation (see Ch1), it is very hard to tell these two options apart on the basis of empirical evidence.

According to (1), the only contribution *even* makes comes in form of the definedness condition φ. At least the three following aspects of φ are considered uncontroversial.

First, everybody agrees that φ makes reference to the propositional argument of *even*, i.e. p in our lexical entry above. Here I refer to this proposition as the '**prejacent proposition**', a term coined by medieval logicians and recently revived in von Fintel (1999) to indicate the propositional argument of *only*. I will also refer to the object language sentence in the scope of *even* at LF as the 'prejacent sentence'; however, when it will be clear in the context, 'prejacent' will be meant to refer to the prejacent proposition.

Also uncontroversial is that φ states a comparison between the prejacent and a set of alternative propositions somehow determined by the position of **focus** in the prejacent sentence (cf. Rooth 1985, 1996). To see why, compare (2)a and (2)b:

(2) a. Mary even invited [Bill]$_f$ to the party.
Presupposition: Inviting Bill to the party was less likely/ more noteworthy... for Mary than inviting anybody else to the party.
b. Mary even invited Bill to [the party]$_f$.
Presupposition: Inviting Bill to the party was less likely/ more noteworthy... for Mary than inviting him to any other social event.

Here and throughout I will use '[ ]$_f$' to mark focused constituents. The presupposition in (2)a has to do with Mary inviting Bill as compared to Mary inviting other people. The one in (2)b, on the other hand, compares Mary's invitation of Bill to the party with her invitation of Bill to other events. This dependency of the contribution of *even* on a focalized element in the sentence has come to be known as *focus association* (cf. Jackendoff 1972, Rooth 1985 etc.). In this work I will adopt Rooth's (1996) theory of focus and take the above mentioned **alternative** propositions to be in general (a relevant subset of the set of) propositions obtained by substituting the focused expression in the prejacent sentence (*Bill* and *the party*, in our examples) with expressions of the same semantic type (*Susan, John*...and *the dinner, the concert*... for (2)a and (2)b respectively). Following Rooth (1985-1996), I will refer to this set as C.

Thirdly, no one objects to the observation that the comparison between the prejacent with its alternatives in C is made along the dimension of some contextually relevant **scale** where all propositions are ranked with respect to one other. This property of *even* is also referred to as *scalarity.*

While this much is more or less uncontroversial, the nature of the scale and the condition *even* imposes on the position of the prejacent on it, is, instead, still matter of debate. Here I will mainly follow a tradition started by Karttunen & Peter (1977-K&P henceforth), according to which these conditions are taken to be the following: (i) that the prejacent and its contextually relevant alternatives be ranked with respect to likelihood (*likelihood view*); (ii) that the prejacent occupies the lowest position in the ranking (i.e. it is the least likely to be true among all the alternatives) (*universal scalar presuppositions*) and (iii) that some alternative proposition distinct from the prejacent be also true in the utterance context (*existential presupposition*) (cf. Stalnaker 1974, Fauconnier 1975a,b and K&P1979). This much assumed, I'd like to point out here that in the discussion of the case study below, it will be possible to uniquely concentrate on the scalar import of *even* and ignore its existential presupposition.

Here is a way to formalize Karttunen&Peters' semantics in terms of a partial lexical meaning of *even* (c.f. also Rooth 1985):

(3) $[\![even]\!]^{w} = \lambda C.\ \lambda p{:}\ \forall q \in C\ [\ q \neq p \rightarrow q\ >_{LIKELY}{}^{w}\ p\ ]\ \&\ (\exists q \in C\ [q \neq p\ \&\ q(w)=1]).\ p(w)$

$p\ >_{LIKELY}{}^{w}\ q$:= given a set of relevant facts in w, p is more likely than q

C := the set of contextually relevant alternatives to p, in the sense of Rooth (1996).

φ ≈ 'p is the least likely proposition among the alternatives & some alternative that is distinct from p is true'

According to this lexical entry, *even* is a two-place partial function that takes a contextually salient set of alternative propositions (C) and a proposition (p) and returns the truth value of p in the evaluation world just in case the following conditions are satisfied: that p is the least likely proposition among the alternatives in C and that some q in C distinct from p is true. The requirement that the set C is a subset of the focus value of the prejacent sentence is imposed by the presence of an operator (~) in the syntax, which introduces this requirement in the form of a presupposition, together with the stipulation that the first argument of *even* is co indexed with the covert argument of ~.

For concreteness, let us see how this theory of *even* fares in declarative affirmative and negative sentences. On the one hand, the above lexical entry correctly predicts the 'scalar' presupposition of *even* in affirmative declarative sentences that the prejacent is the least likely on the relevant pragmatic scale. Specifically, (4)a asserts (4)b and presupposes (4)c:

(4) a. Kim even solved [Problem 2]$_f$.

b. **Assertion** (p): Kim solved Problem 2.

c. **Scalar Presupposition**: For any contextually salient alternative x to Problem 2, it is LESS likely that K. solved Problem 2 than that K. solved x.

p is the LEAST likely alternative/ Pr. 2 is the hardest

On the other hand the lexical entry above, by itself, cannot cover cases where *even* occurs in a negative sentence or in the scope of other Downward Entailing (DE) operators. In fact, when we turn to negative sentences, *even* appears to introduce a different scalar presupposition. This is shown in (5).

(5) a. Kim didn't even solve [Problem 2]$_f$.

b. **Assertion** (not p): Kim didn't solve Problem 2.

c. **Presupposition**: For any x among the contextually salient alternatives to Problem 2, it is MORE likely that K. solved Problem 2 than that K. solved x.

p is the MOST likely alternative/ Pr. 2 is the easiest

Surprisingly, the presupposition *even* seems to trigger in (5) is that the prejacent is the most likely, rather than the least likely, among the alternatives; the opposite of what we just saw in (4). Since, as we will see below, the choice between these two presuppositions is not always determined by the presence vs. absence of an overt negation, it might be useful at this point to introduce two abbreviations: adopting a terminology proposed in Barker&Herburger (2000), in the remainder of this thesis I will refer to presuppositions that are typical of *even* in affirmative contexts (like (4)c) as **'hard' presuppositions** and to those that are typical of negative contexts (in (5)c), as **'easy'** presuppositions.

Hard presupposition = p is the least likely proposition among the alternatives
Easy presupposition = p is the most likely proposition among the alternatives.

In addition, for the specific example under consideration I will use the two following abbreviations:

EasyP = Problem 2 was the MOST likely for Kim to solve
HardP= Problem 2 was the LEAST likely for Kim to solve.

As things stand, the meaning for *even* given in (3) above predicts presuppositions of the 'hard' kind but cannot account for 'easy' presuppositions. K&P 1977, however, suggest a solution to this problem in terms of **scope**. Specifically they explain the presupposition in (5) as a consequence of the scope of *even* with respect to negation: if *even* has wide scope, our lexical entry in (3) captures this presupposition as well.[2] According to this view the LF for (5)a is (6)a. The resulting presupposition (6)b is equivalent to (5)c.

(6) a. LF: even [Kim didn't [solve [Problem 2]$_f$]] **the prejacent is 'not p'**

b. **Presupposition**: For every contextually relevant alternative x to Problem 2, it is LESS likely that Kim did**n't** solve Problem 2 than that Kim did**n't** solve x.
$\underbrace{\text{Kim didn't solve Problem 2}}_{\text{Not p}}$

'Not p' is the LEAST likely ⇔ p is the MOST likely

[2] In order to account for why only this reading is available, the assumption that needs to be made is that *even* is a positive polarity item.

Given that *even* takes scope above negation, the prejacent in this LF is no longer the proposition *that Kim solved Problem 2*, but its negation. Therefore, the presuppositions of *even*, according to (3) is that *that Kim didn't solve Problem 2* is the least likely among a set of alternative propositions of the form *That Kim didn't solve x*, where x is some other problem. Since for any two propositions p and q if p is more likely that q than 'not q' is more likely that 'not q' (i.e. negation is a scale reversal operator), this amounts to saying that *that Kim solved Pr.2* is the most likely proposition among a set of alternatives of the form *that Kim solved x*. DE expressions in general share this feature with negation, thus the account extends to all other occurrences of an **easy** presupposition.

While scope is sufficient to explain why *even* can trigger an **easy** presupposition in the scope of a local negation, in order to account for the absence of a **hard** presupposition in this type of environment requires the additional assumption that *even* is a positive polarity item, and as such MUST out scope negation when it is local to it (c.f. Ladusdaw 1979).

It is worth mentioning here that Rooth (1985) proposed a completely different solution from the 'scope view' in order to understand the effect of *even* in negative sentences. Rooth's alternative explanation posits a **lexical ambiguity** for *even*. According to his proposal, besides the one *even* in (3), there is a second *even* ("$even_{NPI}$") which directly introduces the **easy** presupposition. The distribution of this second *even* is confined to those contexts that typically license NPIs (negation, questions, etc.), thus capturing the fact that its presupposition emerges only when *even* occurs in the scope of DE expressions.

(7) $[\![even_{NPI}]\!]^{w} = \lambda C_{<st,t>}.\ \lambda p_{<s,t>}\colon \forall q_{<s,t>}[q \in C\ \&\ q \neq p \rightarrow\ q <_{likely} p].\ p(w)$

Scalar Presupposition: p is the **MOST** likely among the alternatives (**'easy'**).

(8) LF: [Kim_1 didn't [$even_{NPI}$ [t_1 solve Problem 2]$_F$]]] **the prejacent is 'p'**

One finds in the literature on *even* both arguments supporting Rooth's **ambiguity theory** (see Rooth 1998, von Stechow 1991, Rullmann 1997, Barker and Herburger 2000, Giannakidou 2003 and Herburger 2003) and ones supporting Karttunen & Peters' **scope theory** (c.f. Wilkinson 1996). As we will see in section 2.4 below, the facts regarding *even* in questions, addressed in this chapter, will provide indirect evidence for the scope theory. A detailed review of the scope vs. lexical ambiguity debate will be offered in section 2.5.

2.2 A Puzzle of NPIs in Questions

2.2.1 Introduction

We can now start introducing our case study. I will do so by illustrating a puzzle concerning questions with negative polarity items (NPIs), whose relation to *even* will become clear soon.

It is well known that Negative Polarity Items (NPIs) like *any*, *lift a finger* and *the faintest idea*, are grammatical in questions. However the class of NPIs appears to split into two sub-varieties when their effect on the interpretation of questions is taken into account: While questions with *any* and *ever* can be used as unbiased requests of information, questions with so called 'minimizers', i.e. idioms like *lift a finger* and *the faintest idea*, are always biased towards a negative answer (a problem first addressed in Ladusaw 1979). In this chapter I will concentrate on the case of y/n questions, wh-questions with minimizers will be considered in Chapter 3.

The solution I will propose for the polar questions elaborates on Ladusaw's original appeal to general pragmatic principles linking the way a question is asked to the speaker's expectations concerning its answer. Specifically, I show that the rhetorical effect of y/n questions with minimizers is a consequence of presuppositions, which, in each utterance context, reduce the set of possible answers for the speaker to the singleton containing the negative answer. From the perspective of the hearer, the speaker's preference for a question associated with presuppositions of this sort is a signal of her bias towards the negative answer.

The distinctive property of minimizers that accounts for these presuppositions is, as already proposed in Heim 1984, that minimizers contain a silent *even*, while *any* and *ever* do not (contra Lee & Horn 1994). In other words, minimizers, but not *any*, are NPIs of the Hindi variety, which also involve *even* plus an expression referring to a lower scale-endpoint (see Lahiri 1998).[3]

One crucial ingredient of my proposal is Karttunen&Peters' (1979) and Wilkinson's (1996) scope theory of *even*. The present section shows that, once the scope possibilities of *even* in a question are taken into account, the bias follows from the semantics and pragmatics of questions.

There is an additional advantage of this analysis in terms of scope, i.e. that it accounts, without any further stipulation, for certain otherwise unexpected presuppositions of questions containing minimizers and more generally of questions where *even* associates with the lower end-point of pragmatic scales (see Karttunen&Karttunen 1977 and Wilkinson 1996).

[3] Importantly Lahiri points out that Hindi questions with NPIs are biased as well.

This section is organized as follows: in subsection 2.2.2 I present the relevant empirical facts. 2.2.3 shows that the same bias of questions with minimizers is found in questions where *even* associates with expressions denoting the lower end-points of the relevant pragmatic scales.[4] Section 2.2.4 illustrates how the presuppositions introduced by *even* in a question relate to those introduced by this particle in declarative contexts. Interestingly, when *even* associates with a scale lower end-point, the presupposition of the question is the same as the one found in negative contexts, although no overt negation is present in the question.

In the following section (2.3) I present my proposal. Specifically I argue that an analysis in terms of scope predicts not only the bias of the questions under consideration, but also the peculiar presuppositions they come with. What will make this unified account available is that a simple and natural notion of possible answer to a question in a context is restricted to those propositions whose presuppositions are satisfied in that context.

2.2.2 The Facts of NPIs in Questions

Questions that contain *any* and *ever* (like (9)a and (9)b) can be used as neutral requests of information.

(9) a. Did *anybody* call?
  b. Has John ever been to Paris?

On the other hand, questions with minimizers always come with what has often been described as a negative **rhetorical** flavor (Ladusaw 1979, Heim 1984, Wilkinson 1996, Han 1998). Compare the a and b examples in (10)–(15).

(10) a. Will Mary **lift a finger** to help organize the party? Negatively Biased
  b. Will Mary do **anything** to help organize the party? Neutral

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[4] As we will see more explicitly below, the scales I am talking about here are in a sense the opposite of likelihood scales. The examples will involve scales ranging objects on the basis of their size or their difficulty. As solving more difficult problems is, under normal circumstances, less likely than solving easier ones and lifting heavier weights or moving for a bigger distance less likely that performing smaller movements, in all cases considered the lowest point of these scales will correspond to the highest point on the scale of likelihood and vice versa.

(11)	a. Did Mary **utter a single word**?	Negatively Biased
	b. Did Mary say **anything**?	Neutral
(12)	a. Did John lend you a **red cent**?	Negatively Biased
	b. Did John lend you **any amount of money**?	Neutral
(13)	a. Do you have **the faintest idea** how to solve this problem?	Negatively Biased
	b. Do you have **any idea** how to solve this problem?	Neutral
(14)	a. Has Mary ever **hurt a fly**?	Negatively Biased
	b. Has Mary ever hurt **anybody**?	Neutral
(15)	a. Is Mary advising **even a single student**?	Negatively Biased
	b. Is Mary advising **any students**?	Neutral

In order to avoid confusion, a better qualification of these facts might be needed at this point.

It has recently become common practice to classify as 'rhetorical' those uses of questions whose purpose is different from seeking information. Within this practice, 'negative rhetorical questions' are only those questions whose force is not of an interrogative, but, for all intents and purposes, of a negative assertion (see, e.g., Progovac 1993, Han & Siegel 1996 and Han 1998).[5]

This notion of 'negative rhetorical question' does not accurately capture the rhetorical flavor of questions like those in (10)a–(15)a, as the presence of minimizers does not always prevent an information-seeking force altogether.[6]

Nonetheless, questions with minimizers are never neutral. If not 'negative rhetorical', the flavor they come with is that of 'negative bias.' In fact, to the extent that these questions can be used to elicit information, they cannot be used to *disinterestedly* do so (Ladusaw 1979, Ch. 8, p.188). The presence of minimizers is systematically felt to signal the speaker's expectation for (bias towards) a negative answer.

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[5] However, notice that within the above mentioned previous tradition, i.e. in Borkin 1971, Ladusaw 1979 among others, the classification as 'negative rhetorical' was meant to merely indicate that the questions under consideration are felt to be biased towards the negative answer.

Borkin (1971) illustrates this point by showing that questions like those in (10)a–(15)a are infelicitous in contexts where it is clear that the speaker is unbiased as for what the true answer would be like. Notice in these contexts that the corresponding questions with *a* or *any* are fine. (16) illustrates this point.

(16)

Scenario 1:

I am trying to buy coffee at a vending machine that takes only coins. I need just one more penny to get my coffee. Bill comes by:

a. Can you lend me a penny?

b. # Can you lend me a red cent?[7]

Scenario 2:

Jen is the administrative secretary of the department of linguistics at MIT. She is preparing a document for the department archives that lists current students and their official advisors. Stephanie is helping her out. Miss Calendar is a new faculty member and Jen doesn't know her at all and doesn't know which students she is advising, if any. Thus Jen has no expectations as to whether she has started advising already or not. She asks Stephanie:

c. # Is Miss Calendar advising even a single student?[8] # Minimizer

d. Is Miss Calendar advising any students? ✓ANY

Ladusaw (2002) also observes that while questions with *any, ever*, and *yet* can be answered affirmatively with a simple *yes*, questions with minimizers call for some further expansion in case the hearer wants to answer them affirmatively:

---

[6] I'd like to thank Klaus Abels for pointing out to me the importance of this clarification.

[7] (16)b is perfectly felicitous in a scenario, where although Bill offers the speaker his help to pay for an expensive book, the speaker knows that he has just lost his job and he really cannot afford to give away any money away.

[8] Again, this question is perfectly fine when Ms Calendar has been around for a while already but actually Jen suspects that she is very lazy with students.

(17) A: Did Mary contribute any money to this cause? ✓ANY

B: Yes.

A: Did Mary contribute a red cent to this cause? # Minimizer

B: # Yes.

B': Well, yes, actually she gave a little bit.

B': Yes, actually she gave a lot of money, did you forget?

This seems to be a characteristic of rhetorical questions in general. For example, if the following question is uttered by Kobe after a 52 point game, a plain *no* does not seem to be a felicitous reply:

(18) Kobe: Am I or am I not the best basketball player ever?

Addressee: # No

Addressee: √ Well actually you are not, because other players did much better than this.

Given that judgments of this sort are quite solid, we can conclude that a minimizer in a question obligatorily signals the speaker's expectation of a negative answer, whether or not the question under consideration is also used to elicit some sort of information confirming or disconfirming such an expectation; *any* and *ever*, on the other hand, do not generate this flavor. The analysis presented in this section attempts to make sense of this difference.

2.2.3 Why 'Even'?

As mentioned above, my account of the bias of minimizers in questions will exploit Heim's (1984) assumption that these items involve a possibly hidden *even* and that their overt component provides a focus which *even* is associated with. This section shows why *even* is relevant.

Besides containing a covert *even*, the overt component of minimizers like *lift a finger* clearly denotes the low end-point of the contextually relevant pragmatic scale (cf. Horn 1989, p. 399, see also ft. note 4). Interestingly, the semantic effect of *even* in questions depends precisely on the position of its focus on the contextually relevant scale. When the focus is the lower end-point, the question has the same rhetorical flavor to it as questions with minimizers, when it is the higher end-point the question is, instead, neutral.

Consider, for example, a question like (19) uttered in a context where the relevant alternatives to the focused element (*add 1 to 1*) are various mathematical operations, which can be ranked on a scale of 'difficulty'. On such a scale, *add 1 to 1* is clearly the lower end-point and the question is felt to be biased.

(19) Can you *even* [add 1 to 1]$_f$? *negatively biased*

On the other hand, if the expression associated with *even* denotes the higher value on that scale (as in (20), the question can be used as a disinterested request of information.

(20)Can you *even* [solve this very difficult equation]$_f$? *neutral*

Thirdly, when the position of the focus of *even* on a scale is still to be determined, the question is 'ambiguous' between a neutral and a biased reading, accordingly. This is shown in (21). (21)a is a biased question, if the relevant pragmatic scale in the utterance context is (21) b. On the other hand, the same question is neutral, if Problem 2 is the higher end-point of the contextually relevant scale, as in (21) c.

(21) a. Can Sue *even* solve [Problem 2]$_f$? ambiguous
b. < the most difficult problem, problem n,..., Problem 2> negative biased
c. < Problem 2, problem n....,..., the easiest problem > neutral

Finally if there is no relevant ranking or if Problem 2 occupies a position somewhere in the middle of the relevant ranking, then the question is just infelicitous:

(22) a. #Did Kim even solve Problem 2?
b. <the hardest problem, Problem 5, Problem 2, Problem 3, the easiest problem>

Notice that if we assume that minimizers involve a hidden *even*, the similarity between questions involving them (repeated below) and questions where *even* associates with the lower end-point of a scale, as in (23)a. and (23)b, is expected.

(23) a. Did anyone (even) *lift a finger* to help you? negative biased

b. Does John have (even) *the least bit of taste*? negative biased

c. Do you have (even) *the faintest idea* of how hard I'm working? negative biased

This is so because, as pointed out above, it is a property of these idiomatic expressions that they always denote the minimal quantity or extent in their respective domains and therefore always occupy the lower point of their respective scales. For example, in each context, the overt portion of *lift a finger* will denote the lowest value on a scale where different actions are ranked with respect to how helpful they turn out to be in that context.

(24) < *be the most helpful ...,*
do the dishes and carry all the shopping bags,
drive the car and open the door,
open the door,
...,
lift a finger>

Given this, an account of the biased reading of questions like (19)a. with *even* will automatically extend to the systematic bias of questions with minimizers like those in (10) to (15). Section 2.3 will present such an account.

Before turning to this proposal, however, in the next section I will introduce one further puzzling correlation between the position of the focus of *even* on the relevant scale and the effect of *even* in a question: while when the focus is the highest on the scale the question carries the usual presupposition of *even,* when it is the lowest on the scale the question carries an unexpected presupposition, i.e. a presupposition typically occurring when *even* appears in a negative sentence (as first noticed in Karttunen&Karttunen 1977, see also Wilkinson 1996)

2.2.4 The Second Puzzle of Questions with 'Even:' 'Easy' Presuppositions

If we look at them from another perspective, the facts presented in the previous section show that, besides an ambiguity between neutral and biased readings, questions with *even* exhibit a second related puzzle, which has to do with which presuppositions *even* introduces in them.

Indeed, as we saw there, *even* in a question is compatible only with two types of contexts: contexts where its focus is the lowest point on the relevant scale (the easiest problem, the smallest thing etc.) and contexts where it is the highest point on that scale (the hardest problem, the biggest thing etc.). But this means that questions with *even* are also ambiguous also with respect to the presuppositions they carry (c.f. Karttunen&Karttunen 1977 and Wilkinson 1996). Let us see why.

Consider once more the example repeated in (25). Since this example is compatible only with contexts where Problem 2 is the hardest or where the problem is the easiest, it is felicitous only when either of the two following presuppositions is true: that solving problem 2 was the least likely thing for Kim (**HardP**) or that it was the most likely thing for her (**EasyP**):

(25) a. Did Kim *even* solve [Problem 2]$_f$? ambiguous

b. < problem 2, problem 5, problem 3, ...,...,.., the easiest problem >
Presupposition: For any alternative x, it is MORE likely that Kim solved x than that she solved Problem 2 (*p is the LEAST likely among the alternatives*) **(hardP)**

c. < the most difficult problem, problem 3, problem 5, ..., problem 2>
Presupposition: For any salient alternative x to Problem 2 it is LESS likely that Kim solved x than that Kim solved Problem 2. (I.e *.p is the MOST likely among the alternatives.*) **(easyP)**

This is so because if the problem is the hardest for Kim to solve (i.e. the highest on the difficulty scale) the proposition *that Kim solved Problem* 2 is the least likely (lowest on the scale of likely hood) and vice versa.

Importantly, given the correlation pointed out in the previous section between the position of the focus of even on the scale and the interpretation of the question, the ambiguity between a bias and a neutral reading and the one being discussed here are two sides of the same coin. Questions with *even* are ambiguous between a biased reading carrying an 'easy' presupposition and a neutral reading carrying a 'hard' presupposition.

The puzzle these questions exhibit, when considered from the perspective of what they presuppose, is the following. Their two possible presuppositions (**hard** and **easy**) coincide respectively with the presuppositions of the corresponding affirmative and negative declarative sentences. Given this, the presence of a **hard** presupposition is not surprising, as there is no negation in (25)a., but the presence of an **easy** presupposition appears at first to be puzzling from the point of view of the scope theory adopted here, precisely because there seems to be no negation in the question that *even* could out scope.

As a matter of fact, Rooth's lexical ambiguity hypothesis does instead predict the possibility of an **'easy'** presupposition as well. This is so because, the one *even* which directly triggers this presupposition (i.e. (7) above), is expected to be licensed in questions by whatever factor licenses NPIs in general in these contexts. In addition, precisely when the focus of *even* is the lower end-point, the other meaning of *even*, which generates a **'hard'** presupposition is pragmatically excluded. This is only an apparent advantage of the ambiguity theory though, because, as we will see below, this theory fails to predict the systematic co-occurrence of **'easy'** presuppositions with the 'negative bias reading' of the question.

2.2.5 Interim Summary: Restating the Puzzle

In the last two sections, two aspects to the 'ambiguity' of questions with *even* emerged. First, these questions can be neutral or biased. Second, they can be associated with the presuppositions that are typical of affirmative or of negative sentences containing *even.* The two aspects of the ambiguity are related as follows: In contexts where the 'easy' presupposition is true the question is biased, in those where a 'hard' presupposition is, the question is neutral. Plausibly, in some cases the expression representing the focus of *even* is compatible only with one of the two presuppositions (e.g. *the easiest problem, the hardest problem*) and therefore the question is either unambiguously biased or unambiguously neutral respectively.

These facts are summarized in Table 1.

Y/N Questions With *Even*		
	Case A	Case B
Interpretation	**Biased**	**Unbiased**
Presupposition	**'easy'**	**'hard'**
Examples:	*Did Kim even*	*Solve Problem 2?*
➔	*Did K even solve the easiest problem?*	
		Did K even solve the hardest problem?

Table 1

Since in minimizers *even* associates to the lower end-point of a scale, a question hosting one of these items can only convey an 'easy' presupposition, i.e. they belong to column A, in table1.

What is puzzling about these facts, is that *even* is capable of introducing in questions, which do not contain an overt negation, a presupposition that typically emerges only when this focus particle co-occurs with negation. In addition, the emergence of such a presupposition systematically corresponds to a biased interpretation of the question.

Given this, although our initial goal was an understanding of the bias of questions of this type, now the task becomes more demanding: finding a unified explanation of both this rhetorical effect and of the unexpected presupposition of these questions (i.e. 'easy'). Despite the apparent advantage of the ambiguity theory pointed out above, the remainder of this chapter shows that, the scope theory ultimately proves more suitable to this task: An explanation based on a single meaning for *even* (as in (3)) and the syntactic (scope) configurations in which it is interpreted accounts for both the presence of an **'easy'** presupposition and its co-occurrence with the rhetorical flavor.

2.3 A Solution in Terms of Scope

2.3.1 The Idea in a Nutshell

According to the theories of questions presented in Chapter 1, asking a question like *Did Mary call?* Amounts to ask which of the following options is true:

(26) a. Mary called.

b. Mary didn't call.

Similarly, (27) amounts to asking whether (28)a is true or (28)b is true.

(27) Did Kim even solve the easiest problem?

(28) a. # Kim even solved the easiest problem.

b. Kim didn't even solve the easiest problem.

The affirmative answer to (27)a is infelicitous, because it presupposes that the easiest problem was the hardest for Kim to solve. [9,10] On the other hand, the negative answer is felicitous because it has one reading (where *even* scopes above negation), carrying the opposite presupposition (i.e. **easyP**).

This helps understanding why questions where *even* associates with the lower end point of the relevant scale are systematically biased: Since only the negative answer can be felicitous, no concrete choice is given to the addresee: (s)he can only answer negatively. In addition, we can also see why biased readings are systematically related to an 'easy' presupposition: the only real choice given to the addresee is a proposition presupposing that the problem was the easiest for Kim.

An important and novel component of this kind of expalanation is the possibility that the asnwers to one and the same question can carry different, and in fact incompatible, presuppositions:

(29) a. *Yes, Kim even solved the easiest problem* presupposes **hardP**.

b. *No, she didn't even solve the easiest problem* carries an **easyP**.

---

[9] Unless, of course, Kim is an ambitious and provocative student who always solves the hardest problems in a problem set, and leaves out the easier. In such a context, where (28)a becomes a felicitous answer, the question is not biased to begin with.

[10] The combination of assertion and presupposition of (28)a can't be represented in the semantics as felicitous, thus it can't find a felicitous linguistic form. This is different from the following fact about *any*:

(i)	Q: Did John say anything?	Neutral
	A: *Yes John said anything	(Yes John said something)

(i) A is simply ungrammatical, but there is nothing semantically wrong with it. So the semantic object is perfectly felicitous and will not be excluded as a possible answer. Indeed we can express the same content with *some*. On the other hand (28)a. is semantically odd, because of the combination of *even* with the scale-bottom, but not ungrammatical! (see previous foot note)This is why an NPI *even* will not help!

Although surprising, this possibility can be shown to follow from the assumption that *even* unambiguously denote the function described in (3) and from the syntactic configurations in which it is interpreted in the question. An analysis in these terms will be presented in the rest of this section.

2.3.2 Scope Ambiguity of Questions with 'Even'

If the scope theory of *even* is correct, the differences in table 1, repeated below, should be the effect of a scope ambiguity. In this section, I will begin by showing how, besides the expected **'hard'** presupposition, this hypothesis predicts the possibility of an **'easy'** presupposition in questions with *even*.

Y/N Questions With *Even*		
	Case A	**Case B**
Interpretation Presupposition	**Biased** **'easy'**	**Unbiased** **'hard'**
Examples:	*Did Kim even*	*Solve Problem 2?*
➔	*Did K even solve the easiest problem?*	(crossed out)
	(crossed out)	*Did K even solve the hardest problem?*

Table 1

In confronting the task of deriving **'easy'** presuppositions, we can start by pointing out that the presupposition of the negative answer would be an 'easy' one, if *even* was present in this answer and had wide scope over negation (the opposite scope relation would generate instead **hardP**).[11]

[11] The careful reader has probably already noticed that (30)b doesn't seem to have a reading where negation has scope over *even*. The absence of this reading is due to the fact that English *even* is generally infelicitous in the immediate scope of negation, a restriction that has often been attributed to a Positive Polarity nature of *even*. Given this, an LF like (30)d should be ruled out. Notice, however, that I will not entertain the hypothesis that we can derive the above ambiguity between hardP and easyP presuppositions in (30)a from a scopal ambiguity of *even* in the answer (30)b. Such a hypothesis of a scopally ambiguous answer to a scopally unambiguous question would be *per se* implausible. Instead, the analysis that will be presented below attributes the possibility of the two presuppositions of (30)c and (30)d to a scope ambiguity of *even* with respect to the trace of *whether* in the question. Therefore, the restrictions on

(30) a. Q: Did Kim even solve [Problem 2]$_f$

b. A: No, Kim didn't even solve [Problem 2]$_f$

c. LF1: even [NOT Kim solved [Problem 2]$_f$] (even>not)

Scalar Presupposition: **not p** is the LEAST likely among the alternatives ⇔ **easyP**

d. LF2: NOT even [Kim solved t_1 [Problem 2]$_f$] (not>even)

Scalar Presupposition: **p** is the LEAST likely among the alternatives ⇔ **hardP**

The task ahead of us consists in showing that the two different presuppositions are actually due to different scope options for *even* in the question (30)a itself. In other words, the proposal is that questions involving *even* are scopally ambiguous; under one reading they carry a **'hard'** presupposition, under the other they carry an '**easy**' one. In order to entertain this hypothesis we will need to make two assumptions.

The first assumption is that a y/n question always involves a hidden *whether*, (previous approaches based on this assumption are Hull & Keenan 1973, Hull 1975, Bennett 1977, Hausser & Zaeffer 1979, von Stechow & Zimmermann 1984, Higginbotham 1993 and Krifka 2001). Here I will take this silent *whether* to mirror Karttunen's wh-words in its syntax and semantics. Within a Karttunen-style semantics, this amounts to saying that *whether* denotes an existential quantifier with an implicit restrictor, just like *who* (whose Karttunen-style lexical entry is given in (31)b for comparison).[12] Differently from these wh-phrases, however, *whether* quantifies over functions of type <t,t>,[13] and its implicit restrictor contains just AFF and ¬:

λt. t=1 is AFF	**λt. t=0 is ¬**
AFF (T) → T	¬ (T) → F
AFF (F) → F	¬ (F) → T

Intuitively, treating *whether* as an existential quantifier over a set containing only these two truth-functions boils down to the claim that *whether* means something like *which of yes or no* (c.f.

the LF occurrences of the English lexical item *even* under negation, that blocks (30)d), will not affect it.

[12] For the present purposes, it would be equivalently fine to adopt a Groenendijk and Stokhof (G&S henceforth)-style semantics of questions and get rid of the assumption of a hidden *whether*. As an additional cost this hypothesis comes with, though, a type lifted meaning for *even* would be needed in order to interpret the structures in which this particle scopes above the G&S ?-morpheme (cf. Appendix).

[13] That *whether* should denote a higher order quantifier of this kind is already in Bennett 1977 (cf. also Krifka 1998).

Krifka 1997), just like *who* is equivalent to *which person.*

(31) a. $[\![\textit{whether}]\!] = \lambda f_{<<t,t>t>}. \exists h_{<t,t>} [h = \lambda p.p \text{ or } h = \lambda p.\sim p] \text{ and } f(h)=1]$

$\approx$ *which of 'yes' or 'no'*

b. $[\![\textit{who}]\!] = \lambda P_{<e,t>}. \exists x_e [\text{person } (x) \text{and } P(x)=1]$ Karttunen-meaning[14]

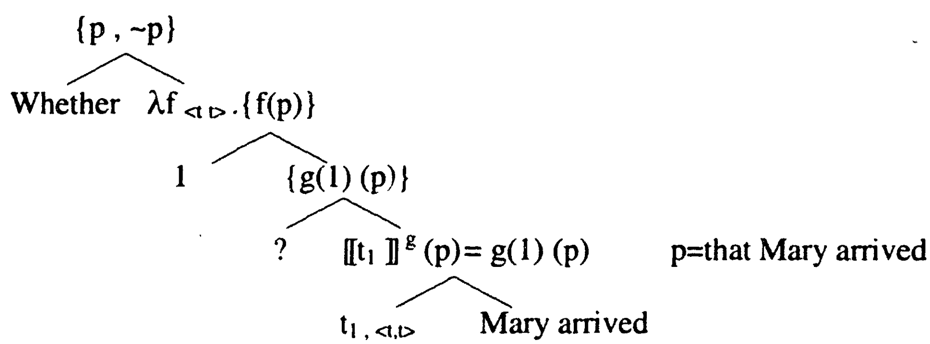
$\approx$ *which person*

Like other wh-words, in the syntax, *whether* moves above the set-creating ?-morpheme, leaving a trace of type <t,t> in its base position.[15] The resulting denotation for a y/n question will be a Hamblin-set, namely the set containing the affirmative and the negative answer.

It might be useful to see how this works for a simple y/n question like (32)a (see also appendix for a more detailed derivation).

(32) a. Did Mary arrive?

b.



As shown in (32)b, the semantic composition proceeds in the usual manner. The denotation of the proto-question contains the variable over truth functions, denoted by the trace of *whether*. At the next higher node the λ-abstraction rule applies and binds this variable. Then, the resulting

[14] This is so if we assume, with Karrtunen, that all wh-words are existential quantifiers combined with their sister in the syntax by a generalized version of Karttunen's Wh-quantifying Rule (see appendix). Alternatively, one could view wh-words as 'question-quantifiers' (as shown in (ii)) and do away with the wh-quantifying rule.

(ii) $[\![\textit{who}]\!] = \lambda Q_{<e,<st\,t>>}. \{p: \exists x [\text{person}(x) \,\&\, p \in Q(x)]\}$

$[\![\textit{whether}]\!] = \lambda Q_{<<t,t>,<st,t>>}. \{p: \exists h_{<t,t>} [(h = \lambda t.t \text{ or } h=\lambda t.t=0) \,\&\, p \in Q(h)]\}$

[15] In Chapter 3 an alternative analysis will be suggested, according to which all wh-words are indefinites rather than quantifiers and are interpreted in their base position. The predictions with respect to the facts discussed in this chapter will be the same as those of a movement-based analysis. Other facts however will suggest that an in situ analysis is to be preferred. Given that for the purposes of this chapter the two views are equally suitable and because movement makes it easier to visualize the core of my proposal, I will temporarily assume that all wh-phrases move at LF above ?.

λ-abstract is combined with the quantifier denoted by *whether*, by an application of the following versions of the *wh-quantification-rule* (see Karttunen 1977), generalized to all types of quantifiers, as to cover the case of quantifiers over objects of type <t,t>:

(33) Wh-quantifying Rule (generalized):

If α has daughters β and γ, where

$[\![\beta]\!]^{w,g}$ is type $<<\sigma,t> t>$ and $[\![\gamma]\!]^{w,g}$ is type $<\sigma,<st,t>>$, then for every world w and assignment g:

$[\![\alpha]\!]^{w,g} = \{ p : [\![\beta]\!]^{w,g} (\lambda x_{\sigma} . p \in [\![\gamma]\!]^{w,g} (x)) = 1 \}$

The output of this operation, in our example, is a set of propositions that contains, for each function of type <t,t> in the restrictor of *whether*, the value of this function applied to the proposition *that Mary arrived.* As there are only two of these functions (identity and negation) the propositions in the set will be *that Mary arrived* and *that Mary didn't arrive*, i.e. the Hamblin denotation of the question, as desired.

The second assumption needed for the present purposes is that *even* can have narrow or wide scope relative to the trace of *whether*. This assumption is an implicit consequence of endorsing a scope theory of *even*. The two LFs of (30)a. are, thus, (34)a and b.

(34) a. [Whether$_1$ [? [**t$_1$** [*even* [Kim solved [Problem 2]$_f$] | $t_{whether}$ >even |

b. [Whether$_1$ [? [*even* [**t$_1$** [Kim solved [Problem 2]$_f$] | even> $t_{whether}$ |

As an effect of the presence of *even*, the elements of the set denoted by each of these structures are partial propositions: Each proposition is defined only in those worlds in which the presupposition introduced by *even* is satisfied. However, given that the scope of *even* is different in the two structures, these presuppositions will be, in turn, different. Specifically, those propositions in the two sets corresponding to the negative answers are distinct partial propositions: the negative answer to (34)a presupposes **hardP**, while the negative answer to (34)b presupposes **easyP**. Let's see how this difference follows from a scope ambiguity of *even* relative to the trace of *whether*.

Assuming the usual meaning for ? (as in the Answer-basedApproach), the semantic composition for (34)a is shown in (35)a (cf. also appendix).[16] (35)b and c illustrate the denotations and presuppositions of negative and affirmative answer to the question under this reading.

YES (over the first member of the set), NO (over the second member)

(35) a. $\{\lambda w.\ AFF\ [\![even]\!]^w(p)=1\ ,\ \lambda w.\ \neg([\![even]\!]^w(p))=1\}$ **$Trace_{whether} > even$**

Whether $\quad \lambda f_{<t,t>}.\{\lambda w.\ f([\![even]\!]^w(p))=1\}$

1 $\quad \{\lambda w.\ g(1)\ ([\![\mathbf{even}]\!]^w(p))=1\}$

? $\quad g(1)\ ([\![even]\!]^w(p))$

$t_{1,<t,t>}$ $\quad [\![even]\!]^w(p)$ $\qquad$ p = *that Kim solved Pr.2*

even $\quad$ Kim solved Problem 2

b. $[\![no]\!]=\lambda w.[\![even]\!]^w$(that Kim can solve Problem 2)=1 $\qquad$ NOT > EVEN

$= \sim [\![even]\!]$(that Kim solved Problem 2)

Presupposition: *That Kim solved Problem 2* is the LEAST likely proposition among the relevant alternatives. **hardP**

c. $[\![yes]\!]=\lambda w.[\![even]\!]^w$(that Kim can solve Problem 2)=1

$= [\![even]\!]$(that Kim solved Problem 2)

Presupposition: *That Kim solved Problem 2* is the LEAST likely proposition among the relevant alternatives. **hardP**

In (35)a *even* composes directly with the proposition *that Kim solved Problem 2*, as shown in the shaded box in the three above. Therefore the presupposition it induces will be that this proposition is the least likely among the alternatives, no matter what value g(1) takes, i.e. no matter if we talk about the negative or the positive answer.

[16] Since the analysis is compatible with any current view on phenomena of association with focus, to simplify matters a bit, I will leave out from the following structures the first argument of *even*, i.e. the set of contextually relevant alternatives C, and assume, for the moment, that *even* is a partial identity function over propositions.

(36)b illustrates the semantic composition of (34)b, the structure where *even* has wide scope with respect to the trace of *whether* (cf. also the appendix).

For every possible world w:

YES *NO*

(36) a. $\{\lambda w.\ [\![even]\!]^{w}(p)=1,\ \lambda w.\ [\![even]\!]^{w}(\sim p)=1\}$ *even* > $Trace_{whether}$

Whether $\lambda f_{<t,t>}\ \{\lambda w.\ [\![even]\!]^{w}(\lambda w'.\ f\ ([\![K.\ solved\ Problem\ 2]\!]^{w'})=1)=1\}$

1 $\{\lambda w.[\![\mathbf{even}]\!]^{w}(\lambda w'.(g(1))\ ([\![K.\ solved\ Problem\ 2]\!]^{w'})=1)=1\}$

Q $[\![even]\!]^{w}(\lambda w'.(g(1))\ ([\![K.\ solved\ Problem\ 2]\!]^{w'})=1)$

even $g(1)(\ [\![K.\ solved\ Problem\ 2]\!]^{w})$

p = *that K solved Pr.2*

$t_{1,<t,t>}$ Kim solved Problem 2

b. $[\![no]\!] = \lambda w.\ [\![even]\!]^{w}(\sim$ (*that Kim solved Problem 2*))=1 EVEN>NOT

= $[\![even]\!]$ (*that Kim didn't solved Problem 2*))

Presupposition: The proposition *that Kim didn't solve Problem 2* is the least likely among the alternatives. ⇔ **easyP**

c. $[\![yes]\!] = \lambda w.\ [\![even]\!]^{w}$(that Kim can solve Problem 2)=1

= $[\![even]\!]$(that Kim can solve Problem 2)

Presupposition: *That Kim solved Problem 2* is the LEAST likely proposition among the relevant alternatives. **hardP**

In this case the argument of *even* (i.e. (g1) (p)) contains the variable denoted by the trace of *whether*. At the top node, after the application of the *wh-quantification-rule, whether* has been quantified-in and this variable is bound by this existential quantifier; given this, the resulting denotation of this structure is the set containing two partial propositions obtained by applying $[\![even]\!]$ to the value of the identity or of the negation function applied in turn to the meaning of *Kim solved Problem 2*:

{⟦*even* ⟧(AFF(⟦*Kim solved Problem 2*⟧)) , ⟦*even*⟧(¬(⟦*Kim solved Problem 2*⟧))}=
{⟦*even*⟧(*that K solved Problem 2*) , ⟦*even*⟧ (*That Sue didn't solve Problem 2*)}

As a consequence, in the case of negation, since ⟦*even*⟧ applies to the already negated proposition, the presupposition it induces will be of the **easyP** kind, i.e. *that Kim didn't solve Problem 2* is the least likely proposition among the alternatives, thus that *that Kim solved Problem 2* is the most likely. This is shown in (37).

(37) ⟦*even*⟧ (*That Kim didn't solve Pr2*)

(i) is defined iff for every p in the set of relevant alternative propositions, p $>_{likely}$ that Kim did NOT solve Problem 2; ⇔**easyP**

(ii) if defined, ⟦even⟧(*That Kim didn't solve Pr2*) = 1 iff Kim didn't solve Problem 2.

On the other hand, in the affirmative answer *even* scopes over the identity function, i.e. an upward entailing function, therefore the resulting presupposition is **hardP**, just like in the case where *even* takes narrow scope instead.

To sum up, a scope ambiguity of the sort postulated above for a question like (30)a, i.e. between the two LFs in (34), predicts the difference in presuppositions between the negative answers of these two LFs that is illustrated in (38).

(38) a. Can Sue even solve Problem 2?

b. *no* answer to (34)a = ~ ⟦even⟧(that S. can solve Problem 2)
Scalar Presupposition: **hardP**

c. *no* answer to (34)b = ⟦even⟧(that Sue can't solve Problem 2)
Scalar Presupposition: **easyP**

Interim Summary:

Recall that our goal in this section was to make sense of the intuition that when *even* associates with the lower end-point of the relevant pragmatic scale in a question, the question comes with an **'easy'** presupposition. Let's see how far we got in accounting for this phenomenon.

So far, I have merely shown how a scope theory of *even* predicts that one possible answer to these questions under one of their two readings (*even*>trace$_{whether}$) is associated with an **'easy'** presupposition. Since the presupposition of the other possible answer and of both answers under the other reading is a **'hard'** one, this obviously doesn't suffice to account for the intuition that the question as a whole unambiguously carries an **'easy'** presupposition.

In fact, we can conceivably take a question denoting a set of partial propositions to presuppose the disjunction of the presuppositions of these propositions, as predicted on the basis of the question felicity principle mentioned in Chapter 1. Recall that this principle indeed simply requires that one of the possible answers to the question be felicitous. Given this, as things stand right now, the above analysis still yields the incorrect prediction that, no matter what the position of the focused expression in the relevant scale is, a question with *even* can have one of two presuppositions: i. a **hard presupposition**, under its surface scope reading and ii. the disjunction **'hard or easy'**, under inverse scope of *even* with respect to the trace of *whether*.

In order for an **'easy'** presupposition to become the presupposition of a question with *even*, one of the two readings (i.e. trace$_{whether}$>*even*) and one of the answers to the other reading (*even*>trace$_{whether}$) should be excluded for some reason, at the stage where the presupposition of the whole question is determined. Section 2.3.3 shows that this is precisely what happens in the cases where the focus of *even* is the lower end-point on the scale.

2.3.3 Presuppositions and Possible Answers in a Given Context: Bias Explained

In the previous section we saw that the Hamblin set of a question with *even* contains only partial propositions, i.e. propositions whose felicity in a context will be restricted by the presuppositions introduced by *even*. We can entertain some speculations about how this affects the interpretation of a question containing *even* in a given context.

Recall that according to Stalnaker view, adopted in this work, the context is a set of possible worlds in which all the propositions presupposed by the participants to a conversation are true. Since answers with false presuppositions give rise to presupposition failures, it is reasonable to assume that a speaker uttering a question in a context c is biased towards those answers whose presuppositions are true in all the worlds in c ('true in c' henceforth). This section illustrates in more detail how this effect comes about.

Let's call Q/c the subset of the Hamlin set Q, containing only those possible answers the speaker is presenting as live alternatives in a context c, i.e. the answers whose presuppositions are true in c. (See Heim (2001)).

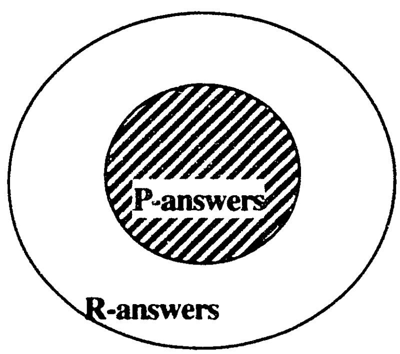
On the one hand, when all the answers to a question have the same presuppositions only two options are possible: Q/c can be identical to Q or empty. The latter situation results in a presupposition failure and in fact the question is infelicitous, as we saw in Chapter 1. Consider the famous example in (39).

(39) Have you stopped beating your wife?

If the utterance context c is such that the addressee has never beaten his wife, Q/c is empty and the question infelicitous. This is so because both its answers (and therefore the question itself) presuppose a proposition that is not true in c.

On the other hand, in cases where different elements in the Hamblin-set Q have different presuppositions, there will be also contexts (say c') where the set of possible answers (Q/c') is a non empty proper subset of Q. For example, if some possible answers to a question presuppose P and others presuppose R and if P is true in c', but R is not, the situation will be as follows:

Figure 1:



P-answers= answers presupposing P

R-answers= answers presupposing R

▨ = Q/c'

☐ = Q

Given our considerations in the previous section, this is precisely the kind of situation we expect to find when *even* occurs in a question and is associated with the scalar lowest va;ue. What I will argue now is that, in contexts of the sort just described, the question will come with a bias flavor towards the P-answers.

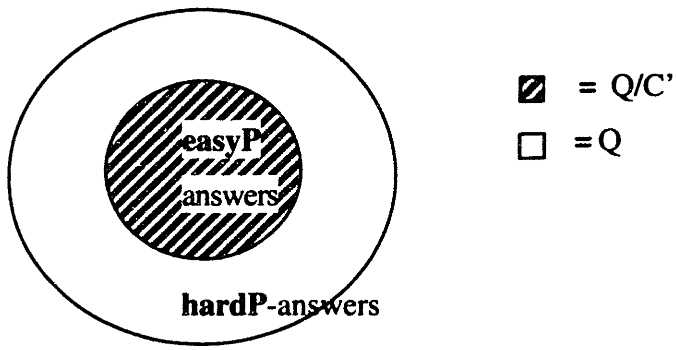
Consider once more our question (30)a, repeated below in (40). The utterance context has the important function of providing the information as to how high on a pragmatic scale the denotation of the focused expression (*Problem 2*) is ranked with respect to the relevant alternatives. The contexts that interest us, given our present purposes, are those in which Problem 2 is very easy to solve, i.e. where Problem 2 denotes the lower end-point of the scale (40)b below.

(40) a. Did Kim even solve Problem 2?

b. C':: < the most difficult problem, ..., Problem 2 >

In a context of this sort, a **'hard'** presupposition is false and an **'easy'** one is true, thus Q/C' contains only **easyP**-answers.

Figure 2:



This situation has two important consequences. The first consequence regards reading (34)a (trace $_{whether}$> *even*) repeated here as (41)a. Recall that under this reading both answers to the question presuppose **hardP**. Therefore, this reading is absent in C' because all its answers presuppose **hardP** and therefore would be infelicitous in C'. This is shown in (41).

(41) $[\![\text{Whether}_1 ?\ \mathbf{t_1}\ \textit{even}\ \text{M. solved } [\text{Pr2}]_f]\!]\,]\!] = \{ [\![\text{even}]\!](p) , \sim [\![\text{even}]\!](p) \}$

Since *Yes* presupposes **hardP,** $[\![\textit{yes}]\!] \notin [\![(41)\text{a}]\!] / C'$

Since *No* also presupposes **hardP,** $[\![\textit{no}]\!] \notin [\![(41)\text{a}]\!] / C'$ → $\boxed{[\![(41)\text{a}]\!] / C' = \varnothing}$

The second consequence is that the set of those answers to the second reading (i.e. (34)b, repeated in (42) that are possible according to the speaker's presuppositions, i.e. the set $[\![(42)]\!]/C'$, contains only the negative answer. This is so because only this answer comes with a presupposition that is true in C'.

(42) $[\![\text{Whether}_1 \ ?\ \textit{even}\ \mathbf{t_1}\ \text{M. solved } [\text{Pr } 2]_f]\!] = \{[\![\text{even}]\!](p)\ ,\ [\![\text{even}]\!](\sim p)\}$

Since *Yes* presupposes **hardP**, $[\![\textit{yes}]\!] \notin [\![(42)]\!] / C'$

Since *No* presupposes **easyP**, $[\![\text{no}]\!] \in [\![(42)]\!] / C'$ → $[\![(42)]\!]/C' = \{[\![\text{even}]\!](\sim p)\}$

The conclusion is that, in contexts where *even* associates with the lower end-point of the relevant scale, the question hosting it will be unambiguously interpreted under the wide scope reading of *even* and only its negative answer will qualify as 'possible':

Answers/ C	Trace $_{\text{whether}}$ > EVEN	EVEN > Trace $_{\text{whether}}$
Yes	⊘	⊘
No	⊘	✓

Table 2

This accounts for both the puzzling phenomena related to questions of this type that were discussed in the previous sections.

First, we can now understand why a question containing *even* is felt to be biased towards a negative answer, in contexts where the focus of *even* is the lowest scale end-point. If the speaker decides to formulate a question in a way that, given the context, excludes the possibility of an affirmative answer, he must be biased towards the negative one. Second, as the singleton of the possible answers in these contexts contains the answer presupposing **easyP**, if questions inherit the presuppositions of their answers, as dictated by the Anwer-Based Approach to projection, then the question also unambiguously presupposes **easyP**.

As mentioned above, the analysis presented here for questions with *even* extends automatically to minimizers. Recall that these items involve a hidden *even*. In addition, given their idiomatic nature, in every context, the overt portion involved in their structure denotes the lower end-point of the relevant pragmatic scale. As a consequence, the present proposal correctly predicts that these items will always enforce on questions a negative bias effect.

2.3.4 The Unbiased Reading Explained

So far, this section provided a unified perspective on two puzzling properties of questions with minimizers and, more generally, of questions with *even* and a focused expression denoting the lower point of the contextually salient pragmatic scale*:* A rhetorical effect and an unusual presupposition. Adopting Heim's (1984) hypothesis that NPIs of the above variety contain a hidden *even*, I argued that the two above properties follow from: the scope theory of *even* and rather natural and simple assumptions regarding what should count as a possible answer in a context.

The above proposal makes another desirable prediction. The prediction concerns contexts where the focus of *even* denotes instead the highest scale end-point.

(43) a. Can Sue even solve Problem 2?

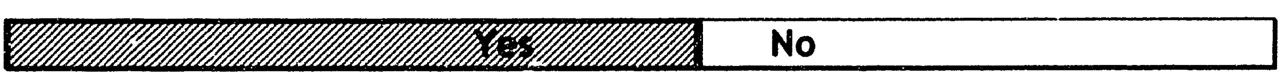
b. c: < Problem 2, problem 5,..., the easiest problem>

In contexts of this kind, the question in (43) is not obligatorily biased towards either answer.

Recall from the previous section that the conditions under which a question is **obligatorily biased** are the following: the reading where both answers have the same presuppositions ($t_{whether}$ >*even*) is pragmatically excluded and only one answer to the question under the other reading (*even*>$t_{whether}$) is pragmatically possible, as illustrated in the picture below:[17]

Figure 3: Trace $_{whether}$> *even*

Figure 4: *even*>Trace $_{whether}$



 = answers presupposing **hardP** and therefore infelicitous in the context

[17] We can view the effect of the presuppositions of *even* here as reducing the denotation of the question to a singleton

When the context is such that Problem 2 is the hardest (for Kim) to solve, this situation never comes about. This is so because, although under the reading where *even* scopes above the trace of *whether*, one of the answers is systematically excluded, the other reading is always available and its answers are both felicitous:

(44) a. Whether$_1$ [? [**t_1** [*even* [Kim solved [Problem 2]$_f$] $t_{whether}$ >*even*

b. ⟦*no* ⟧ = ~ ⟦*even*⟧(that Kim solved Problem 2) NOT > EVEN

Scalar Presupposition: *That Kim solved Problem 2* is the LEAST likely proposition among the relevant alternatives. **hardP**

c. ⟦*yes*⟧ = ⟦*even*⟧(that Kim solved Problem 2)

Scalar Presupposition: *That Kim solved Problem 2* is the LEAST likely proposition among the relevant alternatives. **hardP**

(45) a. [Whether$_1$ [? [*even* [**t_1** [Kim solved [Problem 2]$_f$] *even*> $t_{whether}$

b. ⟦*no* ⟧ = ⟦*even*⟧ (~(p)) EVEN>NOT

#Scalar Presupposition: The proposition *that Kim didn't solve Problem 2* is the least likely among the alternatives. ⇔ **easyP**

c. ⟦*yes*⟧ = ⟦*even*⟧(that Kim can solve Problem 2)

Scalar Presupposition: *That Kim solved Problem 2* is the LEAST likely proposition among the relevant alternatives. **hardP**

The picture, in these contexts, is therefore the following:

Figure 5: Trace $_{whether}$>*even*

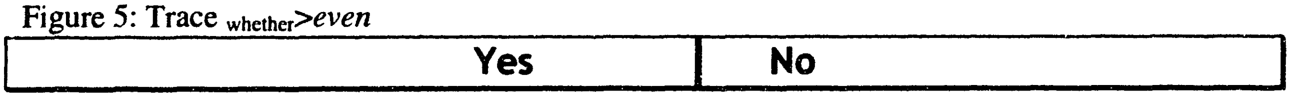
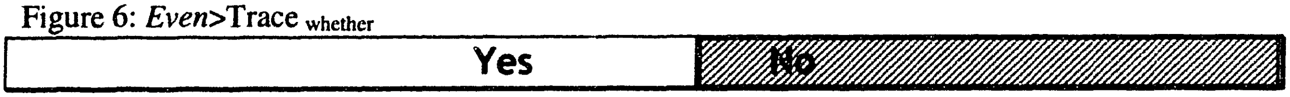


Figure 6: *Even*>Trace $_{whether}$



 = answers presupposing **easyP** and therefore infelicitous in this context

---

by, e.g., applying Higginbotham's 1996 factorization process (see Higginbotham 1996, p. 375).

Since in this case, a reading where both answers are presented by the speaker as available choices no biased interpretation is enforced.

2.4 An Indirect Argument for the Scope Theory

In the previous section we have seen how a scope theory of *even* provides a unified account of both peculiar properties that questions with *even* exhibit in contexts where the focus of *even* is the lower end point of the scale.

At the beginning of this chapter (section 2.1) I mentioned that Mats Rooth in his dissertation challenges Karttunen&Peters' analysis in terms of scope and proposes an alternative view in terms of lexical ambiguity of *even*. In this section I will show that Rooth's lexical ambiguity thesis cannot cope with the same set of empirical observations regarding *even* in questions as well as the scope theory does. My conclusion will be therefore that questions provide at least indirect support to the scope approach.

The question that needs to be addressed is twofold: first we need to establish whether Rooth's theory can account for the 'easy' presuppositions these question can sometimes carry, secondly whether it can also explain why these presupposition systematically co-occurs with bias. With respect to the former of these two issues, as noted above, Rooth's proposal seems to fare as well if not better than the scope theory. In fact it correctly predicts that questions with *even* can have an **'easy'** presupposition, because $even_{NPI}$, which is responsible for such a presupposition, should be licensed in questions just like any other NPI. On the other hand, however, Rooth's proposal, by stipulating the existence of $even_{NPI}$ directly introducing an 'easy' presupposition, leads to the incorrect prediction that questions with *even* should never be obligatorily biased, thus failing to deal with the second of the two issues mentioned above. In the rest of this section I will illustrate why this is the case.

In the contexts where a biased interpretation is obligatory, a **hard** presupposition is infelicitous, while the **'easy'** presupposition is true. According the ambiguity view, this simply means that the non-NPI meaning of *even* (in (3) above), which triggers **hardP,** is excluded; the only possible reading is the NPI one (given in (7) above), which triggers an **'easy'** presupposition:

(46) a. Did Kim *even* solve [the easiest]$_f$ problem? **hardP**

b. Did Kim *even$_{NPI}$* solve [the easiest]$_f$ problem? **easyP**

If c $\subseteq$ ***that Problem 2 was the easiest for Kim to solve*** then -> √a and #b

Notice, however that the choice of the NPI-*even*, blocks our prediction that the affirmative answers should be infelicitous in these cases. This is so because *even$_{NPI}$* actually introduces an **'easy'** presupposition in each answer, which makes both answers felicitous in the contexts under consideration:

(47) a. Did Kim *even$_{NPI}$* solve [the easiest]$_f$ problem? *Negatively Biased*

a. [whether [? [*even$_{NPI}$* [Kim solved [the easies]$_f$ problem]

b. $[\![$ *no* $]\!]$ = ~ $[\![$*even$_{NPI}$*$]\!]$(*that Kim solved the easiest problem*)

Presupposition: *That Kim solved the easiest problem* is the MOST likely proposition among the relevant alternatives. **EasyP**

c. $[\![$ *yes* $]\!]$ = $[\![$*even$_{NPI}$*$]\!]$(*that Kim solved the easiest problem*)

Presupposition: *That Kim solved the easiest problem* is the MOST likely proposition among the relevant alternatives.

b. Since c $\subseteq$ ***that the easiest was the easiest for Kim to solve*** **both answers are felicitous!**

Defenders of the ambiguity view might object that *even$_{NPI}$* cannot actually occur in the affirmative answer, because unlicensed, and that this excludes the possibility of (47)c. and is enough to explain the effect of negative bias:

(48) a. *Yes, Mary even$_{NPI}$ solved [the easiest]$_f$ problem.

b. No, Mary didn't even$_{NPI}$ solve [the easiest]$_f$ problem .

However an explanation of negative bias along these lines cannot be right. In fact since the only reason why *even$_{NPI}$* is unacceptable in an affirmative answer is that it is a NPI and NPIs want negation, if the above account was correct, NPIs like *any* and *ever* should also trigger negative bias, as they also are ungrammatical in affirmative answers.

(49) a. Did you meet any students? *Neutral*

b. * Yes I met any students.

c. No, I didn't meet any students.

But, as noticed at the very beginning of this chapter, this is not the case: any and *ever* do not trigger bias in questions. As a consequence, what does triggers bias in a question with minimizers and *even* cannot have anything to do with NPI licensing in its respective answers.[18]

As a potential rebuttal to my objection, the ambiguity camp might claim that bias should be viewed as independent from the presupposition of *even* and rather as an effect of the presence of an expression denoting the lowest point of a pragmatic scale (as basically proposed for the case of minimizers in van Rooy 2002, which builds on speculation made by Krifka 1995).

This proposal does not seem to be correct either, as a comparison between questions with *even*+the scalar low endpoint and the correspondent questions without *even* clearly show: while the former are negatively biased the latter are not. For concreteness, Compare the effect of (50)a with that of (50)b , in a context where the relevant pragmatic scale is (50)c.

(50) a. Did Kim even solve Problem 2? biased

b. Did Kim solve Problem 2? unbiased

c. <the most difficult problem, problem n,..., Problem 2>

Moreover, this view would still fail to explain the difference between minimizers and *any*, which also denotes the lowest point on its own scale.

On the basis of these considerations, the conclusion we can draw is that the ambiguity hypothesis has no explanation for the facts discussed in this chapter, and rather deprives us of the only plausible explanation. Therefore, these facts provide at least indirect empirical support for the competing view, i.e. Karttunen&Peters' scope theory of *even*.

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[18] Notice that Han's 1998 proposal only strong NPIs (cf. Zwarts' 1996) induce a bias effect in questions is not satisfactory either. In fact Strong NPI should be ungrammatical in contexts like in (i), while minimizers are not:

(i) a. Less then 3 students lifted a finger to help.

b. At most three students contributed so much as a dime.

c. At most 2 people had the slightest idea about what was going on

Moreover, it is not clear how their 'strength' should explain the bias flavor of questions with minimizers.

2.5 On the Projection Problem

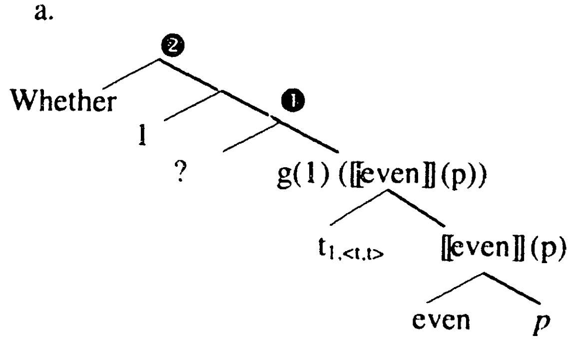
The previous sections have shown that an explanation of the correlation between bias and 'easy' presupposition crucially relies on the fact that questions with *even* can contain propositions with contrasting presuppositions, that their infelicitous answers are factored out and that the presupposition of the remaining answers is inherited by the question as a whole.

In this section I will argue that, if this proposal is on the right track, it can actually shed some light on the problem of presupposition projection in questions introduced in Chapter 1. In order to do so, I will compare the predictions of the two approaches discussed there, i.e. the Answer-based Approach, which was implicitly assumed so far, and the Question-based approach, when applied to the case of questions with *even*.

I will conclude the Answer-based Approach, is more adequate to the task, in that it derives directly the presuppositions of questions with *even*. The Question-based Approach, on the other hand, will prove at best to be redundant.

Let us consider each possible LF of a question with *even* in turn and see how each approach derives its presuppositions. The first possible LF is schematically represented in (51):

(51) a. Trace $_{whether}$>EVEN



Recall that under the Answer-based Approach the lexical entry of the ?-morpheme is such that its output does not inherit the felicity conditions of its input:

(52) $[\![?]\!] = \lambda p_{<s,t>}.\{p\}$

Given this the function is always defined, i.e., for every proposition it returns a set containing that proposition. Such a proposition, in this case, is both partial and assignment-dependent:

(53) $[\![❶]\!] = \{\lambda w.\ g(1)\ ([\![even]\!]^{w}(p)) = 1\}$

When the meaning of *whether* applies, the result is also always defined. Specifically we derive a set of two propositions both coming with a **hard presupposition:**

(54) $[\![❷]\!] = \{\lambda w.\ AFF\ ([\![even]\!]^{w}(p)) = 1,\ \lambda w. \neg\ ([\![even]\!]^{w}(p)) = 1\}$

This makes the question unanswerable unless the **hard presupposition** is true, therefore the question pragmatically presupposes it, i.e. it is felicitous only when p is the least likely among the focus determined alternatives.

Let's now turn to the Question-Based approach. In this approach the meaning of the ?-morpheme is such that its output does inherit the definedness conditions of its input.

(55) For any possible world w, and assignment function g

$[\![?]\!]^{w,g} = \lambda p_{<s,t>}: w \in dom\ (p).\ \{p\}$

Therefore, according to this approach, the meaning of the proto-question is the following:

(56) For any possible world w, and assignment function g

$[\![❶]\!]^{w,g}$ is defined iff $w \in dom\ (\lambda w'.\ g(1)\ ([\![even]\!]^{w'}(p)) = 1)$

if defined then $[\![❶]\!]^{w,g} = \{\lambda w.\ g(1)\ ([\![even]\!]^{w}(p)) = 1\}$

This node carries an assignment-dependent definedness condition. In order to determine how this condition affects the definedness of the entire structure we need to establish how conditions of this sort project when *whether* is quantified in.

There are two theories of presupposition projection in quantificational structures: Heim (1988) and Beaver (2001). Heim's theory derives a universally quantified definedness condition in any quantificational structure; Beaver's, on the other hand derives existential definedness conditions when the relevant quantifier is an existential one. Therefore, according to the two theories, the resulting presuppositions are as given in (57)a and b respectively:

(57) For any possible world w,

a. $[\![❷]\!]^{w}$ is defined iff $\exists f \in \{AFF, \neg\}$ s.t. , $w \in$ dom (f ($[\![even]\!]$(p)))

b. $[\![❷]\!]^{w}$ is defined iff $\forall f \in \{AFF, \neg\}$ s.t. , $w \in$ dom (f ($[\![even]\!]$(p)))

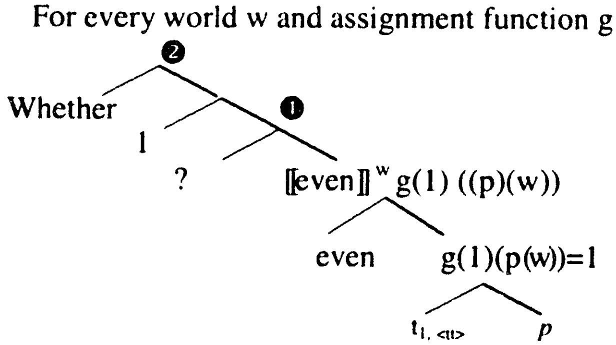
Since f is outside the scope of *even*, the presupposition is, independently on whether f is AFF or $\neg$, that p is the least likely among the alternatives, i.e. '**hard**'. Therefore both the above conditions can be satisfied only in worlds where the **hard** presupposition is true. When defined then:

(58) $[\![❷]\!]^{w} = \{\lambda w.\ AFF\ ([\![even]\!]^{w}(p)) = 1,\ \lambda w.\ \neg\ ([\![even]\!]^{w}(p)) = 1\}$

Like above, both answers come with a '**hard**' presupposition. Given this, according to the Question-based Approach there are two reasons why the question, under this reading, pragmatically presupposes a **hard** presupposition. First because it semantically presupposes it, second because it would be impossible to answer it felicitously unless it was true. Given this, this approach presents some redundancy that was not there in the Answer-based Approach.

Let's now turn to the other possible reading of the question, schematically shown in (59)

(59) For every world w and assignment function g



$Trace_{whether}$>EVEN

abbreviation $p = \lambda w.\ [\![p]\!]^{w} = 1$

In the Answer-based Approach we saw that:

(60) a. $[\![❶]\!] = \{\lambda w.\ [\![even]\!]^{w}\ g(1)\ ((p)(w))) = 1\}$

b. $[\![❷]\!] = \{\lambda w.\ ([\![even]\!]^{w} AFF(p(w))) = 1,\ \lambda w.\ [\![even]\!]^{w} \neg\ (p(w))) = 1\}$

$= \{\lambda w.\ ([\![even]\!]^{w}(p) = 1,\ \lambda w.\ [\![even]\!]^{w} \sim (p) = 1\}$

The result is a set of propositions, one presupposing **easyP** the other presupposing **hardP.** In contexts where **hardP** is false, the **hardP**-answer is factored out and the question as a whole ends up biased and presupposing what the remaining answer presupposes, i.e. **easyP**, and vice versa.

Let's see what happens if we, instead, endorsed the Question-based Approach. Once again, the proto-question carries an assignment-dependent presupposition.

(61) For any possible world w, and assignment function g

$[\![❶]\!]^{w,g}$ is defined iff $w \in dom\ (\lambda w.[\![even]\!]^{w}(g(1)\ ([\![p]\!]^{w})=1)$

if defined then $[\![❶]\!]^{w,g} = \{\lambda w.\ [\![even]\!]^{w}(g(1)\ ([\![p]\!]^{w})=1\}$

In this case, however, unlike for the other reading, Heim's and Beaver's projection theories ultimately generate very different results:

(62) For every possible world w,

a. $[\![❷]\!]^{w}$ defined iff $\exists f \in \{AFF, \neg\}$ & $w \in dom\ (\lambda w'.[\![even]\!]^{w'}(f.[\![p]\!]^{w})=1)$

$w \in$ **hardP** $\vee$ $w \in$ **easyP**

b. $[\![❷]\!]^{w}$ defined iff $\forall f \in \{AFF, \neg\}$, $w \in dom\ (\lambda w'.[\![even]\!]^{w'}(f.[\![p]\!]^{w})=1)$

$w \in$ **hardP** $\wedge$ $w \in$ **easyP** **($\perp$)**

If Heim's theory turns out to be the correct approach to projection in wh-environments, then the Question-Based approach is empirically unsatisfactory, because it would make the prediction that a wide scope reading of *even* in question would carry an inconsistent presupposition. This would systematically exclude this reading and we would loose our account for bias and **easy** presuppositions altogether. On the other hand, if Beaver's system turns out to be the most adequate to cope with how presuppositions project in general under wh-quantification, than the Question-based approach would be only redundant.

To see this, let's grant, for the moment, to the Question-based Approach that, in fact, presuppositions project in this structures as Beaver would predict. If this is so then the question as a whole would carry a very weak semantic presupposition, i.e. that either p is the least likely or p is the most likely.

When defined its denotation would be the, by now, familiar set of two propositions with opposite presuppositions, that the question denotes also under the other approach:

(63) If defined then $[\![❷]\!]^{w} = \{\lambda w.\ ([\![even]\!]^{w}(p) = 1, \lambda w.\ [\![even]\!]^{w} \sim (p) = 1\}$

If this question is uttered in a context where the **easy** presupposition is true then it is semantically defined (since for every world in the context set $w \in$ **hardP** $\vee$ $w \in$ **easyP**) however it can only be answered negatively. Given this, the question turns out to be biased. The reason why the question as a whole appears to presuppose **EasyP**, rather than **hardP** $\vee$ **easyP** is again a pragmatic one. The presupposition of the question corresponds to the presupposition of the only felicitous answer. Vice versa, when **hardP** is true, only the *yes* answer to the question under this reading survives, and the question ends up pragmatically presupposing **hardP.** When neither is true, the question is undefined and unanswerable at the same time.

Given this, on top of its purely semantic presupposition (**hardP** $\vee$ **easyP**) , the question always carries a stronger pragmatic one (either an **easy** one or a **hard** one), so that the semantic presupposition is never really doing any work. Therefore, also in this case, the Question-based approach is clearly redundant, in a way that the Answer-based approach is not.

Conclusions:

In this section I offered a comparison between the two approaches to presupposition projection in questions hypothesized in Chapter 1. I have shown that, on the one hand, the Answer-based approach can straightforwardly account for the presuppositions of *even* in questions. On the other hand, the Question-based Approach does so only in a massively redundant way and requires the perhaps controversial additional assumption that assignment-dependent presuppositions in wh-quantification project 'existentially', as dictated by Beaver's theory, rather than universally.

Before concluding, it is also worth pointing out that the additional principle required by the Answer-based Approach (i.e. the Question Bridge Principle, repeated below) turns out to be particularly enlightening, once questions with 'unbalanced' presuppositions are admitted by the semantic-pragmatic system.

(64) **Question Bridge Principle**

A question is felicitous ONLY IF it can be felicitously answered.

Specifically, the principle allows us to distinguish **infelicity** from **bias.** According to this principle, for a question to be felicitous it is not necessary that all its answers have true presuppositions (an implicit requirement assumed in Higginbotham 1993/1996 among others) but only that **at least one of the answers does.**

Therefore, the empirical generalization that we predict is the following: a y/n question is **infelicitous** when all its possible answers have false presuppositions, while it can be **felicitous, but biased** when one, but not the other, of its answers is felicitous in the context. This generalization is empirically supported by contrasts like the following:

(65) Common Ground entails that Mary never smoked.

Has Mary quit smoking? Infelicitous

Set of felicitous answers = ∅

(66) Common Ground Information entails that Problem 2 was the easiest

Did Mary even solve problem 2? Biased but felicitous

Set of felicitous answers: {that Mary didn't even solve problem 2}

2.6 Ambiguity Theory vs. Scope Theory of *Even*: an Overview of the Debate

In the previous sections I have shown how an analysis of *even* in questions based on scope allows us to account for a number of puzzling aspects of these questions and how this account sheds light on the general issue of presupposition projection in interrogative environments. In addition I have shown that if a lexical ambiguity of the type hypothesized by Rooth was endorsed, the account of bias would no longer hold. This lead me to the conclusion that questions with *even* provide evidence for the scope theory.

As I mentioned above, however the current literature on *even* is still divided up into two camps: one supporting the scope theory and the other Rooth's ambiguity theory. This section presents an overview of this debate.

Above and beyond making the correct predictions regarding questions with *even*, the scope theory is, at first sight, the more compelling alternative as it resolves the puzzle of the presuppositions of *even* in negative contexts in terms of the very well motivated notion of scope, while the ambiguity theory builds on the additional stipulation that expressions like *even* are lexically ambiguous. Given this, all things being equal, the scope theory should be preferred.

In simple negative sentences things are indeed equal, as Rooth's second lexical entry for *even* was precisely crafted to mimic the meaning of *even* with wide scope over negation. Importantly, however, when we take into considerations more cases of *even* in DE contexts, the predictions of the two theories diverge. In this territory one seems to find evidence in either direction. In the next subsection (2.6.1) I will report some of the most compelling arguments that have been presented against the scope theory; in the following one, Wilkinson's argument in favor of it. I will conclude that the issue regarding which theory is correct remains unresolved until the problems undermining either of the two camps will be satisfactorily addressed.

2.6.1 Arguments against the Scope Theory: The Exceptional Scope of 'Even'

In this section I will concentrate on three main arguments challenging the scope theory of *even*. A general objection based on syntactic considerations regarding covert movement (Rooth 1985, Rullmann 1997, Barker and Herburger 2001); a related but more specific objection regarding the peculiar constraints the scope theory needs to stipulate for the scope of *even* (Rullmann 1997); and, finally, an argument based on the semantic predictions of the two theories (Rooth 1985). There is a fourth argument in favor of the ambiguity hypothesis, that is based on the observation languages different form English overtly signal the difference in meaning between the two *even*s Rooth hypothesized by exploiting different expressions. This last argument will be left aside for the moment, because Chapter 4 will be entirely devoted to it.

Islands Violations:

The first, and perhaps most serious problem, for the scope theory, is that is requires movement operations that violate well known constraints on scope. For example, in order to derive the correct presupposition in (67)and (68), i.e. an 'easy' presupposition, *even* needs to move out of the antecedent of a conditional and out of a relative clause, respectively.

(67) Every student who handed in even $[\text{one}]_f$ assignment got an A

Presupposition: For n $\neq 1$, the proposition *that every student who handed in at least n assignments got an A* is more likely than the proposition *that every student who handed in at least 1 assignment got an A*

(68) If you hand in even $[\text{one}]_f$ assignment, you will get an A.

Presupposition: For every n$\neq$1, the proposition *that if you hand in at least n assignment you get an A* is more likely than the proposition *that if you hand in at least n assignment you get an A.*

However, both the above environments are islands for movement in general and therefore for covert movement as well (as shown in (69)and (70)). Crucially, other focus particles are no exceptions to this generalization, as shown in (71) and (72).

(69) a. If you hand in every assignment you get an A.

$\neq$

b. Every assignment is such that if you hand it in you get an A.

(70) a. Every student who handed in every assignment got an A.

$\neq$

b. Every assignment is such that every student who handed it in got an A.

(71) a. If you hand in only $[\text{one}]_f$ assignment you fail the class.

$\neq$

b. Only if you hand in $[\text{one}]_f$ assignment you fail the class.

(72) a. Every student who handed in only $[\text{one}]_f$ assignment, failed the class.

$\neq$

b. Only every student who handed in $[\text{one}]_f$ assignment failed the class.

Analogously, movement over the trace of *whether* in y/n question should be ruled out by similar restrictions on covert movement, if we want to account for the following facts:

(73) a. Did some students come?

b. √ [whether$_1$ [?[t$_1$ [some students [came]]]]]

A: Yes some students came

A': No, it is not the case that any student came.

c. * [whether$_1$ [?[some student [t$_1$[came]]]]] (neg. answer: Nobody came)

A: Yes, some student came.

A': #No, some student didn't come.

(74) a. Did you only meet [Mary]$_f$?

b. √ [whether$_1$ [?[t$_1$ [only [you met [Mary]$_f$]]]]]

A: Yes I met only Mary

A': No, I met other people too.

c. [whether$_1$ [?[only [t$_1$ [you met [Mary]$_f$]]]]]

A: Yes I met only Mary

A': # No, I only didn't meet Mary.

(75) Did you also meet Mary?

A': Yes, I met also Mary

A'': No I didn't meet also Mary.

A''': #No, I also didn't meet Mary.

Summing up, the scope theory needs to stipulate that the movement of *even* is less constrained than movement operations of a more familiar type. This seems to deprive this theory of much of its initial appeal, a criticism that has often been brought into the debate by defenders of the alternative lexical ambiguity view.(cf., e.g., Rooth 1985, Rullmann 1997 and in Barker Herburger 2001).

Schwarz 2000 shows, however, that such an argument is not conclusive. His claim builds on the following contrast, first noticed in Heim (1984):

(76) a. Every student that even handed in $[\text{one}]_f$ assignment, got an A.

b. # Every student that even handed in $[\text{one}]_f$ assignment, was wearing blue jeans.

Heim points out that, in general, minimizers and the combination of *even* + the lowest end of a scale is acceptable in the restrictor of a universal only if the relation between the restrictor and the nuclear scope is non-accidental. Schwarz observes that, although exceptional, movement of *even* from the restrictor of the universal to a position dominating the entire sentence, as the scope theory has it, can account for Heim's generalization, while the ambiguity theory cannot. Let us see why.

According to the ambiguity theory, the NPI lexical entry for *even* is interpreted within the scope of the DE expression that licenses it. Therefore the prejacent should be the same in both (76) a and (76) b and the two sentences are predicted to carry the same presupposition, despite the different content of their nuclear scope:

(77) Scope of *even* in (76)a and (76) b: [t_1 handed in $[\text{one}]_f$ assignment]

Presupposition of (76)a and (76)b according to the ambiguity theory:

For every student, for every $n \neq 1$, handing in at least 1 assignment is more likely than handing in at least n assignments.

Since the presupposition is the same in the a and the b case, the contrast between the two remains unexplained.

On the other hand, according to the scope theory, the entire sentence ends up in the scope of *even*, and therefore the different nuclear scopes of (76) a and (76) b, contribute to the presuppositions of these sentences, in ways that help understanding the detected contrast. Specifically, only one of these presuppositions is perfectly natural, i.e. the one expressing a generalization that is not contingent:

(78) a. **Presupposition of (76)a**: For n $\neq 1$, the likelihood of the proposition *that every student who handed in at least n assignments got an A* is greater than the likelihood of the proposition *that every student who handed in at least 1 assignment got an A.*

b. **Presupposition of (76)b**: For n $\neq 1$, the likelihood of the proposition *that every student who handed in at least n assignments is wearing blue jeans* is greater than the likelihood of the proposition *that every student who handed in at least 1 assignment is wearing blue jeans.*

(78)b is extremely odd because it suggests that there is a relation between the number of assignments students hand in what they happen to wear at the time the sentence is uttered, such that that we should expect that the bigger is the number of assignments they handed in, the bigger the chance that they happen to be wearing blue jeans .[19]

Schwarz's observation is important as it shows that, after all, it must be the case that some typical restrictions on scope do not apply in the case of *even* and that contexts that appear at first to be problematic for the scope theory turn out to provide supporting evidence in favor of it. Before drawing this conclusion, though, one additional qualification is needed.

Schwarz's argument holds only insofar as the notion of *likelihood* is never understood merely in terms of entailment, i.e. if it is not sufficient that p entails q for p to be less likely than q.[20] In fact, if this was the case, also the scope theory would fail to account for the oddness of the example in (76)b above. The reason is that the prejacent in that example entails all the alternatives in C.

(79) For any n $\neq 1$, *that every student who handed in at least 1 assignments is wearing blue jeans* ENTAILS *that every student who handed in at least n assignment is wearing blue jeans.*

[19] Of course we can think of a peculiar context where this relation holds. In such contexts the b sentence in (76) becomes perfectly natural. The following scenario is an instance: *The students in this class generally allow themselves to dress casually only when they have done a good job. Their implicit rule is the following: they can wear blue jeans when they hand in more than one assignment, and even a T-shirt, when they hand in more than 2. However, apparently this semester they must have made their dressing code less restrictive because today* ...every student who even handed in $[\text{one}]_F$ assignment, is wearing blue jeans.

(79) is logically true because for any n, *handing in at least n assignments* entails *handing in at least 1 assignment.* Given this and since *every* is DE in its restrictor, for every predicate P, *everybody that handed in at least 1 assignment P* entails *everybody who handed in at least n assignments.* This means that no matter what P is, the prejacent is the strongest among the alternatives.

Therefore, if the truth of (79) above was sufficient to guarantee the truth of (80) below, which is the presupposition of (76)b, then the latter should always be felicitous.

(80) For $n \neq 1$, *that every student who handed in at least n assignments is wearing blue jeans* is more likely than *that every student who handed in at least 1 assignment is wearing blue jeans.*

This is why the scope theory wouldn't fare any better with Heim's facts than the ambiguity theory, unless something else besides entailment can be shown to be necessarily at stake, when the relative likelihood of two presuppositions is evaluated in natural language.

At this point I can only offer some speculations on how this notion should look, in order to overcome the above problem. What is needed for resolving this problem is a notion of *likelihood* where strength is only a necessary but not a sufficient ingredient. This is plausible if we think about *likelihood* in terms of expectations. Indeed, although if p entails q, we certainly will not expect p to be true when q is false, this does not prevent us from having no expectations whatsoever with respect to which of the two propositions has a better chance to be true, a situation that would make them equally likely for the participant to the conversation. Plausibly, more is needed than logical entailment to trigger our expectations with respect to the truth of certain universal generalization, something that has to do with what usually happens in the world where we live, connections between events and behaviors that tend to co-occur or that we even see as in a causal relation with respect to each other. When these correlations are absent, we tend not to have stronger or weaker expectations. We simply do not have any.

Since the presupposition of *even* requires that the prejacent is strictly less likely that the alternatives, if likelihood is intended as above, when no ranking along the dimension of our

[20] This problem was pointed out to me by Kai von Fintel.

expectations is provided, as in the case discussed above, the sentence is expected to be infelicitous.

Insofar as expectations, intended along these lines, are at the basis of the notion of likelihood involved in the interpretation of *even,* then the scope theory does in fact help understanding the above facts, while the ambiguity theory fails to do so.

The above considerations, if on the right track, might lead us to conclude that ultimately, although the scope theory needs to assume movement operations of an exceptional kind, evidence for such movement operations comes form the very presuppositions of sentences involving *even* within DE islands. In absence of any alternative explanation for these presuppositions, all we can do is to bite the bullet and recognize that *even* is exceptional in its scope possibilities. Questions with *even* offer additional support to a move in this direction, because only the scope theory can help understanding their bias, at the expense of stipulating that *even* can take wide scope where other quantificational expressions cannot.

Peculiar Constraints on the Scope of 'Even' (Rullmann 1997)

Besides being exceptional in the sense that it violates typical movement constraints, Rullmann (1997) claims that the scope of *even,* as the scope theory must have it, patterns in a very peculiar way. In fact, while it can violate islands whenever crossing a DE expression, this does not seem to be the case when *even* occurs in a relative clause headed by a non-DE determiner. In support of this claim, Rullmann offers a comparison between the two following sentences:

(81) a. We hired a linguist who even read [*Syntactic Structures*]$_f$.
b. We even hired a linguist who read [*Syntactic Structures*]$_f$.

If *even* could scope outside the relative clause in (81)a, this example would have a reading equivalent to (81)b. Crucially, under this reading the sentence would be expected to carry the same existential presupposition of (81)b , i.e. the following presupposition:

(82) There is a book x, s.t. x $\neq$ *Syntactic Structures* and we hired a linguist that read x.

Notice that for (82) to be true, the linguist who read SS and the linguist who read some other book do not necessarily need to coincide. Under the narrow scope (NS) reading of *even*, the existence presupposition is, instead, stronger and does impose this condition:

(83) There is some book x different form *Syntactic Structures* such that the linguist we hired read x as well.

As a matter of fact (81)a is infelicitous in contexts where we hired two different linguists, one who just read SS and the other who read only some other book, but felicitous if the linguist we hired read some other book besides SS. On the basis of this observation, Rullmann concludes a WS (wide scopes) reading of *even* must be impossible in this case.

The discrepancy between scope possibilities of *even* between DE and non-DE environments is indeed quite suspicious. Thus Rullmann's observation offers a particularly compelling argument against the scope theory.

Although I have no response to Rullman's point I'd like to point out two apparent exceptions to Rullmann's generalization. The first exception concerns examples analogous to Rullmann's but involving what looks very much like a higher contrastive topic. One such example is provided in (84):

(84) *This department is known for always hiring senior faculty. However this tendency has been changing in the last couple of years. For example last year we hired a linguist who graduated in 1998, and, ...* [This]$_{CT}$ year we hired a linguist who even graduated [a week]$_{f}$ before her appointment started!

Assertion: This year we hired a linguist who graduated a week before starting.
WS Existential presupposition: There is a time t $\notin$ the day which was a week before the appointment was supposed to start, s.t. we hired a linguist who graduated at t.
NS Existential presupposition: There is a time t $\notin$ the day which was a week before the appointment was supposed to start, s.t. the linguist we hired graduated at t.

Since linguists typically graduate only once in their life, the NS existential presupposition is unlikely to be true. This notwithstanding, all the speaker I consulted found the sentence completely acceptable in the above context, which suggests that *even* in this case is able to take WS outside the relative clause here. [21]

Another exception to Rullmann's generalization is found when we consider the case of *even* in questions. Let us see why.

The examples in (85) show that covert movement of *even* out of a definite NP and out the complement of predicates like *claim* is ruled out.

(85) a. #Mary didn't hear the rumor that John even solved [the easiest]$_f$ problem.

b. # Mary didn't claim that John even solved [the easiest]$_f$ problem.

(86) shows that questions where *even* is found in one of these two environments and associates with the lower extreme of a scale are infelicitous as well.

(86) a. #Did Mary hear the rumor that John even solved [the easiest]$_f$ problem?

b. #Who claimed that John even solved [the easiest]$_f$ problem?

This confirms one of the findings of this chapter, i.e. that only under a WS reading of *even* above the trace of *whether* the association with a scale low endpoint is felicitous. Since in these two cases the trace is outside an island for the movement of *even* this reading is ruled out and therefore the question is infelicitous.

(87) [Who[whether[?[$t_{wherher}$ [t_{who} claimed that J. even solved [the easiest]$_f$ problem?]]]]

* even> $t_{whether}$

However, when *even* occurs inside a relative that is headed by an indefinite expression, like in Rullmann's cases, the question is felicitous and biased, which suggests that movement of *even* out of this type of relative clauses ought to be possible.

[21] Within the very same paper, Rullmann argues that actually *even* does not introduce an existential presupposition, but rather triggers, together with the assertion, an implicature to the same effect, in virtue of introducing a scalar

(88) a. Did Mary choose a house that even meets $[\text{one}]_f$ of her needs?

b. Who has a theory that addresses even $[\text{one}]_f$ of these problems?

(89) a. LF [whether[? [even $[t_{<t,t>}$ Mary choose a house that meets $[\text{one}]_f$ of her needs?]]]

b. √ Even> $t_{whether}$

The two cases just discussed show, contra Rullmann, that some relative clauses headed by non-DE expressions do not after all necessarily qualify as islands for *even.* Importantly, however, since readings where *even* scopes outside these clauses become available only under special circumstances, Rullmann concern towards the scope theory cannot be addressed unless an explanation of why this is so is provided.

The Semantic Argument (Rooth 1985)

The perhaps most notorious counterexample to the scope-theory is due to Rooth. Rooth's example is reported in (90)(cf. Rooth 1985, Chapter 5):

(90) Because they had been stolen from the library, John couldn't read *The Logical Structure of Linguistic Theory.* Because it was always checked out, he didn't read *Current Issues in Linguistic Theory.* The censorship committee kept him from even reading [*Syntactic Structures*]$_f$.

Rooth notices that the two theories of *even* make different predictions in this case. The scope theory predicts the existential presupposition in (91)a, while according to the ambiguity theory the sentence carries instead the weaker presupposition in (91)b.

(91) a. There is a book x, s.t. x$\neq$ SS and the censorship committee kept John from reading x.

b. There is some book x different form SS, s.t. John didn't read x

presupposition. One might wonder whether this does undermine Rullmann's conclusion. The answer is that it actually doesn't. To see why see footnote number 27.

(90) shows that (91)a doesn't have to be true for the sentence with *even* to be felicitous, therefore the ambiguity theory appears to make the right prediction, while the scope theory fails to do so.

Wilkinson's (1996) responds to this counterexample by suggesting that *even* in the above case associates also with the subject of the sentence. If this is correct, the alternatives to the prejacent are in (92)a. and the existential presupposition of the scope theory, is unproblematic.

(92) a. {p: ∃x,y & p= *that x kept John from reading y*}

b. There is an x and a y, s.t. x≠ SS, and y≠ The censorship committee, s.t. y kept John from reading x.

The following observation, due to Rullmann, suggests that something along the lines of Wilkinson solution is on the right track: The variant with *even* overtly scoping in the matrix clause, given below, is also judged to be natural in the above context (cf. Rullmann 1997, p.55):

(93) Because they had been stolen from the library, John couldn't read *The Logical Structure of Linguistic Theory.* Because it was always checked out, he didn't read *Current Issues in Linguistic Theory.* The censorship committee even kept him from reading [*Syntactic Structures*]$_{f}$.

2.6.2 *Wilkinson's Argument in Favor of the Scope Theory*

Although the scope theory has been considered problematic, in the face of the facts discussed in the previous section, there are cases in which it fares better than the ambiguity theory. These facts are brought into the debate by Karina Wilkinson (cf. Wiklinson 1996).

Wilkinson discusses examples like the following, where *even* occurs in the scope of factive adversative predicates like *sorry*, *be surprised* and *regret* and is associated with a focus which denotes the lowest point on some scale:

(94) a. Mary is sorry that she even [opened]$_{f}$ that book.

b. I am surprised that you even made [one]$_{f}$ mistake.

c. I regret that I even missed [one]$_{f}$ episode of Buffy.

To appreciate Wilkinson argument, let's consider in turn what presuppositions the two theories attribute to one of the above sentences.

Given the position of the focus associated with *even* on the scale, the examples above are compatible only with contexts in which the 'easy' presupposition is true. According to the ambiguity camp, this condition is imposed only when the NPI lexical entry of *even* is involved. According to the scope camp, on the other hand, this condition emerges when *even* takes scope above the above matrix predicates, which are scale reversal operators.[22]

Therefore the ambiguity view predicts that the sentence in (94)a should carry an existential presupposition like the one described in (95)a:

(95) Mary failed to do something else with the book, different from opening it

If this was correct, then the sentence should be infelicitous in contexts where Mary did all other possible things with the book (say read the first chapter, read half of it, read it all) besides just opening it, but this is clearly not the case.

The scope theory, on the other hand, seems to fare much better with cases of this sort. The existence presupposition this theory attributes to the sentence under consideration is given in (96).

(96) There is something different from opening it, that Mary is sorry having done with the book,

In fact, this presupposition does not entail that there is something else Mary hasn't done with the book but that there is something else she did with the book.

Although the above facts do seem to be evidence against the ambiguity theory, the argument in favor of the scope theory becomes weaker than it appears when other factive predicates are considered. In fact, Wilkinson notices that also the scope theory runs into problems when we turn to factive predicates that are not DE. She considers the predicate *glad*.

Also under *glad, even* can be associated with the low endpoint of a scale. For example, the following sentence has a reading where *these tickets* are meant to be less desirable for the speaker,

[22] Specifically, factive predicates like *surprise, sorry* and *regret* are Strawson Downward Entailing (cf. von Fintel 1999).

when compared to the alternatives (cf. also Kadmon and Landman 1991 and Krifka for discussion of similar cases):

(97) I am glad we even got [these]$_f$ tickets.

The scope theory derives the following presupposition by scoping *even* above the matrix predicate:

(98) For any relevant tickets X, s.t. X$\neq$these tickets, *being glad to have gotten X* is more likely (for the speaker) than *being glad to have gotten these tickets.*

If it is less likely that the speaker is content with the tickets he got than he would be with others, the tickets must be less desirable than others for her. The ambiguity theory can account for this reading only insofar as it can show that *glad* can license the NPI reading of *even* (see Schwarz 2002, for discussion).

The problem for the scope theory emerges, instead, when we turn to the existence presupposition this view seems attribute to this sentence:

(99) There are some other tickets different form these that I am glad we got.

Given the factivity of *glad*, this presupposition can be true only if it is true that we got other tickets as well. This prediction is obviously wrong as the sentence itself suggests that the tickets are the only ones we got.

Notice that once we stipulate that *even*$_{NPI}$ would be licensed under *glad* the existential presupposition of the ambiguity theory would instead be unproblematic:

(100) There are some other tickets different form these that we didn't get.

This notwithstanding, Wilkinson does not consider Upward Entailing (UE) factives like *glad* to provide support for the ambiguity theory. Instead, she suggests that the factive component of *glad* must be factored from the alternatives *even* quantifies over. In other words the presupposition of *even* is computed solely on the truth-conditional content of the prejacent.

Let's see how this would solve the problem for the scope theory. To illustrate the point we can substitute *x is gad that p* with *x would be glad if p,* which is a close enough paraphrases of the former minus factivity. When factivity is factored out, the existence presupposition predicted by the scope theory is correct:

(101) There are other tickets different form these that I would be glad if we got.

Notice that, Wilkinson solution seems to make the correct prediction in other cases as well:

(102) People didn't seem to feel like dancing last night, even $[\text{Bill}]_f$ danced only with Sue.

Although *only* introduces the presupposition that Bill danced with Sue, (102) is felicitous even when nobody else danced at all. This shows that this presupposition is ignored when the existential presupposition of *even* is compute.

If all cases where like the two discussed above, we could entertain the hypothesis that it is part of the meaning of *even* to ignore the presuppositions of its argument and therefore rescue the scope theory from the apparent problem with *glad*. Unfortunately, however, it is not at all clear that Wilkinson's proposal generalizes to all cases. One problematic example is given in (103) the following sentence:

(103) Don't worry, there will be no smokers at the dinner. My sister and my mother never smoked and #even my friend Willow quit smoking/ no longer smokes.

Both *quit* and *no longer* introduce the presupposition that sometime before the reference time the property in their complement (here *smoking*) was true of the subject (here *Willow*). If this presupposition was factored out from the existence presupposition of *even*, the sentence above should only presuppose that someone different from Willow is not a smoker. However, if this was the case then the sentence above should have been felicitous as there are other people that do not smoke in the context. Since, however, there is nobody who used to be a smoker the use of *even* in this case is inappropriate, which suggests that the existence presupposition of *even* does require that someone else not only is a non-smoker at the time of the utterance but also used to be one sometime before.

Summing up, there seems to be a certain degree of variation with respect to which presuppositions *even* can ignore and which seem instead to be taken as definedness conditions also of the alternatives this particle quantifies over. The presupposition that the prejacent is true carried by *only* and factive predicates appear to be ignorable, but other presuppositions don't. It is hard to see how this variation could be derived just from the meaning *even*.

To conclude, while occurrences of *even* in factive DE environments is problematic for Rooth's ambiguity theory of *even*, the interaction between *even* and presuppositions in its scope needs to be better understood in order to establish whether this evidence does provide a convincing argument in favor of the competing theory.

2.6.3 Conclusions

This section showed that the analysis concerning the behavior of *even* in DE contexts is still subject to debate. Arguments have been presented against and in favor of each of the two possible analyses of these cases, the scope theory and the ambiguity theory. Hopefully the discussion above has given the reader a taste of how these arguments are based on yet to be fully understood facts.

2.7 More on *Even*: Likelihood, Universal Force and Existential Presupposition

Besides their scope theory, other three components of Karttunen&Peters' analysis of *even*, which I have endorsed in this chapter, have been challenged: (i) that the relevant scale involved in the meaning of *even* should (always) be a likelihood scale, (the *likelihood view*) (ii) that the prejacent should be the least likely among the alternatives (rather than, e.g. less likely than most of them) (iii) that the *existential presupposition* should be part of the lexical import of *even*.

The aim of this section is to provide a discussion as comprehensive as possible of the nature of the debate and to show which, if any of the objections against Karttunen&Peters' proposal directly affect my analysis of questions with *even* (cf. also Rullmann 1997 for an extensive survey and discussion, from which much is taken here).

2.7.1. The Scales of 'Even'

Following up on a criticism already expressed in Horn (1979) and Kay (1995), Rullmann (1997) presents the following example as counterevidence for the *likelihood hypothesis*:

(104) A: Is Claire an ASSISTANT professor?

B: No, she's even an ASSOCIATE professor.

Rullmann claims that it is not necessary that being an associate professor be less likely for Claire than being an assistant professor for this dialog to be felicitous. Specifically, he argues that the example is felicitous even in a context where it is mutually believed, by all the participants to the conversation, that Claire is an established scholar, with very good teaching record in a well standing department and whose tenure case has been already discussed.

The speakers I consulted, however, find the example completely unacceptable in a scenario of this kind. In fact it seems to be the case that A's question itself suggests that A believes that being an associate professor is not very likely for Claire. Moreover the variant of Rullmann's example like given in (105), uttered in a context where Claire still has her job, is patently infelicitous, which suggests, contra Rullmann, that the example above is completely degraded in contexts where it is common and relevant knowledge that being an associate is more likely for Claire than being an assistant professor rather than the other way around. And, in fact,

(105) A: Is Claire an ASSISTANT professor?

B: # No, didn't you know that all assistant professors have been fired? Claire is even an ASSOCIATE professor.

Similarly, when being an assistant professor is taken to be as likely for Claire as being an associate professor, and when the relative likelihood of the two possibilities for Claire is irrelevant, a sentence like (104)B. This is shown in (106):

(106) A: Claire is an assistant professor or an associate but I don't remember which.

B: #She's even an ASSOCIATE professor./ She is an associate professor.

If A's utterance indicates that A considers the two options (being an associate or an assistance professor) equally likely. This is sufficient to render impossible for B to use *even* in his reply.

My conclusion is that Rullmann's claim is incorrect because the example he discusses does not after all provide compelling evidence against the *likelihood hypothesis*, but rather confirms it.

2.7.2 The Quantificational Force of the Scalar Presupposition

The second objection addresses the second aspect of the classic Fauconnier-K&P analysis, i.e. the claim that the prejacent is the *least* likely among the alternatives rather than less likely than, say, some or most of them (*universal scalar presupposition hypothesis*). Examples like the one in (107), due to Paul Kay, appear to challenge this hypothesis:

(107) Not only did Mary win the first round match, she *even* won the semifinals.

The problem for the *universal scalar presupposition view* is that it wrongly predicts (107) to be infelicitous because the semifinals do not represent the highest point of the relevant scale and the prejacent is not the lowest on a scale of likelihood. Notice however that the alternative suggesting that prejacent must be less likely then MOST alternatives (cf. Francescotti 1995) doesn't seem to fare any better with analogous facts. For example, such a proposal would incorrectly predict the following sentence to be infelicitous if the tournament includes, say, 20 rounds:

(108) Not only did Mary win the first round match, she even won the third round match.

Moreover, the above sentences do present a problem for the *universal hypothesis* only insofar as we are forced to assume that the finals are actually considered among the relevant alternative in the context. Given this, one could defy Kay's and Rullmann's argument, if one could show that it is possible that the proposition *that Mary won the finals* is simply not even considered as a relevant alternative. In fact, if this was the case, the proposition *that Mary won the semifinals* would be the least likely among the relevant alternatives, and therefore the *scalar presupposition* of *even* in the examples under consideration would be satisfied.

At first sight, examples like (109) appear to challenge this solution:

(109) Not only did Mary win the first round match, she *even* won the semifinals, but of course she didn't win the finals.

It seems to be the case that a felicitous context for an utterance of (109) should be such that winning the finals is one of the relevant alternatives.

However, further considerations regarding the semantics of *even* might show that actually this counterproposal can account for (109) as well. What makes this possible is a dynamic perspective within which one can hypothesize that the context has shifted in the transition between the first and the second conjunct and that the set of alternatives C, which is contextually determined, is influenced by this shift as well.

Specifically, the idea is that the context with respect to which the first conjunct in (109) is interpreted is such that the alternative *that Mary won the finals* is not even considered, for instance because completely implausible. This assumed, we can entertain the additional hypothesis that the contextually determined set of alternatives C doesn't contain this proposition either.

By the time the second conjunct is interpreted, the information conveyed by the first conjunct, i.e. that Mary won the semifinals, is already added to the CG and this makes the possibility that she could have won the finals as well more plausible than it was before.[23] Under our current additional assumption that the set of alternatives C also widens when we transit from the first to the second conjunct, then the second conjunct is interpreted with respect to a C' which does contain the alternative *that Mary won the finals.* This much would suffice to account for the above sentence without modifying our theory of *even.*

The above-mentioned assumptions find at least some independent motivation when we consider the nature of one of the ingredients in the meaning of *even.* Notice, first, that the notion of *likelihood* obviously involves modality. Extending von Fintel's (2001) analyses of counterfactuals, we can assume that sentences involving *even,* in virtue of the modal aspect of this particle, are interpreted with respect to an admissible Modal Horizon (MH). An admissible MH is a function, which generates, for each possible world a set of possible worlds that are most

[23] Alternatively, the possibility that Mary won the finals might be made relevant by the very sentence that refers to it.

accessible to it with respect to the relevant ordering source (i.e. *a well-behaved Lewis sphere around the evaluation world,* von Fintel 1999 p. 141 and von Fintel 2001).

If we intend likelihood in terms of speaker's expectations, the ordering source has to be one that ranks worlds with respect to how close they are to the speaker's expectations in the actual world, which, in turn, depend on what the speaker actually believes. Given this it is at least plausible that the MH with respect to which the above example is initially interpreted is one where the worlds where Mary wins the finals are excluded, because they are too far from what is expected. If, as a consequence, the proposition *that Mary won the finals* is excluded from C, the universal scalar presupposition of *even* is satisfied.

In von Fintel's dynamic analyses of counterfactuals, one feature of Modal Horizons is that they extend continuously, as the conversation proceeds and new information is added to the CG. Also in our example, at the time the second conjunct is interpreted the MH has widened as to include the worlds in which Mary does win the finals. This might be possible because this possibility is referred to in the second conjunct itself or because once the information that Mary won the semifinals is processed, the expectations regarding Mary's performance become more optimistic, thus making the possible scenarios in which she wins the finals closer to the actual world than they were before (c.f. ft. note 23).[24] This explains why in the last conjunct this possibility can be considered and still marked as even less likely.

If this analysis is on the right track there is no reason to weaken the scalar presupposition of *even* in order to account for Kay's and Rullmann's facts. Given this and in the absence of a valid alternative, I will keep assuming with Stalnaker, K&P, Rooth and many others that the scalar presupposition introduced by *even* is after all a universal one.

2.7.3 The Existential Presupposition

The third objection to the traditional view on *even* targets the claim that *even* introduces the presupposition that there is some true proposition among the alternatives in C other than the prejacent (*existence presupposition hypothesis*). The skepticism towards this *existential presupposition* originates from the observation, due to von Stechow (1991), that examples like

[24] I'd like to thank Kai von Fintel for pointing out this option to me.

(110) are acceptable, although given the presence of *only* in the sentence such a presupposition would contradict the assertion.

(110) Yesterday at the party, John even danced only with $[[\text{Sue}]_f]_F$.

Assertion: John didn't dance with anybody different from Sue

Existential Presupposition: There is some x different from Sue such that J. danced only with x.

Importantly, the claim that this example should represent a problem for the *existence presupposition hypothesis* crucially relies on the not necessarily uncontroversial assumption that *even* and *only* associate with the same focus.

Therefore, before dismissing the existential presupposition of *even* altogether, some further consideration regarding the acceptability conditions of the above example might be important. According to a significant number of speakers, the above sentence is acceptable only in two types of contexts: (i) in contexts where it is commonly known and salient that John at the party or in some other occasion did something else, also surprising, than dancing uniquely with Sue and (ii) in contexts where instead somebody else danced uniquely with a person different from Sue.

Although these intuitions are quite solid, it is not completely obvious what they are due to. On the one hand they suggest that there is a reading of the above sentence where an existential presupposition of some sort is after all triggered by the presence of *even*. Moreover, under this reading, this presupposition is perfectly compatible with the truth-conditional import of *only*. On the other hand this is so because the alternative propositions that seem relevant for such a presupposition are different from what they should be if the focus of *even* was just the NP *Sue*. Specifically, alternatives to the entire VP *danced only with Sue,* in one case and alternatives to John in the other seem to play a role in determining the existential presupposition I'm talking about, as if the focus *even* associates with was in fact either the whole VP or the subject and the object NP, rather than just the object NP *Sue*.

The above observation does not merely show that the above sentence has one possible reading, with the focus of *even* actually bigger than the focus of *only*, that carries an existential presupposition, but it also shows that the sentence fails to have a reading where *even* and *only* share the same focus and the existential presupposition is absent. This is so because such a reading should be felicitous in contexts where speaker and addressees do not know whether John or anybody else did anything different from dancing with Sue, while the sentence is not.

We do instead predict that the above sentence is acceptable in the two types of contexts described above if either the entire VP was the focus of *even* or *even* was associated with two foci, i.e. the NP *Sue* together with the subject *John*:

(111) a. John even [danced only with $[\text{Sue}]_f]_f$.

Existence Presupposition: There is something else that John did besides dancing only with Sue.

b. $[\text{John}]_f$ even danced only with $[\text{Sue}]_f$.

There is some x ≠ John and some y ≠ Sue s.t. x danced only with y.

The first option is straightforward, as intonational prominence on the object NP is compatible with a focus as big as any constituent containing it, thus the VP as well. The hypothesis that the second option is also a possibility is inspired by a solution found in Wilkinson (1996) of related cases where the traditional view on *even* also appears to make incorrect predictions as far as the existential presupposition is concerned (c.f. Wilkinson 1996 and discussion in the next session), and depends on the assumption that *even*, differently from *only* needs to dominate its focus only at LF.

While the above discussion shows that it is far from so clear that examples like (109) should provide any evidence against the *existential presupposition* view, other facts, appear instead to challenge more seriously the claim that such a presupposition is part of the meaning of *even*. One instance is the dialog in (102), already considered above:

(112) A: Is Claire an ASSISTANT professor?

B: No, she's even an ASSOCIATE professor.

B's utterance indeed appears to involve an instance of *even* that cannot possibly introduce the presupposition that some alternative proposition is true, besides the prejacent, because all the focus-determined alternatives are mutually exclusive.[25]

On the basis of examples like the above, Rullmann concludes, with von Stechow, that the existence presupposition is not part of the meaning of *even*, but points out that, if we drop this assumption, examples like the following should still be explained:

(113) a. #We even invited $[\text{Bill}]_f$, although we didn't invite anyone else.

b. #John even drank $[\text{beer}]_f$, but that was the only thing he drank.

(Rullmann 1997, p.18)

In order to explain the effect of the existence presupposition in the cases where it is present, Rullmann suggests deriving it in the form of an implicature from the assertion and the scalar presupposition of *even*, on the basis of the following Gricean reasoning:

i. The speaker asserted p
ii. The speaker conveyed that p is the least likely to be true among the relevant alternatives
Conclusion: The speaker must have intended me (the addressee) to infer that some more likely alternative is also true.

Importantly, the above reasoning goes through only insofar as the alternative relevant propositions are related by entailment. This is what explains the absence of an existential

[25] There is actually an alternative way to understand this example and all cases where the relevant scale appears to be one where the alternatives are mutually exclusive, without giving up the existence presupposition of *even*. One could entertain the hypothesis that *even* requires a scale where actually all the alternatives are related by entailment (or perhaps 'lumping' in the sense of Kratzer 1989). Even when the relevant ranking appears to be violating this condition, a pragmatic mechanism of 'conversion' can transform it in a well-behaved entailment scale. What this mechanisms needs is a salient gradable property, like 'at least as good as' or 'as least as desirable as' or 'at least as far in his carrier as' etc. When such a property is available, then each element in the ranking can be transformed into an element on an entailment scale by modifying it with the relevant gradable property to it. For instance, in our case above, while the alternatives *to be an Associate professor, to be an Assistant professor, to be a temporary lecturer*...are mutually exclusive, the correspondent *to be at least as far in her career as an Associate professor, to be at least as far in her carrear as Assistant professor, to be at least as far in her carrier as a temporary lecturer*...are all related to each other by entailment (Something along these lines might be independently needed in order to resolve a puzzle pointed out in Schwarz (2002), and discussed in the next chapter). If this picture is on the right track, we might also understand the degree of acceptability of sentences like (112)B as a function of how easily a gradable property that is adequate for turning the ranking into an entailment scale is can be made available in the context.

implicature in examples like (112). What blocks the 'implicature' here is that the relevant alternatives are mutually exclusive, therefore no inference can be drawn:

(114) A: Is Claire an ASSISTANT professor?

B: No, she's even an ASSOCIATE professor.

Since there is no entailment between being a full professor, an associate, an assistant, and a post-doc, no inference can be triggered from the assertion of the prejacent and the presupposition that the prejacent is the lowest element on the scale.[26, 27]

The appealing feature of Rullmann's proposal is that it exploits independent pragmatic mechanisms to resolve a very mysterious puzzle. However, for his indirect account to extend to all cases, Rullmann needs to assume that the inference leading to an existential implicature is supported also when the relevant alternatives aren't in a relation of logical entailment:

(115) Mary even likes [sprouts]$_f$.

Existence presupposition: Mary likes some other food besides sprouts.

In this case, since liking sprouts does not entail liking other kinds of more tasty food, from the assertion (*that Mary likes potatoes*) together with the presupposition that liking sprouts is less likely than liking other kinds of food, we are actually not entitled to conclude that Mary likes

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[26] Rullmann claims that such an indirect account explains away also some counterexamples to Rooth's ambiguity theory. I will return to this issue the end of this chapter.

[27] Recall that one of Rullmann's arguments against the scope theory was based on observations regarding the existential presupposition of sentences containing *even.* We are now in the position to address the question raised in ft. 21, i.e. whether the claim that *even* does not per se introduce a presupposition of this type does undermine that argument. As mentioned in that footnote 21 this is actually not the case. In fact, also in Rullmann's indirect approach, the intuition that a speaker uttering (81)a is committed to the truth of the stronger (83) can only be accounted for if *even* has necessarily narrow scope (NS): Only the NS scalar presupposition, together with the assertion can generate this stronger existential implicature. The WS and the NS scalar presuppositions are given below:

(i) For every x, s.t. $x \neq SS$, *Hiring a linguist who read x* is more likely than *hiring a linguist that read SS.*

(ii) For every, s.t $x \neq SS$, *reading x* is more likely for y (the linguist we hired/ every linguist) than *reading SS.*

Because of the two different scalar presuppositions, the WS and the NS readings also generates different implicatures:

(iii) The speaker asserts *that the speaker's department hired a linguist that read SS* and Presupposes (i)
Conclusion: The speaker must have intended me (the addressee) to infer (82)

(iv) The speaker asserts *that the speaker's department hired a linguist that read SS* and Presupposes (ii)
Conclusion: The speaker must have intended me (the addressee) to infer (83)

something else. Although Rullmann does discuss the problem, he does not provide a convincing solution to it.

In conclusion, since the evidence concerning the existence presupposition is not conclusive, and since the results of my analysis of *even* in questions are independent from whether or not we ultimately assume *even* to carry an *existence presupposition*, in remainder of this these I will keep assuming this presupposition but focus solely on the scalar presupposition, repeated below:

(116) $[\![even]\!]^{w}(C)(p)$ is defined only if $\forall q \in C\ [\ q \neq p \rightarrow q >_{LIKELY}{}^{w}\ p\ ]$

Chapter 3

Presuppositions and Bias in Wh-questions

The focus in the previous chapter was on the presuppositions and meaning of polar questions containing *even* and minimizers. This chapter aims to bring into the picture the case of wh-questions as well.

Ladusaw (1979) observes that the way minimizers affect the interpretation of a hosting constituent question is the same as the way they affect the interpretation of a y/n question: unlike *any* and *ever,* minimizers force a negative bias reading in these questions as well. Specifically wh-questions containing minimizers express the speaker's expectation that the open sentence inside the proto-question is true of no relevant individual in the restrictor of the wh-phrase. In other words the kind of answer the speaker expects when she asks a wh-question with a minimizer is *nobody, nothing* or, e.g., *no student* depending on the restrictor of the wh-word.

In this chapter we will also see that, the correlation between questions with minimizers and questions with *even*, pointed out in the previous chapter, fully extends to the case of wh-questions as well: also wh-questions with *even* are ambiguous between a biased and a neutral reading (c.f. Wilkinson 1996) and also in this case bias systematically coincides with cases where the question carries an 'easy' presupposition, while under a neutral reading the question carries a 'hard' presupposition. The contextual information regarding the position of the focus of *even* resolves the ambiguity: if the focus is the lowest on the scale then the first reading is the only one available. If the focus is the highest, then the second reading is. In all other cases the question as a whole is infelicitous.

Since wh-questions and y/n questions with *even* exhibit the same distributional pattern of bias and presuppositions, a unified analysis of the effect of minimizers and *even* in the two types of questions is highly desirable.

My main goal in this chapter is to extend the analysis proposed in Chapter 2 to the case of constituent questions. This will amount to showing that, due the presupposition of *even*, only the universal negative answer to a wh-question containing *even*+the lowest scale point is felicitous. In doing so, an immediate complication in the H/K system adopted here (unlike in G&S's) will need to be addressed, which is due to a very basic difference between the denotation of y/n interrogatives and of wh-interrogatives in this system: while the denotation of y/n questions includes a negative answer the one of wh-questions does not.[1] What is needed in order to extend the analysis developed in Chapter 2 to wh-questions is, instead, a denotation of the questions that includes negative answers as well. In addition it is crucial that the way this type of denotation is obtained is such that the scope of *even* relative to negation in the negative answers follows compositionally from its scope in the question. I will show below that this can be achieved within the H/K theory of questions if this theory is slightly modified as to include the possibility that also wh-questions (optionally) contain a hidden *whether.*[2]

The assumption of a hidden *whether* alone will be shown to be sufficient to explain in terms of scope also the bias and presuppositions of wh-questions with *even*+ a scale low end-point. Besides this immediate advantage, this assumption will call for some independent justification, since it departs a bit more radically from a Karttunen-Hamblin's syntax semantics of questions, than the one made in Chapter 2 about y/n question.

The cost of the additional assumption of *whether* in wh-questions is compensated by the fact that such an assumption turns out to provide a new perspective on a number of interesting aspects of the semantics of wh-questions, the semantics of certain embedding predicates and the distribution of minimizers in embedded interrogatives, which reveals previously overlooked interesting correlations between them. Moreover, suggestive evidence in favor of the analysis developed in this chapter comes from Bulgarian, where wh-questions can actually contain a phonologically realized *whether* (i.e *li*), whose distribution is as predicted within the a novel perspective developed here.

[1] This is not necessary in G&S semantics of questions. But see ft. note 2.

[2] Since, differently from H/K's semantics of wh-questions, G&S's does include, among the other possible complete answers, negative answers one can actually derive bias and presuppositions of wh-questions within this system without postulating the presence of *whether*, but introducing a type lifted meaning for *even* as illustrated in the appendix. The motivation for adopting H/K system, instead, of G&S will become clear in sections 3.4 and 3.5.

These considerations will suggest that a system which requires the presence of *whether* in order to introduce negative answers in a question and therefore license minimizers (like H/K's) is to be preferable to one that does not (like G&S's, see appendix).

In the concluding section of this chapter, I will present a problem pertaining to two aspects of the semantics of constituent questions: the distinction between strongly and weakly exhaustive interpretations and the one between *de re* and *de dicto* readings. Specifically, I will show some potentially problematic implications of how my proposal in this chapter derives strongly exhaustive *de dicto* readings

The Chapter is structured as follows. Section 3.1 presents an overview of the relevant facts regarding minimizers and *even* in questions. Section 3.2 addresses the problem of deriving an 'easy' presupposition for these questions within H/K semantics. Section 3.3 shows how the presence of *whether* in the structure of wh-questions solves this problem and allows us to derive both bias and presupposition of *even* questions where the focus is the low end-point of the contextually relevant pragmatic scale. Section 3.4 discusses the implications of the assumption of a hidden *whether* in wh-questions and introduces the evidence for this assumption coming from Bulgarian. Finally section 3.5 introduces the problem of strongly exhaustive *de dicto* interpretations.

3.1 The Facts

In this section I will offer a brief overview of the relevant facts. I will start by illustrating the behavior of minimizers in wh-questions (in section 3.1.1), and then turn to the more general case of *even* in section 3.1.2.

3.1.1 Minimizers in Wh-questions

The examples from (1)-(4) show that the puzzling contrast between minimizers and *any/ever* we found in y/n questions, replicates itself in wh-questions as well.

(1) a. Who will **lift a finger** to help us? — Negatively Biased

b. Who will do **anything** to help us? — Neutral

(2) a. Who uttered **a single word**? Negatively Biased

b. Who said **anything**? Neutral

(3) a. Who contributed **a red cent** to this cause? Negatively Biased

b. Who offered **any money** to this cause? Neutral

(4) a. Who is advising **even a single student**? Negatively Biased

b. Who is advising **any students**? Neutral

For the purpose of better qualifying these intuitions, it's worth recalling two distinctive properties of negatively biased questions identified in the previous chapter: first, negatively biased questions cannot be uttered felicitously in a context where the speaker has clearly no clue regarding their true answer; second they cannot be simply answered affirmatively. I will take these two properties to provide a diagnostic for negative bias in wh-questions as well.

First, like in the case of y/n questions, that wh-questions with minimizers are biased is confirmed by the observations that they are systematically infelicitous in contexts where the speaker is clearly unbiased as to what the true answer to her question would be like and therefore her question is clearly meant to be a neutral and genuine request of information. In this respect they differ form wh-questions with *any*, as shown in (5).

(5)

Scenario 1:

My roommate Sue and I gave a party, some friends helped organizing it. At the end of the party I decided to send cards to thank all those who helped us. I don't want to forget anybody, so I ask Sue...

a. Who did anything to help? ✓ANY

b. # Who lifted a finger to help? # Minimizer

Scenario 2

I am trying to buy coffee at a vending machine that takes only coins. I need just one more penny to get my coffee. Some colleagues happen to come by...so I ask them

b. Guys, who can lend me a penny?

c. #Guys, who can lend me a red cent?

Secondly, just like polar questions also wh-questions with minimizers can't be simply answered affirmatively, but '*call for some further expansion in case the hearer wants to answer them affirmatively*' (Ladusaw 2002):

(6) A: Who contributed any money for this cause? ANY

B: Mary (did).

(7) A. Who contributed a red cent for this cause? Minimizer

B: # Mary (did).

B': Well, Mary did give some money, don't you remember?

B": Actually, Mary contributed a considerable amount of money, don't you remember?

B''' [Mary] $_{\text{Contrastive Topic}}$ did.

Summing up, constituent questions fully replicate the pattern of y/n questions: when they contain an NPI like *any* they can be interpreted as neutral, but when they contain a minimizer, they are obligatorily biased. The assumption borrowed in the previous chapter form Heim (1984), that minimizers contain *even* while *any* and *ever* do not will account for the difference in the wh-cases as well. To illustrate why this is so, the next section investigates the effect of *even* on constituent questions.

3.1.2 'Even' in Wh-questions

Like y/n-questions, also wh-questions are ambiguous between a neutral and a biased interpretation when they contain *even*. In addition also these questions can either carry an 'easy' or a 'harp' presupposition. Moreover, in this case as well, neutrality and bias are each linked to just one of the two presuppositions, in the same way as in y/n questions. This section illustrates the relevant data.

I start by showing that wh-questions with *even* are biased whenever *even* associates with expressions referring to the lower end-point of a contextually relevant pragmatic scale, and neutral when it associates with expressions that refer to the high end point of it. This is shown in (8) below.

(8) a. Who even answered [Question 2]$_f$?

< Question 2, ..., Question 15.... the easiest question> — Neutral

< The hardest question, Question 15,..., Question 2> — Negatively biased

b. Does your truck even fit an [elephant]$_f$? — Neutral

c. Does your truck even fit a [fly]$_f$? — Negatively biased

When the context entails that Question 2 is the hardest, the question in (8)a is neutral, when it entails that it is the easiest it is biased. In some cases, like (8)b and c, it is already clear out of context what position the focus occupies on the scale, this is why (8)b is unambiguously neutral and (8)c unambiguously biased.

(9) replicates the first of the two tests for bias, mentioned above, and shows that wh-questions where *even* associates with the lower element on the scale are infelicitous in contexts where the speaker has no expectations concerning the answer, unlike cases without *even* or with *even*+ highest element in the scale.

(9)

Scenario 1:

Two TAs are grading a test together. TA B is a less advanced student, therefore she is reading only the answers to the easiest question and then reports to TA A, who is instead correcting the harder questions and then grading the whole test. The night before the grades are due, A cannot find the tests, but she has written down all the results for the questions she had corrected, which were mixed results. To be able to give the grades, though, she also needs to talk to B to know how the students did on the easiest question. Therefore she calls up B and asks her:

a. Who answered the easiest question? — ✓without *even*

b. Who answered even [the easiest question]$_f$? — # with *even*

Scenario 2:

Two TAs are grading a test together. TA B is reading the answers to the hardest question and to the easiest question and then reports to TA A, who is instead correcting all other answer and then grading the whole test. The night before the grades are due A cannot find the tests, but she has written down all the results for the questions she had corrected, which were mixed results. To be able to give the grades, though, she needs to talk to B to know how the students did on the easiest and on the hardest question. Therefore she calls up B and asks her:

a. Who answered the easiest question and who answered even the hardest question?

b. Who answered even the easiest question and who answered the hardest?

Wh-questions with *even* pattern with y/n questions in another respect. Consider once more the question repeated in (10)a We saw above that this question is compatible with contexts where Question 2 was the hardest and with contexts where Question 2 was the easiest. But this amounts to saying that the question is ambiguous between a reading carrying a **hard** presupposition (in (10)b) and a reading carrying an **easy** one, in (10)c (cf. also Wilkinson 1996).

(10) a. Who even answered [Question 2]$_f$?

b. 'Hard' presupposition: For every contextually relevant person, having answered Q2 is less likely than having answered any other question.

c. 'Easy' presupposition: For every contextually relevant person, having answered Q2 is more likely than having answered any other question.

When it is clear out of context that the position of the focus of *even* is the highest or the lowest on the relevant scale, the question unambiguously carries a **hard** or **easy** presupposition, respectively:

(11) a. Who even answered [the hardest]$_f$ question?

'Hard' presupposition: For every contextually relevant person x, it is LESS likely that x answered the hardest question than that x answered any other question (from a relevant set of questions, e.g. in a test) .

b. Who even answered [the easiest]$_F$ question?

'Easy' presupposition: for every contextually relevant person x, it is MORE likely that x answered the easiest question than that x answered any other question (from a relevant set of questions, e.g. in a test).

Since the two presuppositions above state respectively that a **hard** presupposition and an **easy** presupposition hold of every x in the domain of the wh-phrase, I will refer to them as 'universal **hard**' and 'universal **easy**' presuppositions respectively.

In this chapter I will use the two abbreviations, **easyP** and **hardP** introduced in the previous one to refer instead to the two following 'open' propositions, for reasons that will become clear below:

(12) **hardP:** Solving problem 2 is LESS likely for x than solving any other problem
easyP: Solving problem 2 is MORE likely for x than solving any other problem

The correlation between these possible presuppositions, 'easy' and 'hard', and the neutral and biased readings considered above is quite straightforward because contexts where the focus is the lowest/weakest element on the relevant scale are such that the 'easy' presupposition is true, contexts where it is the highest element are necessarily such that the hard presuppositions is true:

(13) a. Negatively biased reading iff c ⊆ *that Question2 is the easiest*
b. ⇨For any relevant individual x, answering Q2 is MORE likely than solving any other relevant problem

(14) a. Neutral reading iff c ⊆ *that Q2 two is the hardest*
b. ⇨For any relevant individual x, answering Q2 is LESS likely than solving any other relevant problem

In the face of the above facts, and given that minimizers occupy the lowest position on theirs scale, also in the case of wh-questions, an account of the bias and the presupposition of *even+* the lowest element on the scale automatically extends to the bias of minimizers.

Since an account which explains the co-occurrence of an 'easy' presuppositions with bias must be preferred to one explaining this presupposition alone, in this case as well the ambiguity of questions with *even* must be understood in terms of the scope of *even* in these questions. This is so because an explanation in terms of a lexical ambiguity of *even*, as Rooth has it, would fail to account for the effect of bias, as argued already in the previous chapter. However, in this case, a scope-based explanation will require to modify more radically the Karttunen's analysis of wh-questions. The next section explains why this is necessary. The section after next will illustrate how the required modification can be achieved.

3.2 The Problem of Accounting for 'Easy' Presuppositions in Wh-questions

Adopting the same strategy as in the previous chapter, I will start by addressing the question of how the two possible opposite presuppositions of wh-questions with *even* (illustrated again in (15) can be derived, and then return to the problem of bias.

(15) a. Who even solved [Problem 2]$_f$?

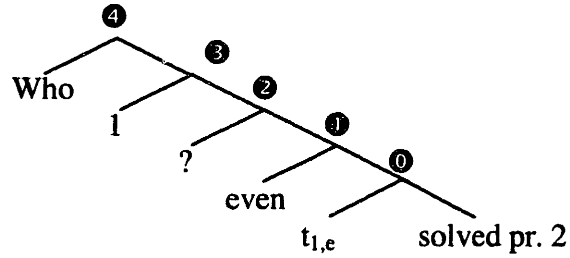
b. '∀ **Hard**' presupposition: For every contextually relevant person, having solved P2 is LESS likely than having solved ad any other problem.

b. '∀ **Easy**' presupposition: For every contextually relevant person, having solved P2 is MORE likely than having solved ad any other problem.

The **hard** presupposition can be derived directly in Karttunen's system as follows. First notice that, since, *even* introduces the requirement that the proposition in its scope is the least likely among the alternatives, the effect of *even* in a wh-question is to introduce a **hardP** like presupposition in each possible instantial answer. Let us see why.

(16)a. is the Karttunen style-LF of (15)a. (16)c shows how the denotation of this question is computed from the bottom to the top of the structure.

(16) a. LF:



b. $[\![?]\!] = \lambda p.\{p\}$

c. Abbreviations: p= *that g (1) solved Pr.2,* prs. =person, S= *even[$t_1$solved [Problem 2]$_f$]*

For every world w and assignment function g:

$[\![⓿]\!]^{w,g}$	=	$[\![$*solved Pr2*$]\!]$(g(1))	by FA
$[\![❶]\!]^{w,g}$	=	$[\![$*even*$]\!]^w$ (*that g(1) solved Problem 2*)	by IFA
$[\![❷]\!]^{w}$	=	$\{\lambda w$: S $\in$ dom ($[\![]\!]^w$). $[\![$even$]\!]^w$(p)=1}	by IFA*
$[\![❸]\!]^{w,g}$	=	λx_e. {λw: S$\in$ dom ($[\![]\!]^w$) . $[\![$*even*$]\!]^w$ (*that x solved Problem 2*) =1}	by λ-A
$[\![❹]\!]^{w,g}$	=	{q: $\exists$x [prs.(x) & q= λw: S$\in$ dom $[\![]\!]^w$.$[\![$*even*$]\!]^w$ (*that x solved Problem 2*)=1]}	by K

=

{ p: $\exists x_e$[person(x) & (p= λw: $\forall$ q $\in$ C [q $>_{LIKELY}^{W}$ *That x solved Pr. 2*] . x solved Pr 2 in w}

=

{ p: $\exists x_e$[person(x) & (p= λw: **hardP** . x solved Pr 2 in w }

First, since the wh-phrase quantifying over individuals of type e moves above *?*, the sister node of *even* (i.e. the node marked as '⓿' below) denotes an assignment dependent sentence (type t). The rule of IFA combines the meaning of *even* of this open sentence and generates again, as the denotation of node ❶, an assignment dependent value: a partial open sentence presupposing **hardP** and asserting what the open prejacent asserts. The latter combines with the meaning of ? by an application of the revised IFA* rule, retuning a set containing a proposition which is both assignment dependent and partial (node ❷). At node ❸, λ-abstraction applies thus binding the variable inside the truth-condition of the partial proposition in the set. Finally, the meaning of the wh-phrase is quantified in by an application of the Karttunen Wh-quantification rule. The result of this last step is a set of alternative partial propositions that for each relevant person x contains an answer asserting *that x solved Problem 2* and presupposing that *solving problem 2 was less likely for x than solving any other relevant problem* (i.e. **hardP):**

(17) {*that Mary even solved Problem 2, that Bill even solved Problem 2, that Kim even ...*}

The answer to this question in a given world amounts to the conjunction of the propositions in this set that are true in that world.

The question that needs to be addressed at this point is why a question with a denotation of this sort should presuppose as a whole a 'universal **hard'** presupposition like the one illustrated in (15)b.

At first, on the basis of the Question Felicity Principle alone, we would expect the question to be felicitous in a context where just one of its instantial answers is defined, as this would be sufficient for the question to be answerable. In other words on the basis of this principle alone it appears that the question should carry the following 'existential **hard** presupposition':

(18) $\exists$x [person (x) & $\forall$p [p$\in$ {p: $\exists$y$\neq$ Pr2 & p = *that x solved y*} & p$\neq$ *that x solved Pr 2* $\rightarrow$ *that x solved y* $>_{likelyW}$ *that x solved Pr2*]]

'There is at least one relevant person x, s.t. solving P2 was less likely for x than solving any other problem'

However, this presupposition is too weak. In fact, reporting the intuitions of native speakers, in (15) above I described the presupposition of the question as a 'universal **hard** presupposition'. Such a claim was based on the following observation: in most contexts where only the weaker existential presupposition is true the question is still infelicitous, while in contexts where the universal presupposition is also true the question becomes acceptable. There are however some interesting exceptions to this generalization.

(19) **Scenario:**

A class of 5 students took a test: Four linguists and one philosopher. The test contained a question (Problem 2) on wh-movement, which was of intermediate difficulty for somebody with some linguistic background. For the philosophy student, however, this question was the hardest in the Problem set. Both speaker and addressee know that the philosopher would find this problem very hard:

Guess, who even solved Problem 2? Biased

In this scenario, the question seems to be felicitous. In addition it is biased and biased towards the answer: *the philosopher did!* A fact that follows from the theory of bias proposed in this thesis: this answer is the only one whose presupposition is satisfied.

However, besides these special cases in which it is meant to be biased towards an instantial answer, the intuition is that a question like the above carries a universal presupposition. This can be understood, within the present view, as follows. A speaker uttering a question in a way that for every individual x the answer *That x solved Problem 2* presupposes that the problem was hard for x, knows that for any arbitrary individual in the restrictor of *who*, if the addressee answers that that individual solved the problem, he will automatically presuppose that the problem was difficult for that person. Moreover, if the speaker is unbiased, she doesn't know in advance (and has no expectations regarding) which propositions will be chosen by the addressee as the true answer to her question. Given this, it must be the case that she is taking for granted that the problem was hard for every arbitrary x in the restrictor of *who*. Since the addressee will be able to infer this much, the question is a presupposition failure unless this condition is indeed satisfied in the context of the conversation.[3]

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[3] Notice that the above discussion is reminiscent of the case of uniqueness and existence presupposition of personal pronouns. For a sentence containing a referential use of a pronoun to be be used in a cooperative way it is not only required that the addressee knows that there is a unique relevant and salient individual in the context, but must also be able to identify such an individual (see discussion in Soames 1989 and Stalnaker 1999). The analogy with this case is the following.

The speaker can take for granted a merely existential hard presupposition only if he has some evidence that this presupposition is true (i.e. if he has some way of identifying the individuals verifying this presupposition) and only if this evidence is available to the addressee as well. This is possible only when the speaker is biased, and the addressee is in the position of knowing what answer he is biased towards, because only in this case the addressee will be in the position to determine whether the presupposition of HIS answer is the one the speaker is taking for

How about the ∀-**easy** presupposition? Deriving this presupposition is less straightforward. In fact, the scope theory predicts that a presupposition like **easyP**, is generated only when the scope of *even* contains negation. In the previous chapter I showed that a wide scope reading of *even* in a y/n question generates precisely this structural configuration in the negative answer in its Hamblin set.

However, if we assume a Hamlin-denotation also for wh-questions, this analysis doesn't seem to be available for the case of constituent questions, as no proposition in the Hamblin-set is a 'negative' answer. In fact, as shown in (20), the Hamblin set of a wh-question only contains, for each individual in the restrictor of the wh-phrase, the proposition representing the affirmative instantial answer relative that individual, i.e. the proposition that that individual verifies the open sentence denoted by the syntactic sister of the ? morpheme:

(20) a. Who solved [Problem 2]$_f$?

b. { p: ∃x [person x and p=λw. x solved problem 2}

c. {*That Mary solved Problem 2, that Bill solved Problem 2, …*}

Given this, in H/K system, as is, there is no way of scoping *even* in the question that derives an **easy** presupposition and the bias effect this presupposition is generally accompanied by.

Unfortunately, Rooth's ambiguity theory of *even*, doesn't fare better with this problem. This view explains **easyP** as the presupposition introduced by $even_{NPI}$ and therefore predicts that it should always be possible in wh-questions, because wh-questions as well are licensing environments for NPIs. However, despite this apparent advantage, the argument given in the previous chapter, showing that the ambiguity theory fails to explain the effect bias triggered by this reading, extends to the case of wh-questions as well. Given this, the solution to the problem must be found somewhere else.

3.3 A Solution in Terms of Scope: *Whether* in Wh-Question:

This section shows that an account of bias and **easy** presuppositions of questions with *even*+ the low-end point of a scale in terms of scope is possible, after all.

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granted. In all other cases, what the speaker is taking for granted must be about how difficult is the problem is for any arbitrary individual, because he cannot identify which one the addressee will pick in his answer.

3.3.1 'Whether' in Wh-questions

The first task ahead of us, consists in identifying the component in questions like (15) that *even* scopally interacts with as to introduce different presuppositions. This problem is reminiscent of the one concerning y/n questions with *even* and can be solved in an analogous way. Let's see how.

The solution developed in the previous chapter for the case y/n questions was that an **'easy'** presupposition can be derived without further stipulation about the meaning of *even* or the denotation of y/n questions (as proposed in Hamblin 1973). All we needed to assume there is that the way we arrive at such denotation involves a wh-quantifier over functions of type <t,t>, i.e. *whether,* with the meaning repeated in (21).

(21) $[\![whether]\!] = \lambda f_{<<t,t>,t>} . \exists h_{<t,t>}. [h = \lambda t.t=1 \text{ or } h=\lambda t. t=0] \text{ and } f(h)=1$

In the case of y/n questions, this assumption leads to a quite standard question denotation. In the case of wh-questions, as we saw above, it is necessary to depart a bit more radically from a Karttunen/Hamblin's semantics of questions. What we need is a set containing both affirmative and negative answers for each relevant individual in the restrictor of the wh-word, and to arrive at this set in such a way that the possibility for *even* to scope over negation in the negative answers follows compositionally from its scope in the question. To achieve this result, however, it is sufficient to assume that also constituent questions (can) contain a *whether* with the same denotation and the same syntactic properties as in y/n questions (a proposal already made in Higginbotham 1993). Before turning to the complex case of questions with *even,* let us first see how this affects the denotation of a simple question as desired.

Consider the questions in (22)a. According to our current assumption this question has the LF structure given in (22)b[4], i.e. the structure of a multiple wh-question. The computation of its interpretation will therefore proceed by applying the usual semantic mechanisms and will generate a set of alternative propositions representing all the positive and negative instantial answers to the question. (22)c shows the details of how this work.

(22) a. Who called?

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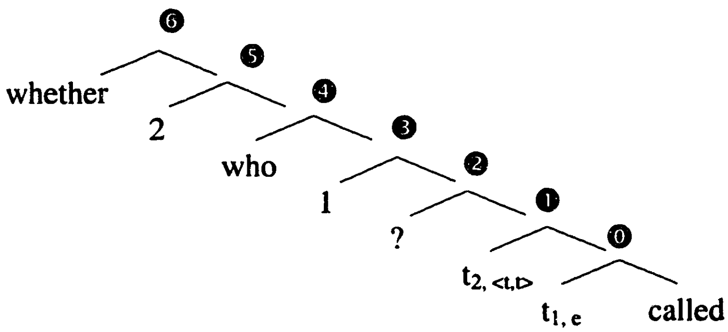
[4] But see footnote 13 in Ch 2 and the last section of this chapter.

b. LF:



b. Relevant lexical entries:

$[\![whether]\!] = \lambda f_{<<t,t>,t>} . \exists h_{<t,t>}. [h \in \{AFF, \neg\}$ and $f(h)=1]$

$[\![who]\!] = \lambda P_{<e,t>}. \exists x_e$ [person (x)and $P(x)=1$]

c. For every world w and assignment function g:

$[\![$ ⓿ $]\!]^{w,g} = [\![called]\!]^{w,g}(g(1))$

$[\![$ ❶ $]\!]^{w,g} = g(2)([\![called]\!]^{w,g}(g(1)))$

$[\![$ ❷ $]\!]^{w,g} = \{\lambda w. g(2)([\![called]\!]^{w}(g(1)))=1\}$

$[\![$ ❸ $]\!]^{w,g} = \lambda x_e. \{\lambda w. g(2)([\![called]\!]^{w}(x))=1\}$

$[\![$ ❹ $]\!]^{w,g} = \{p: \exists x$ [person(x) and $p = \lambda w. g(2)([\![called]\!]^{w}(x))=1]\}$

$[\![$ ❺ $]\!]^{w,g} = \lambda f. \{p: \exists x$ [person (x) and $p = \lambda w. f([\![called]\!]^{w}(x))=1]\}$

$[\![$ ❻ $]\!]^{w,g} = \{p: \exists x_e \exists h_{<t,t>}. [prs.(x) \;\&\; h = \lambda t.t=1$ or $h=\lambda t.t=0) \;\&\; p=\lambda w. h([\![called]\!]^{w}(x))=1]\}$ by K

=

$\{p: \exists x_e [prs.(x) \& (p=\lambda w. AFF([\![called]\!]^{w}(x))=1$ or $p=\lambda w. \neg([\![called]\!]^{w}(x))=1]\}$

=

{p : ∃x [person (x) and (p = *that x called* or p = *that x didn't call*)]}

Just like for other wh-questions containing two wh-words, this set contains as many alternatives as the cardinality of the Cartesian product of the sets denoted by the restrictor of the two wh-phrases. In this special case, since one of these sets contains just two elements (AFF and ¬), the denotation of the question contains for each relevant individual x in the restrictor of *who* two propositions, one representing the affirmative answer (*that x called*) and one the negative answer (*that x didn't* call) relative to that individual. For example, if the set of relevant individuals is {Mary, Kim}, the denotation of the question in (22)a is the following set.

(23) {***that Mary called, that Mary didn't call, that Kim called, that Kim didn't call***}

Given this, the denotation of a wh-question containing *whether* differs from the H/K denotation in the desired way: it contains also all possible instantial negative answers. Before discussing the implications generated form this difference, let us see how the presence of *whether* in wh-questions allows us to understand the effects triggered on them by *even.*

3.3.2 Scope Ambiguities of Wh-Questions with 'Whether' and 'Even'

Once we allow the possibility that also wh-questions contain *whether*, we predict that questions that do contain *whether* and contain also *even* are scopally ambiguous: Like in the case of y/n-questions, *even* can scope either above or below the trace of *whether* in these wh-questions as well. This is illustrated in (24): a question like (24)a can have either of the two LFs in (24)b or c:

(24) a. Who even solved Problem 2?

b. [Whether_2[who_2[Q [$\mathbf{t}_{2,<t,t>}$[*even* [$t_{1,e}$ solved $[\text{Pr2}]_f$] | $\text{trace}_{whether}$ > even |

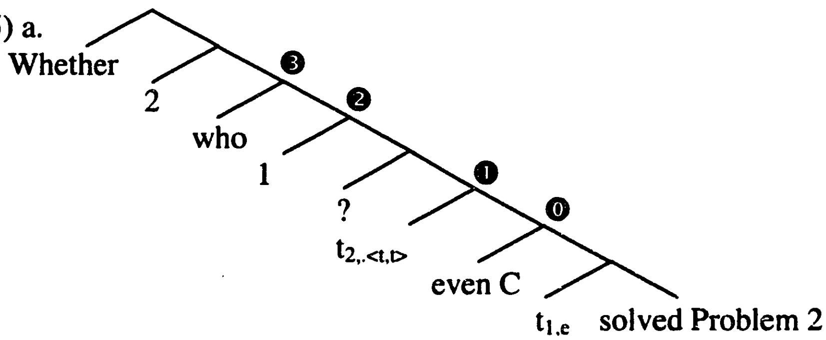
c. [Whether_2[who_1[Q [*even* [$\mathbf{t}_{2,<t,t>}$ [$t_{1,e}$ solved $[\text{Pr 2}]_f$] | even > $\text{trace}_{whether}$ |

This section and the next one illustrate how this ambiguity accounts for the two possible readings of wh-question with *even* and the two presuppositions they come with. I will start by showing that under the reading in (24)b. the question carries a ∀-**hard** presupposition while under reading (24)b., the possibility of a ∀-**easy** presupposition emerges. I will return to the bias effect that co-occurs with the latter presupposition in the next section.

We know, from the example above in (22), that, given the presence of *whether* the denotation of a question like (24)a will contain for each individual the proposition representing the negative answer and the one representing the affirmative answer relative to that individual. We also know, from the discussion of example (16) in section 3, that given the presence of *even* each proposition in the set is partial. What we need to see now is what presupposition each of these propositions carry under each of the above reading. Let's start with LF1.

Given that *even* scopes below *whether* in LF1, the presence of *whether* in the computation of its presupposition is going to be irrelevant, therefore, under this reading, we expect to derive a set of propositions all presupposing **hardP**, just like in (16). (25) shows that this is in fact the result (cf. also the appendix for the details of this derivation):

(25) a.



Trace$_{whether}$ > *even*

Abbreviations: p= *that g (1) solved Pr.2,* prs. =person

b. For every world w and assignment function g:

[[⓿]]^{w,g} = [[*even*]]^{w} (C)(p) is defined iff p is the least likely proposition in C.
If defined, then [[*even*]]^{w} (C)(p)= 1 iff (g(1)) solved problem 2

[[❶]]^{w,g} = g(2)([[*even*]]^{w} (p)) defined iff is defined iff p is the least likely proposition in C.
if defined then = g(2)([[*even*]]^{w} (p)) =1 ff g(2) ([[*solved Pr2*]](g(1)) =1

[[❷]]^{w,g} = λx_e. {λw: **hardP.** g(2)([[*even*]]^{w} (*that x solved Problem 2*)) =1}

[[❸]]^{w,g} = {q: ∃x [prs.(x) & q= λw: **hardP.** g(2)([[*even*]]^{w}(*that x solved Problem 2*))=1]}

[[❹]]^{w,g} = {p: ∃x_e [prs.(x) & (p = λw: **hardP.** AFF([[*even*]]^{w}(that x solved P2)) =1 ∨ p =λw: **hardP.** ¬ ([[*even*]]^{w}(that x solved P2)) =1)]}

=

{p: ∃x_e [prs(x)&[(p= λw: ∀ q∈C [q $>_{LIKELY}^{w}$ *That x solved P2*] . x solved Problem 2 in w)
or
(p= λw: ∀ q∈C [q $>_{LIKELY}^{w}$ *That x solved P2*] . x didn't solve Problem 2 in w)]] }

This set contains, for each relevant person x, two partial propositions (i.e. (A) and (B)), which are partial in exactly the same way (i.e. they presuppose **hardP**).

A. **Assertion:** *that x solved Problem 2*

Presupposition: Solving P2 was LESS likely for x than solving any other problem. **hardP**

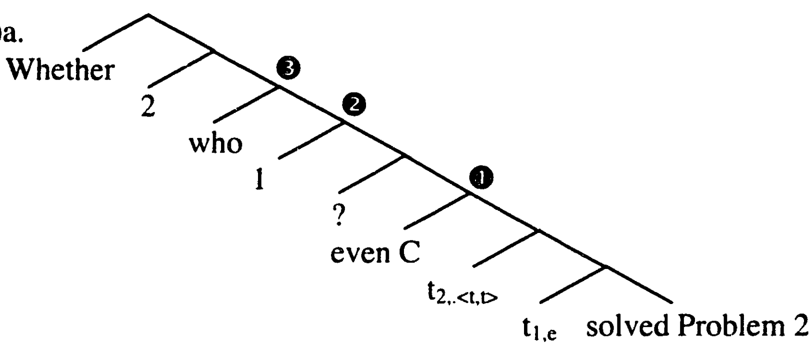
B. **Assertion:** *that x didn't solve problem 2.*

Presupposition: Solving P2 was LESS likely for x than solving any other problem. **hardP**

As a consequence, all the possible answers to the question under this reading presuppose **hardP.** As shown in the previous section for structures like (16), when this happens, the question as a whole carries a **universal hard** presupposition.

Let us now return to the second possible LF of the question under consideration. Contrary to the previous case, under this reading the presupposition of *even* is affected by the presence of *whether* in the question. In particular for each individual in the restrictor of *who,* the denotation of the question under this reading will contain two possible answer (a negative and an affirmative one) carrying opposite presuppositions (i.e. **easyP** and **hardP** respectively). This is shown in (26) (see also appendix):

(26)a.



Trace$_{\text{whether}}$> *even*

b. For every world w and assignment function g: (abbreviation: **solved problem 2 = P2)**

$[\![❶]\!]^{w,g}$ is defined iff (λw'. g(2) ($[\![$ **P2** $]\!]^{w'}$(g(1))=1) is the least likely proposition in C
if defined then $[\![❶]\!]^{w,g}$ = g(2) ($[\![$ **P2** $]\!]^{w}$(g(1))=1)

$[\![❷]\!]^{w,g}$ = λx$_e$. {λw. $[\![$ **even** $]\!]^{w}$ (λw'. g(2) ($[\![$**P2**$]\!]^{w'}$(x))=1)=1}

$[\![❸]\!]^{w,g}$ = {p: ∃x [prs(x) & p= λw. $[\![$**even** $]\!]^{w}$ (λw. g(2) ($[\![$**P2**$]\!]^{w'}$(x))=1)=1]}

$[\![❹]\!]^{w,g}$ = {p: ∃x [pr(x) & [(p = λw:∀q∈C [q>$_{\text{LIKELY}}$^{w} (λw'. AFF $[\![$**P2**$]\!]^{w'}$(x)=1)] . AFF $[\![$**P2**$]\!]^{w}$ (x)=1)
∨ (p = λw: ∀ q∈C [q >$_{\text{LIKELY}}$^{w} (λw'.¬ $[\![$**P2**$]\!]^{w'}$(x) = 1)]. ¬ $[\![$ **P2** $]\!]^{w}$(x)= 1)]] }

=

{p: ∃x [prs(x)) & [(p = λw: **hardP.** x solved Pr2 in w) or (p = λw: **easyP** x did**n't** solve Pr2)]]}

Let's have a closer look at what kind of propositions we find in this second set. Given the contribution of *even,* also this set contains two partial propositions for each relevant person x. This time, however, the two propositions are partial in different ways. The proposition corresponding to the 'positive answer' (i.e. *that x solved problem* 2) presupposes **hardP** and therefore it is identical to A above, while the proposition corresponding to the 'negative answer' (i.e. *that x didn't solve problem* 2), presupposes **easyP**:

A. **Assertion:** *that x solved Problem 2*
Presupposition: Solving P2 was LESS likely for x than solving any other problem. **hardP**

C. **Assertion:** *that s* ***didn't*** *solve problem 2.*
Presupposition: **Not** solving P2 was less likely for x than solving any other problem. **easyP**
⇔ Solving Problem 2 was MORE likely for x than solving any other

Given this, the presence of a covert *whether* in wh-questions and the possibility of *even* to take wide scope relative to its trace accounts for the possibility of **easyP** presuppositions in the negative instantial answers to wh-questions with *even*, just like in the case of polar questions. This simply shows that under the latter interpretation some of the answers have an **easy** presupposition. The next questions that need to be addressed is how the question as a whole can end up carrying a 'universal **easy** presupposition' and why this presupposition emerges always and only in situations where the question is obligatorily biased. The next section provides an answer to these two questions.

3.3.3 Bias and Presuppositions Explained

In order to account for the pattern of biased vs. neutral readings of wh-questions with *even* and their presuppositions, illustrated again in (27), we need to investigate what happens when a wh-question with *even* is uttered in one of two types of contexts: contexts where the 'universal **easy** presupposition' is true and contexts where the 'universal **hard** presupposition' is. Let's consider these two cases in turn.

(27) a. Who even solved [Problem 2]$_f$?

b. '∀ **Hard**' presupposition: For every contextually relevant person, having solved P2 is LESS likely than having solved ad any other problem.

b. '∀ **Easy**' presupposition: For every contextually relevant person, having solved P2 is MORE likely than having solved ad any other problem.

If a question like (27)a is uttered in a context where Problem 2 is the easiest for everybody, a presupposition like(28)c, i.e. **hardP,** is false, for every choice of x among the relevant people while, the **easyP** presupposition is true for every x.

(28) a. c ⊆ '∀ **easy**' presupposition

a. **HardP:** Solving problem 2 is LESS likely for x than solving any other problem

b. **EasyP:** Solving problem 2 is MORE likely for x than solving any other problem

Therefore, in a context of this sort, the reading where *even* has narrow scope relative to the trace of whether, is pragmatically excluded by the Question Bridge Principle because there is no way to provide a felicitous answer to it. This is so because, as we saw above, all the possible answers to the question under this reading presuppose **hardP.**

Mary solved Pr2	Mary didn't solve Pr2
Bill solved Pr2	Bill didn't solved Pr2
Kim solved Pr2	Kim didn't solved Pr2
...	...

Figure 1: $\text{Trace}_{\text{whether}}$> *even* = Answers presupposing **hardP** and therefore infelcitous

On the other hand the principle does not exclude the other possible reading to this question (i.e. *even* > $\text{trace}_{\text{whether}}$), as some of its answers are felicitous in the context we are considering. Specifically all the possible negative instantial answers to the question are defined in all the worlds in the context set because each one of them presupposes **easyP.** The positive instantial answers, on the other hand presuppose **hardP** and therefore they are all infelicitous in such a context:

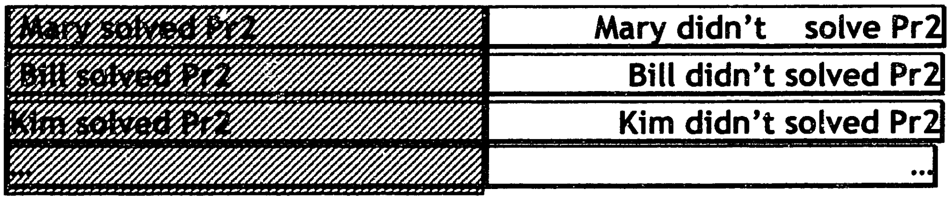


Figure 2: *even* > Trace$_{\text{whether}}$ ▨ = Answers presupposing **hardP** and therefore infelcitous

□ = Answers presupposing **easyP** and therefore felicitous

This is sufficient to account for why the question *who even solved Problem 2?* is biased towards the universal negative answer *that nobody did* in a context where the universal **easy** presupposition is satisfied. Indeed in a context of this sort the addressee can safely conclude from the very way the question is worded that no matter what person x s(he) picks up, the speaker is biased towards the negative instantial answer relative to that individual: *that x didn't solved Problem 2.* In addition, since this is the case for any arbitrary relevant individual, the addressee can draw the general conclusion that the speaker intended to express bias towards all the negative answers in the set, and therefore towards the answer that *nobody solved problem 2.*

We can now turn to the second type of contexts mentioned above, namely contexts where the '∀- **hard** presupposition' is true, instead. What needs to be explained is why in such contexts the question under consideration is not obligatorily biased.

If the context is such that Problem 2 is the hardest problem for everybody, the situation predicted by the present analysis is not completely symmetric to the one pictured above. Let's start considering the aspect in which it is symmetric. Like above, we predict all the answers to LF2 presupposing **easyP** to be factually unavailable:

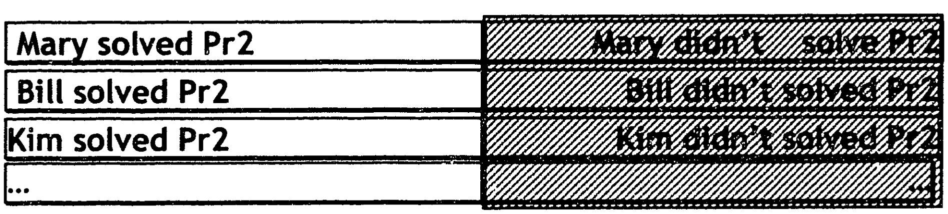


Figure 2: *even* > Trace$_{\text{whether}}$ ▨ = Answers presupposing **easyP** and therefore infelcitous

□ = Answers presupposing **hardP** and therefore felicitous

However this will not trigger bias for the following reason: that LF1 is pragmatically available, contrary to what happens in the contexts considered before, because all the answers to the question under this reading presuppose **hardP** and are therefore are felicitous.

Mary solved Pr2	Mary didn't solve Pr2
Bill solved Pr2	Bill didn't solved Pr2
Kim solved Pr2	Kim didn't solved Pr2
...	...

Figure 1: $\text{Trace}_{\text{whether}}$> *even* □ = Answers presupposing **hardP** and therefore felcitous

Indeed LF1 does leave open the possibility to the addressee to give a complete answer which for any individual can entail either the affirmative or the negative instantial answer relative to that individual. This *per se* is sufficient for the questions to have a neutral reading because a biased interpretation is forced only if the addressee is prevented to assert any combination of affirmative instantial answer.

The asymmetry between the two cases is illustrated in the following table, which summarizes the findings of this section.

Scope: **Answers:**	**Trace** $_{\text{whether}}$ > ***even***	***even*** > **Trace** $_{\text{whether}}$
x did solve Pr2	⊘	⊘
x didn't solve Pr2	⊘	✓

Table 1: c ⊆ ∀ **hard** presupposition

Scope: **Answers:**	**Trace** $_{\text{whether}}$ > ***even***	***even*** > **Trace** $_{\text{whether}}$
x did solve Pr2	✓	✓
x didn't solve Pr2	✓	⊘

Table 1: c ⊆ ∀ **easy** presupposition

3.3.4 *Conclusions*

In this section I presented an analysis of the relation between bias and **easy** presuppositions in wh-questions with *even*. The proposal extends automatically to both Hindi NPIs (see Lahiri 1998), and to English minimizer NPIs. Since the meaning of both sets of expressions involve *even* and a focus which is the lower end-point of a pragmatic scale, the bias they trigger in questions is fully predicted.

My account relies on the unconventional assumption that the structure of these interrogatives contains a silent *whether* and that, as a consequence, their denotation contains negative answers.

Before concluding, it is worth pointing out that such a proposal leads to the following prediction. Wh-questions containing *even* + the high end-point of a pragmatic scale do not need to contain *whether,* as this combination is compatible with a **hard** presuppositions, which can be generated also in the absence of *whether*, as we saw in section 3.2. To the contrary, wh-questions where *even* associates with the lower end-point of the relevant pragmatic scale (and therefore with minimizers as well) can be acceptable only if they contain *whether,* because compatible only with **easy** presuppositions, which in turn can be derived only in the presence of *whether.*

Although this prediction is hard to test in English, where *whether* is not phonetically realized, Bulgarian provides an adequate testing ground as in this language wh-questions do optionally contain an overt instance of *whether*. The next section shows that distribution of this wh-word in Bulgarian confirms my prediction. The Bulgarian facts will therefore suggest that an analysis of bias and presuppositions in English wh-questions with *even* that requires the additional assumption of a hidden *whether* is to be preferred to one that doesn't (see ft.2).

3.4 *Whether* in Wh-Questions: Implications and Evidence

The assumption of an (optional) unpronounced *whether* in English wh-questions generating a denotation containing 'negative' alternatives departs significantly from the semantics and syntax of wh-questions in H/K system.

The aim of this section is to provide independent evidence for it, illustrate precisely in which respects this novel view on wh-questions differs from the traditional H/K's view and explore further implications these differences yields.

3.4.1 'Whether' in Wh-Questions: Evidence From Bulgarian.

The hypothesis that English constituent questions can optionally contain a covert *whether* and that *whether* becomes obligatory in questions with minimizers is obviously very hard to test, because in the presence of another wh-word this wh-quantifier is always unpronounced. In order test this hypothesis one needs to look into languages different from English. Bulgarian appears to provide the adequate testing ground.[5]

Both matrix and embedded y/n questions in Bulgarian obligatorily contain the 'question clitic' *li* (or its non clitic variant *dali*):

(29) b. Iska *(li) kafe?
want-3sg *li* coffee
'Does he/she want coffee?'
b. Čudja se/ ne znam iska *(li) kafe
wonder-1sg refl/not know-1sg want-3sg *li* coffee
'I wonder/ I don't know whether he/she wants coffee'

Interestingly, *li* can, but doesn't have to co-occur with wh-words in both matrix wh-questions and in wh-questions embedded questions under *wonder:*[6]

(30) a. S kogo li se e sres^tnal vc^era?
With whom *li* refl is met-participle yesterday?
'Who did you meet yesterday?'
b. S koi li studenti se e sres^tnal vc^era?
With which *li* student refl is met-participle yesterday?
'Which student did you meet yesterday?'
Which students did you meet yesterday?
c. C^udja se kakvo li iska
wonder-1sg refl what *li* want-3sg
'I wonder what he wants'

[5] The judgments and reported in this section were provided to me by Roumi Pancheva.

[6] The fact that *li* splits the wh-phrase *which student* is merely due to its clitic nature.

Although the particle *li* is generally thought as a question complementizer (i.e., the overt realization of *?*), its nature is not yet fully understood.[7] Since the facts reported in this section and in the next show that this clitic has many distributional properties in common with the *whether* hypothesized in this chapter, it is at least very plausible that *li* is the Bulgarian counterpart of *whether.*

As mentioned above, if Bulgarian *li* is indeed the overt counterpart of *whether* the analysis presented in this chapter makes very precise predictions regarding its distribution in wh-questions with minimizers and with *even: li* should be obligatory in questions with minimizers and in question where *even* associates with the LOWER end-point of the relevant pragmatic scale, but it can be dropped when *even* associates with the HIGHER end-point. (31)-(33) show that this prediction is on the right track:

(31) Mra~dval ??(li) si e njakoga pra~sta? *Negative Bias*
move-participle ??(*li*) refl is sometimes the-finger
'Has he ever lifted a finger'?

(32) Koj *(li) dori e res^il naj-lesnata zadac^a? *Negative Bias*
Who *li* even is solved most-easy problem
' Who *(li) even solved the easiest problem?'

(33) Koj (li) dori e res^il naj-trudnata zadac^a? *Neutral*
Who *li* even is solved most-difficult problem
' Who (li) even solved the hardest problem?'

The data reported in this section is fragmentary and not conclusive. More tests should be run to precisely establish the nature of *li* and its distribution in a wider variety of embedded contexts. This notwithstanding, this data provide at least preliminary evidence supporting the analysis of bias and presuppositions of wh-questions with *even* and minimizers developed in the previous section.

[7] For example, Boskovič has recently proposed that "li" is not a complementizer but a focus-marker attached to phrases or the verb, which then have to move to the CP domain.

3.4.2 Wh-questions with and without 'Whether': Weak and Strong Exhaustivity

The denotation of wh-questions with *whether* differs from Karttunen's and Hamblin's and resembles instead Groenendijk&Stokhof's in the following important respect: it generates strongly exhaustive readings instead of weakly exhaustive ones (in the sense of G&S (1985)). Let's see what this means.

The significance of the distinction between strong and weak exhaustivity emerges in embedded context, for instance in the complement of question embedding predicates (QEP henceforth) like *know*. In general, 'exhaustivity' is the aspect of the meaning of sentences like (34)a, that guarantees the following type of entailments:

(34) a. Ann knows who called.

b. Bill called.

c. (Bill is relevant)

∴ Ann knows that Bill called.

In order to establish whether Karttunen's and Hamblin's semantics is exhaustive in this sense, we need a semantics for question-embedding *know*. Specifically, assuming with H/K that questions are set of propositions representing their possible answers, the meaning we want for question-embedding *know* can be roughly paraphrased as follows: for any individual x, any possible world w and question Q, *x knows Q* in w iff x believes in w **the true complete answer** to Q in w (see Karttunen 1977, p 17 and ft.11 on p.18, see also Heim 1994).

Since the notion of true and complete answer to a H/K-type of question in a world can be systematically derived from the question denotation via Heim's Ans1 operator (in (35)b), the lexical entry of *know* can be described in terms of Ans1:

(35) a. For every individual x, world w and questions Q,

$[\![$ *know* $]\!]$ (Q) (w) (x) = 1 iff x believes Ans1 (Q) (w)

b. Ans1(Q) (w) = $\cap$ {p: p $\in$ Q & p(w) =1}

(36) shows that, given (35)a and b, H/K semantics does indeed support the inference in (34) above, thus qualifying as 'exhaustive' in the above sense. This is shown in (36), where $[\![$*who called*$]\!]_{H/K}$ refers to H/K-denotation of the question *who called.*

(36) a. $[\![$*Ann knows who called*$]\!]^{w}$ = 1iff Ann believes in w Ans1 ($[\![$*who called*$]\!]_{H/K}$)(w)

b. *That Bill called* $\in$ ($[\![$*who called*$]\!]_{H/K}$)

c. If Bill called in w then Ans1($[\![$*who called*$]\!]_{H/K}$)(w) => *That Bill called* from a&b

d. Bill called in w

$\therefore$ $[\![$*Ann knows who called*$]\!]^{w}$= 1 only if Ann believes in w that Bill called from c&d

On the other hand, given this meaning of *know,* H/K denotation doesn't support the inference in (37), as shown in (38), and therefore does not qualify as strongly exhaustive.

(37) a. Ann knows who called.

b. Bill didn't call.

c. (Bill is relevant)

$\therefore$ Ann knows that Bill didn't call.

(38) $[\![$*Ann knows who called*$]\!]^{w}$ = 1iff Ann believes Ans1($[\![$*who called*$]\!]_{H/K}$)(w) in w

That Bill didn't call $\notin$ ($[\![$*who called*$]\!]_{H/K}$)

Bill didn't call in w

≠> $[\![$*Ann knows who called*$]\!]^{w}$ = 1 only if Ann believes in w' that Bill didn't call

On the contrary, G&S's partition semantics of questions does predict the above inference to be valid as well (cf. G&S 1985), an apparent advantage of the latter system over H/K view.

It is worth noticing, however, that if a wh-question also contains a hidden *whether,* entailments like in (37) become valid, as shown in (40). In fact, the answer we derive by applying Ans1 to a question containing *whether* differs from the one we derive form a question which does not, precisely in that it entails also all the true instantial negative answers to the question.

(39) a. For every w and every set of propositions Q:

Ans1(Q) (w) = $\cap$ {p: p $\in$ Q & p(w) =1}

b. Ans1 (w) ({*that m called, that s called, that b called...*} = *that Mary called*

c. Ans1 (w) ({*that m called, that m didn't call, that s called, that s didn't call...*}=

= *that m called and s didn't call and ...nobody else called*

(40) a. ⟦*A.knows (whether) who called*⟧^{w}=1 iff A. believes Ans1(⟦*(whether) who called*⟧)(w) in w

b. *That Bill didn't call* $\in$ ⟦*(whether) who called*⟧

c. If Bill didn't call in w, Ans1(⟦*(whether)who called*⟧)(w)=>*That B. didn't call* [from a&b]

d. Bill didn't call in w

∴ ⟦*Ann knows (whether) who called*⟧^{w} = 1 only if A. believes in w that B. didn't call [from c&d]

Given this, the proposal made in this chapter allows us to derive strongly exhaustive readings in a system like H/K as well, simply reducing the distinction between strong and weak exhaustivity to the presence vs. absence of *whether*, respectively. In addition, by viewing strong exhaustivity as contingent to the presence of the y/n-quantifier *whether*, this perspective directly captures the parallelism between strongly exhaustive readings of wh-questions and the necessarily strongly exhaustive semantics of y/n questions (shown in (41) and (42)).

(41) Ann knows whether Bill called

Bill didn't call

∴ Ann knows that Bill didn't call.

(42) a. ⟦*A. knows whether Bill called*⟧^{w}=1 iff A. believes Ans1(⟦*whether Bill called*⟧$_{H/K}$)(w) in w

b. *That Bill didn't call* $\in$ ⟦*whether Bill called*⟧$_{H/K}$

c. If Bill didn't call in w, Ans1(⟦*whether B. called*⟧$_{H/K}$)(w) => *That B. didn't call* [from a&b]

d. Bill didn't call in w

∴ ⟦*Ann knows whether Bill called*⟧^{w} = 1 only if A. believes in w that Bill didn't call [from c&d]

A uniform treatment of strong exhaustivity in y/n and wh-questions is a feature which makes this approach preferable to the existing alternatives. Let us see why.

Heim (1994) shows, that strong exhaustivity can be also accounted for in Karttunen's system, by allowing the lexical semantics of QEP which support inferences like (39), to make reference to the following derivative notion of answer, Ans2, defined in terms of Ans1:

(43) For every individual x, world w and question Q,
Ans2 (Q) (w) = λw'. [Ans1 (Q) (w) = Ans1(Q) (w')]

(44) For every individual x, world w and questions Q,
[[*know*]] (Q) (w) (x) = 1 iff x believes Ans2 (Q) (w)

This second notion of answer is equivalent to the *de dicto* G&S's question denotation[8] therefore, just like the latter, it accounts for strong exhaustive readings as well. Heim's proposal, however, differs from G&S's in the following important respect. While G&S encode strong exhaustivity as a characteristic property of the denotation of any question, Heim locates it in the lexical semantics of QEPs. Therefore Heim's system is more flexible in that it allows, in principle, a certain degree of variation between predicates that is impossible in G&S's theory. Specifically Heim predicts the possibility that some QEPs support strongly exhaustive readings (Strong Exhaustive QEPs henceforth), while other support only weakly exhaustive ones (Weakly Exhaustive QEPs), depending on which of Ans1 or Ans2 their meaning refers to (see Heim 1994, Beck and Rullmann 2000 and Sharvit 2002).

Evidence in favor of a flexible approach, and therefore problematic for G&S's, might come, according to Heim, from emotional question embedding predicates like *surprise.* At first approximation, the meaning of question embedding *surprise* can be described as follows: for every individual x and question Q, *Q surprises x* is true iff x expected the negation of the complete true answer to Q. If this is correct, the problem for G&S semantics is the following: in a theory where questions are always strongly exhaustive, if Bill didn't call and Ann instead

[8] This is true insofar as the proto-question contains only Individual Discriminating Predicates (see Heim 1994, p 133-134, and 140; c.f. also Sharvit 2002 and Lahiri 2002 for discussion)

expected him to, but also correctly expected that all those who in fact called would call, the following sentence is incorrectly predicted to be true (cf. also Bermann 1991):

(45) It surprised Ann who called.

In order to understand this argument one should keep in mind the following semantic property of *surprise* (cf. Lahiri 1991, 2002). *Q surprises x* means that x expected the negation the conjunction of the true instantial answers in Q. [9] Given this, Lahiri observes that *surprise*, just like negation, does not distribute over parts of that conjunction, because EXPECT NOT (A&B) does not entail EXPECT (NOT A and NOT B). This seems to be correct, indeed what surprises can be the particular combination A and B, even when A and B taken in isolation were expected. (46) illustrates this point:

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[9] More recently, Sharvit (2002) argues that also facts like (i) show that *surprise* is a weakly exhaustive QEP, in the sense of Heim (1994):

(i) # It didn't really surprise Ann who came to the party. For example it didn't surprise her that Bill didn't come.

At first Lahiri's (1991, 2002) observation that *surprise* does not distribute over parts of a conjunction, appears at first to undermine Sharvit's argument. In fact, one could think that, given Lahiri's semantics for *surprise,* the oddness of (i) should be predicted, regardless of whether *surprise* was strongly or weakly exhaustive. Here is why. If Lahiri and Heim are right in claiming that *Q surprised x* does not entail that x expected any of the instantial answers to Q, taken in isolation, to be false, then that x did correctly expect one true instantial answer, be it positive or negative, to be true is not a sufficient condition to make *Q surprised x* false. Therefore, even if the complete answer to Q entailed the true negative instantial answers, as G&S have it, that x expected a true **negative** answer to be true is not a sufficient reason to deny that x was surprised about Q, unless he also expected all the other true instantial answers to be true (this is shown in (ii)).

(ii) Suppose that the complete true answer to *who called* was *that Mary called, Bill didn't call and Kim called.*
It surprised Ann who called = Ann expected that Mary didn't call or Bill called or Kim didn't call.
Therefore *It didn't surprised Ann that Bill didn't call =/=> It didn't surprise Ann who called.*

Given this, in Lahiri's perspective, one could argue that the example in (i) is odd, even if we assumed a strongly exhaustive semantics for *surprise,* because it suggests that the second conjunct in it should provide a reason for the denial in the first conjunct, but it does not.

Notice, that ,because its structure is the opposite, Heim's argument is not affected by the above mentioned problem, and therefore it appears to be more reliable:

Q surprised x is true iff x expected the negation of the complete answer to Q
Therefore that x actually expected one instantial conjunct in that answer to be FALSE should be sufficient for *Q surprised x* to be TRUE.

However, a comparison between (iii) and Sharvit's example (repeated in (iv)) immediately suggest the explanation given above for the oddness of (iv) cannot be correct, because, if it was we would expect (iii) to be also odd, while instead it is judged to be perfectly fine.

(iii) It didn't really surprise Ann who came to the party. For instance, Bill came and she expected him to.
(iv) # It didn't really surprise Ann who came to the party. For example it didn't surprise her that Bill didn't come

The above contrast suggests that while the correct expectation of a **negative** instantial answer is not sufficient to motivate the denial of *Q surprised x,* the correct expectation of a **positive** instantial answer CAN be. Given this (iii) is a puzzle, in light Lahiri's observation. However see Sharvit (in preparation) for an analysis of *suprise* that builds on Lahiri's original insight but predicts the facts in (iii) and (iv).

(46) It surprised me that Mary and Bill came to the party, since one of them had to take care of the baby, but it didn't surprise me that either of them I particular came.

This is relevant to the above example, because it shows that, as a consequence of the meaning of *surprise*, it is sufficient to not expect just one of the instantial true answers to a question in order to be surprised by the complete answer. Heim's point follows. Recall that the strongly exhaustive answer to a question entails all the true negative instantial answers to that question as well. Therefore, if the meaning of *surprise* was strongly exhaustive answer, as G&S predict, then not expecting one negative instantial answer to a question Q should be sufficient to make x surprised about Q, contrary to our intuitions. On the other hand, Heim's system can avoid this prediction and capture the lack of strong exhaustive readings with *surprise* by simply assuming that the lexical meaning of *surprise* refers to Ans1, rather than Ans2.

Although the strength of this argument is contingent to a more comprehensive understanding of the semantics of predicates of surprise (Heim p.c.), if it is on the right track than a flexible account of exhaustivity is to be preferred.

At this point it is worth noticing that, unlike G&S's, the proposal made in this chapter, exhibits the same flexibility as Heim's insofar as the presence of *whether* in constituent questions is taken to be optional. In order to guarantee that verbs like *surprise* turn out to be weakly exhaustive all we need is a semantics or a syntax for these verbs that excludes the possibility for them to embed *whether* questions all together. If we wanted to encode this restriction in the syntax, would need to derive a constraint of the following type:

(47) * surprise whether

One way to implement the restriction this sort in the semantics, instead, is by the means of a presupposition like (48)a:

(48) For every x, w and Q

a. $[\![surprise]\!]$ (Q) (x) (w) is defined iff $\cap \{p: p \in Q\} \neq \varnothing$

b. if defined then, $[\![surprise]\!]$ (Q) (x) (w) =1 iff x expected in w ~ Ans1 (Q)

The above lexical entry introduces the definedness condition that there should be at least one possible world where all the propositions in Q are simultaneously true. This condition is sufficient to exclude questions with *whether* under *surprise*, because *whether*-questions contain,n for each individual in the restrictor of the wh-phrase, two propositions that are mutually exclusive. Given this there can be no world in which all the propositions in such a question are simultaneously true. Given this, embedding a question with *whether,* would systematically result in a presupposition failure. On the other hand, if the question doesn't contain *whether* this requirement can be satisfied as the question would not contain mutually exclusive propositions and therefore their conjunction isn't a contradiction.

No matter whether we go for a semantic or a syntactic constraint, under the present proposal, strength is captured in terms of the presence vs. absence of *whether* and would predict that this predicates affected by the constraint never supports a strongly exhaustive reading, as desired.

To sum up, I illustrated here two alternative ways to derive strong exhaustivity: one exploiting the notion of Ans2 (as Heim has it), the other the presence of a hidden *whether.* In addition, I have shown that both approaches allow for the possibility of readings that are weakly but not strongly exhaustive. Therefore, if these readings are empirically attested, both Heim's and my approach to exhaustivity turn out to be superior to G&S. I also recalled that the behavior of predicates like *surprise* provide at least suggestive evidence in this direction.[10]

At this point it might be worth to see whether there is any reason to prefer a *whether*--based account over Heim's. Although the considerations below are not conclusive, I believe they might ultimately provide us a motivation for doing so.

By uniformly treating strong exhaustivity of *whether*-constituent-questions and of y/n questions in terms of the presence of *whether*, the *whether*-based view leads to the additional desirable prediction that predicates lacking strong exhaustive readings when embedding

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[10] Heim also observes the soundness of the following inference provides additional support for a flexible account:

(i) Premise 1: John knows that Bill and Sue called.
Premise 2: That Bill and Sue called happens to be the answer to the question *who called?*
Conclusion: John knows the answer to the question *who called?*

Specifically, she observes that (i) shows that *knowing the answer to Q,* in suitable contexts can be understood as *knowing Ans1*. Notice that the *whether*-based approach to exhaustivity accounts for this possibility as well.

constituent questions can never embed y/n questions either (as shown in (49)), a fact which to the best of my knowledge has been so far remained unexplained:

(49) a. #It surprised Ann whether Bill called.

Since y/n, in virtue of containing two mutually exclusive propositions, are inherently strongly exhaustive, a uniform account of the absence of strongly exhaustive readings and the unacceptability of y/n questions under QEPs like *surprise* is certainly desirable.

A uniform account of this sort is not available, however, if strong exhaustivity is understood in terms of Ans2. Notice in fact that positing a semantics of *surprise* in terms of Ans1 would not by itself suffice to exclude (49), as nothing prevents Ans1 to apply to a y/n question as well, nor to assert that the subject expected the negation of the resulting proposition.

The problem is that excluding the possibility that predicates of surprise refer to Ans2 in their semantics, does not in fact completely exclude by itself strong exhaustive readings under *surprise*: Ans1 is sufficient to derive a strongly exhaustive reading whenever the embedded question is a y/n question. The unacceptability of (49), however, suggests that the incompatibility of *surprise* with strong exhaustivity extends to y/n questions as well, a fact that would therefore need to be accounted for in some other way.

Given this, if the *weakly exhaustive* nature of *surprise* is real, we have an indirect argument for the *whether*-based approach.

Finally additional evidence for this view comes once more from Bulgarian. While in English what confirmed our predictions that strong exhaustivity is linked to the presence *whether* is the impossibility for weakly exhaustive predicates to embed y/n questions, if it is correct that Bulgarian *whether* is always phonetically realized, Bulgarian allows us to test the prediction in wh-questions as well. The outcome of this test is given below. Although very colloquial, sentences with constituent questions are acceptable under *surprise*, but only when they do not contain *li* (Pancheva, p.c.).

(50) a. Maria se iznenada koj (*li) dojde

M. refl surprised who (*li*) came

a. Iznenada ja koj (*li) dojde.

Surprised her who (*li*) came

'It surprised her who came'

The facts above show that that our prediction is correct, and therefore confirm that it is not mere coincidence that weakly exhaustive QEPs do not admit y/n question complements.

3.4.3 The Problem of Strongly Exhaustive 'De Dicto' Readings

This last subsection introduces a potential problem for the view on the semantics and syntax of wh-question presented in this chapter. Specifically I will show how so called *de dicto* readings can be derived, within this view, in two different ways. I will then show that while, on the one hand, only one of these ways allows us to account for certain attested strongly exhaustive *de dicto* readings, on the other hand it fails capture our intuitions of what counts as congruent answers to *de dicto* interpretation of questions containing negation and about the asymmetrical status of the restrictor of a wh-phrase and the predicate in the proto-question. The problem affects G&S's theory as well but does not affect Heim's.

The idea of having *whether* in wh-question was already entertained and rejected in Karttunen (1977). Karttunen's motivation for ruling out this possibility was that wh-questions with *whether* would end up to be semantically equivalent to their negations, contrary to the intuitions. In fact, if we limit our attention to the readings considered so far (i.e *de re readings,* as we will see below), the proposal I presented does in fact predict such an equivalence. Both (51) a and b are identical to the set in (51)c. (see appendix).

(51) a. $[\![$(*whether*) *which student called* $]\!]^{w}$

b. $[\![$(*whether*) *which student didn't call* $]\!]^{w}$

c. {p: ∃x [$[\![$*student* $]\!]^{w}$(x)= 1& (p = *that x called* or p = *that x din't call*)]}

This extends also to the G&S's readings considered so far, namely their *de re* readings (c.f. G&S

1985, and appendix):

(52) [[*which students called*]](w) =

{w': λx. x is a student in w & x called in w = λx. x is a student in w & x called in w'} =

{w': λx. ~ (x is a student in w & x called in w) = λx. ~ (x is a student in w & x called in w')} =

[[*which students didn't call*]](w)

The equivalence between positive and negative questions appears at first problematic, since it incorrectly predicts that sentences like the following should be contradictory:

(53) Ann knows which students called but she doesn't know which students didn't call.

This sentence has two non contradictory readings. The first reading is the one Karttunen has in mind and states that Mary knows of all those that are students and called that they called but not necessarily that they are students, while with respect to those that are students and didn't call either she has no opinion or she falsely believes that they called. This reading is true, for example, in the following scenario:

(54) *The students were all in front of Ann. John pointed to each of them and asked her: 'was (s)he at the party?'. Ann gave the correct answer for all of them that indeed where at the party but she was sometimes wrong or didn't have any idea about those who were not.*

Unlike G&S's, Karttunen's view, where only weak readings are derived, predicts this reading for this sentence.

Karttunen's objection applies only to a view on wh-questions according to which *whether* is always involved in their structure. On the other hand, the *whether*-approach I propose correctly predicts besides a contradictory 'exhaustive' reading, in (55)b, the above non contradictory reading of this sentence, if both embedded questions lack *whether*, in (55)a.

(55) a. Ann knows which students called but she doesn't know which students didn't call.

b. Ann knows (whether) which students called but she doesn't know (whether) which students didn't. (⊥)

Given this my proposal and Karttunen's make the same predictions regarding the above described reading. There is, however, another non contradictory interpretation of the above sentence, which Karttunen cannot account for. In fact the sentence above seems to have also an interpretation according to which Mary's knowledge is 'exhaustive', in the sense that Mary knows that Kim, Bill and Sue are students and were at the party an no other student was at the party, and still she doesn't know who are the students who weren't at the party, because she does not know who all the students are. This second reading is one where Mary's knowledge (asserted in the first conjunct and negated in the second) qualifies as *de dicto* rather than *de re* knowledge.

The distinction between *de re* and *de dicto* readings is thoroughly discussed in G&S' work (c.f. G&S 1985 and subsequent work, see also Heim 1994, Beck and Rullmann 1999 and Sharvit 2002 for discussion of how to derive these readings in a set-of-answers semantics of questions). The two readings can be roughly described as follows: if Ann knows which students called, and her knowledge is *de dicto,* then she believes of those individuals that are students and called in the actual world, that they are students and called; under a *de re* reading, on the other hand, she simply knows of those who happen to be students that called, that they called.

While G&S's account of *de re* and *de dicto* readings fails to predict the existence of the 'weakly exhaustive *de re*' reading that Karttunen pointed out, because it derives only strongly exhaustive readings, it does correctly predict that the sentence in (55) under a *de dicto* strongly exhaustive reading is not contradictory. Let's briefly see why (cf. also G&S 1985, and Lahiri 2002, p158 and following for discussion). The way *de dicto* readings are captured in G&S's system is by interpreting the restrictor of the wh-phrase relative to the locally bound world, rather than the actual world. This is shown in (56)a (compare with the above mentioned G&S's *de re reading* in (56)b):

(56) ⟦*which students called*⟧(w) =

a. {w': λx. x is a student in w & called in w= λx. x is a student in w' & called in w'} *de dicto*

b. {w': λx. x is a student in w & x called in w= λx. x is a student in w & called in w'} *de re*

(57) shows the two readings for the corresponding negative interrogative:

(57) $[\![$*which students didn't call*$]\!](w) =$

a. $\{w' : \lambda x. \sim(x \text{ is a student in } w \; \& \; x \text{ called in } w) = \lambda x. \sim(x \text{ is a student in } w' \; \& \; x \text{ called in } w')\}$ *de dicto*

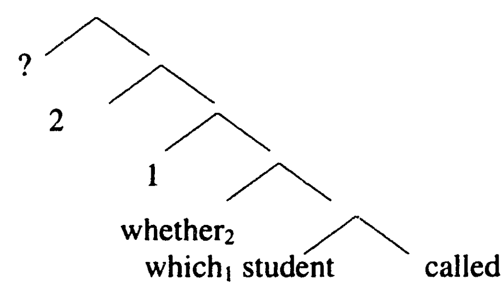
b. $\{w' : \lambda x. \sim(x \text{ is a student in } w \; \& \; x \text{ called in } w) = \lambda x. \sim(x \text{ is a student in } w \; \& \; x \text{ called in } w')\}$ *de re*

While the set of worlds in (56)b is identical to the one in (57)b, as we saw above, the two sets in (56)a and (57)a are distinct (see G&S 1985 and appendix). Given this Ann's knowledge of the former proposition is not incompatible with her lack of knowledge of the second, hence the availability of the reading of (55) we are after.

Let us now return to the *whether*-approach. Notice, that the readings I described so far in my proposal are all *de re,* in the sense of the above informal description. Whether this system can capture the above mentioned reading of (55) depends on whether and how this approach can derive *de dicto* readings as well.

One way to derive *de dicto* readings in this system is by slightly modifying Karttunen's theory and assume that wh-phrases are indefinites (i.e. restricted variables) rather than existential quantifiers, which are interpreted either in situ or in any intermediate landing site under ? (as shown in (58)a and b). The variables these indefinites introduce are then bound by a ? morpheme with the meaning given in (58) c.[11]

(58) a.



b. $[\![$ *whether*$_2$ $]\!]^g = \lambda t_t.\ [(g(2)) = \text{AFF or } (g(2)) = \neg \;\&\; g(2)(t)=1]$

c. $[\![?]\!] = \lambda \wp_{<s,<\alpha_1 \ldots \alpha_n,t>>}.\ \{p: \exists x_1 \ldots x_n \in D_\alpha . p = \lambda w.\ \wp(w)(x_1)\ldots(x_n)=1\}$

[11] This lexical entry is a version of von Fintel &Heim's (2001) generalized here to all types of arguments for $\wp$)

As for *which*-phrases, there are two alternatives regarding how to interpret the predicate restricting the variables they introduce: either as part of the truth conditions (just like in *Heimian* indefinites) or as introducing a presupposition (as proposed in Beck and Rullmann 2000). The two options are shown in (59)a and b respectively:

(59) a. For every assignment function g and world

$[\![\textit{which}_1 \textit{ student}]\!]^g = \lambda P_{<e,t>}. [[\![\textit{student}]\!]^g (g(1))=1 \ \& \ P(g(1))=1]$

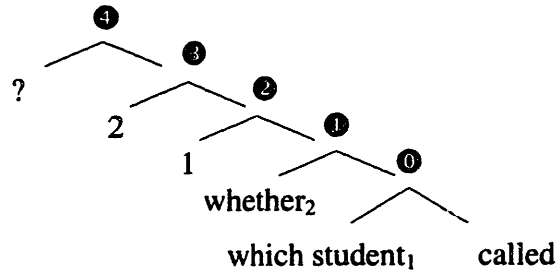
b. For every assignment function g

$[\![\textit{which student}_1]\!]^g = \lambda P_{<e,t>}: [\![\textit{student}]\!]^g (g(1))=1. P(g(1))$

The rest of this section argues that if the meaning in (59)a is adopted, the *de dicto* readings of a constituent *whether*-questions can be shown to be distinct from the same type of reading of the correspondent interrogative containing negation, as desired. Given this, this option allows us to directly derive the non contradictory strongly exhaustive *de dicto* reading we detected in (55). On the contrary, if Beck and Rullmann's analysis is adopted, instead, then constituent *whether*-interrogatives end up being equivalent to their negations under a *de dicto* reading as well, and therefore one of the readings of (55) remains unexplained. However, since Beck and Rullmann account of *de dicto* readings finds compelling independent support elsewhere, we will be left with a dilemma. I will ultimately speculate that 'local accommodation' might provide a solution that allows me to maintain an analysis of strongly exhaustive readings in terms of *whether* and at the same time endorse Beck and Rullmann's view on *de dicto* readings.

Let's first consider in turn what predictions the above two alternatives analysis of *which student* lead to. (60) illustrates the structure and the *de dicto* meaning of *which student called,* under the assumption that *which student* is a regular *heiman* indefinite:

(60)



De Dicto:

$[\![⓪]\!]^{w,g} = [[\![student]\!]^{g,w}(g(1))=1 \ \& \ [\![called]\!]^{g,w}(g(1))=1]$

$[\![❶]\!]^{w,g} = [g(2) = AFF \text{ or } (g(2)) = \neg] \ \& \ g(2)([\![student]\!]^{g,w}(g(1))=1 \ \& \ [\![called]\!]^{g,w}(g(1))=1)=1$

$[\![❷]\!]^{w,g} = \lambda x. [g(2) = AFF \text{ or } (g(2)) = \neg] \ \& \ g(2)([\![student]\!]^{g,w}(x)=1 \ \& \ [\![called]\!]^{g,w}(x)=1)=1$

$[\![❸]\!]^{w,g} = \lambda f. \lambda x. [f = AFF \text{ or } f = \neg] \ \& \ f([\![student]\!]^{g,w}(x)=1 \ \& \ [\![called]\!]^{g,w}(x)=1)=1$

$[\![❹]\!]^{w,g} =$

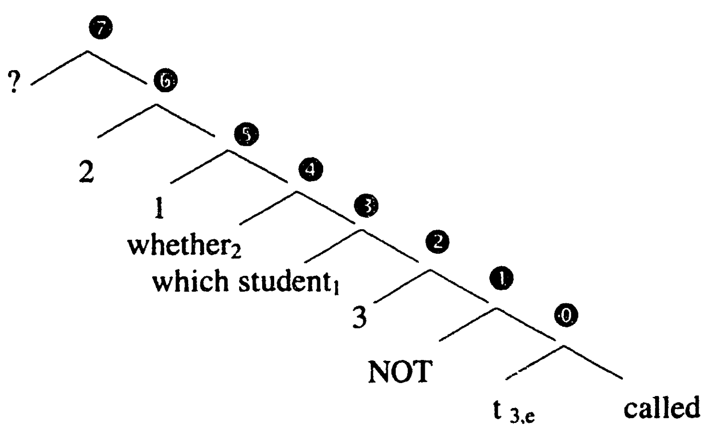
$\{p: \exists x_e, f_{<t,t>} [f = AFF \text{ or } f = \neg \ \& \ (p = \lambda w'. f([\![student]\!]^{g,w}(x)=1 \ \& \ [\![called]\!]^{g,w}(x)=1)=1\} =$

$\{p: \exists x_e$ & (p = *that x is a student and called* or p = *that x is not a student or x didn't call*)$\}$

Let's now turn to the negative counterpart of this question, given in (61)a. Assuming that the *which*-phrase originated in subject position moves by successive cyclic movement before spell out and that at LF it can be interpreted in any intermediate landing site of this movement (as legitimated by scope and economy), the negative counterpart of the question above has an exhaustive *de dicto* reading that is not equivalent to (60), but is equivalent to G&S's *de dicto* interpretation. This reading is illustrated in (61).

(61) a. Which student didn't call?

b.



c. *De Dicto:*

$[\![⓪]\!]^{w,g}$ = 1 iff $[\![\textit{called}]\!]^{g,w}$ (g(3)) = 0

$[\![❶]\!]^{w,g}$ = λx_e. $[\![\textit{called}]\!]^{g,w}$ (x) = 0

$[\![❸]\!]^{w,g}$ = $[\![\textit{student}]\!]^{g}$ (g(1))=1 & $[\![\textit{called}]\!]^{g,w}$ (g(1))=0

$[\![❹]\!]^{w,g}$ = [g(2) =AFF ∨ (g(2)) = ¬] & g(2)($[\![\textit{student}]\!]^{g}$(g(1))=1 & $[\![\textit{called}]\!]^{g,w}$(g(1))=0)=1

$[\![❺]\!]^{w,g}$ = λx. [g(2) =AFF ∨ (g(2)) = ¬] & g(2)($[\![\textit{student}]\!]^{g}$(x)=1 & $[\![\textit{called}]\!]^{g,w}$(x)=0)=1

$[\![❻]\!]^{w,g}$ = λf. [f =AFF ∨ f = ¬] & f ($[\![\textit{student}]\!]^{g}$(x)=1 & $[\![\textit{called}]\!]^{g,w}$(x)=0)=1

$[\![❼]\!]^{w,g}$ =

{p: $\exists x_e$, $f_{<t,t>}$ [f =AFF ∨ f = ¬ & (p = λw'. f ($[\![\textit{student}]\!]^{g}$(x)=1 & $[\![\textit{called}]\!]^{g,w'}$ (x)=0)=1 }=

{p: $\exists x_e$ & (p = *that x is a student and called* or p = *that x is a student and x didn't call*)}

Given this, if *which*-phrases are interpreted as *heimian* indefinites, the *whether*-approach leads to the right prediction regarding the possible meaning of the sentence in (53) (repeated in (62)) which attributes to Ann strongly exhaustive *de dicto* knowledge:

(62) Ann knows which students called but she doesn't know which students didn't call.

On the contrary, if we posit a meaning for *which*-phrases s.t. their restrictor contributes a presupposition, as Beck and Rullmann have it, the problem with this example would remain: the sentence under a strongly exhaustive interpretation would be predicted to be contradictory no matter whether the *which*-phrase is interpreted *de re* or *de dicto.* In fact, the two embedded questions would be equivalent also under a *de dicto* reading. Let us see why.

Suppose *which student receives* the following interpretation:

(63) For every assignment function g

$[\![\textit{which student}_1]\!]^{g} = \lambda P_{<e,t>}$: $[\![\textit{student}]\!]^{g}$ (g(1))=1. P(g(1))

Since negation is a hole for presuppositions, the strong exhaustive meaning of *(whether) which student called* will receive the *de dicto* interpretation in (64)a. For the same reason, no matter where *which student* is interpreted relative to negation in the negative question, the resulting *de* *dicto* interpretation of the corresponding negative question is the same set , i.e (64)b (see appendix).

(64) a. {p: $\exists x_e$ & (p = λw: x is a student in w. x called in w $\vee$ p = λw. x is a student in w. x didn't call)}

b. {p: $\exists x_e$ & (p = λw: x is a student in w. x didn't call in w $\vee$ p = λw. x is a student in w. it is not the case that x didn't call in w)}

Give this, if *which* phrases are presuppositional, as Beck and Rullmann have it, the *whether*-approach fails to account for one of the attested readings of (62): namely the reading according to which Ann has strongly exhaustive *de dicto* knowledge regarding which students called and still doesn't know which students didn't, because she doesn't know who the student are

Here, it becomes important to illustrate what are the independent reasons that make Beck and Rullmann's a very appealing proposal. First, a presuppositional view on wh-phrases nicely captures the asymmetry between the status of the restrictor of a wh-phrase and the main predicate in the proto-question, thus helping distinguishing the meaning of pairs of questions like the following:

(65) a. Which student smokes?

b. Which smoker is a student?

Beck and Rullmann's proposal also provides a very convincing solution to a problem, which has come to be known as the Donald Duck problem. The following dialog illustrates the problem:

(66) A: Which philosopher didn't come to the party.

B: Donald Duck didn't (/did).

In order to generates a *de dicto* reading of *which philosopher,* this phrase must be interpreted under ?, however, if its contribution was truth-conditional rather than presuppositional we incorrectly expect both variants of B's nonsensical answer above to be congruent answers to A's question, as shown in (67):

(67) a. *That Donald Duck didn't come to the party* $\in$

{ p: $\exists$x & p= *that x is not a philosopher or didn't come to the party*}

b. *That DD came to the party* $\in$

{ p: $\exists$x & p= *that x is not a philosopher or didn't come to the party*}

A presuppositional analysis of the *which*-phrase resolves this problem.

At this point we are faced with a dilemma: on the one hand the treatment of strong exhaustivity in terms of *whether* is promising in a number of respects, as it provides a unified view on this semantic property in both y/n and constituent questions and because it nicely predicts the Bulgarian facts mentioned above, while Heim's analysis does not seem to exhibit either of these two advantages. On the other hand the *whether*-based view seems to be committed to a truth-conditional, rather than a presuppositional, analysis of wh-phrases and therefore it fails to explain the DD-problem and the asymmetry between the predicate restricting a wh-phrase and the predicate formed in the proto question via wh-movement. Heim's account of strong exhaustivity, which Beck and Rullmann adopt, does not run into this problem.

Here is a tentative solution of this dilemma that rescues the *whether* approach. It might be the case that this view does not need to commit to a non-presuppositional analysis of wh-phrases after all, if a process of local accommodation can be shown to be triggered in cases like (68), from above:

(68) Ann knows which students called but she doesn't know which students didn't call.

Specifically, it is possible to attribute a presuppositional semantics to *which student,* assume that the two embedded questions do contain *whether* and still derive a non-contradictory strongly exhaustive *de dicto* reading of this sentence, insofar as we can take the negation of in the second question to negate the presupposition of the wh-phrase as well. This option is allowed if local accommodation of that presupposition takes place.

What makes this option at least plausible is a view on local accommodation under negation according to which this process becomes available precisely and only when it is necessary. One instance is when it prevents a contradiction between assertion and presupposition (cf. Heim 1991). The following sentence has been indeed analyzed in these terms:

(69) The king of France doesn't exist.

In the above example the assertion entails that there is no King of France but the presupposition introduced by the definite determiner entails that there is one. If the presupposition is accommodated lower than negation, this contradiction does not arise.

The present case is very similar, if accommodation in the negative question is triggered the sentence becomes consistent. Moreover, Beck and Rullmann solution to the DD-problem is not compromised: in DD-sentences local accommodation is not legitimated as these sentences do not result in a contradiction without accommodation.

Conclusions:

In this section I have illustrated a potential problem for the *whether*-based analysis of strong exhaustivity. There are a number of phenomena (like the DD-problem illustrated above) that hint to a presuppositional nature of wh-phrases. However, the *whether*-approach appears to be committed to a non presuppositional semantics of these phrases, in order to derive distinct strongly exhaustive *de dicto* readings of questions and their negations. This however can be shown to be unnecessary if a process of local accommodation is assumed to be possible in the problematic cases.

3.5 Conclusions

In this chapter I have provided an explanation of why also in constituent questions with *even* can trigger bias and unusual presuppositions.

My account is based on the unconventional assumption that constituent questions as well optionally come with a hidden *whether.* I provided two arguments in favor of this assumption. The first argument builds on Bulgarian questions, the second on the distribution of embedded y/n question under weakly and strongly embedded predicates.

Finally I presented a puzzle regarding strongly *de dicto* interpretations of constituent questions and suggested that the notion of 'local accommodation', exploited elsewhere to resolve similar cases (c.f. Heim 1991), provides a solution to it.

Chapter 4

Even Across Languages and the Scope Theory

In Chapters 2 and 3, I argued that the effect of *even* in questions provides indirect evidence for Karttunen & Peters's (1979) scope theory of *even* and against an ambiguity theory as Rooth (1985) has it. Specifically, I illustrated there that the scope theory allows us to provide a unified account for both the bias and the unexpected 'easy' presupposition of questions that contain *even* in association with the lowest point of the relevant scale; on the other hand the availability of a second, NPI, *even* as hypothesized by Rooth would at best account for the presupposition of these questions but fails to explain why this presupposition systematically co-occurs with negative bias. At the end of Chapter 2, I pointed out that other facts seem to go in the opposite direction, i.e. they seem to support the ambiguity hypothesis instead.

In this chapter I will focus on one more argument in favor the ambiguity hypothesis that often recurs in the literature on *even*. This argument builds on the following cross-linguistics considerations: languages like German, Dutch, and Italian (among others) exploit different expressions to ultimately convey 'hard' and 'easy' presuppositions. Specifically, on the one hand, *sogar, zelfs* and *addirittura* are used in affirmative declaratives in order to convey a 'hard' presupposition in German, Dutch and Italian respectively. On the other hand, *auch nur* (lit. 'also only'), *ook/zelfs maar* (lit. 'also/even only') and *anche solo* (lit. 'also only') ultimately induce in the three languages, the effect of an 'easy' presupposition in negative declaratives. In addition the distribution of the latter three items closely resembles that of NPIs like *any*.

The existence, in languages other than English, of distinct expressions that apparently introduce the same presupposition as Rooth's $even_{npi}$ and that also are NPIs, has been considered by many scholars to represent compelling evidence for the ambiguity analysis (cf. Rooth 1985, von Stechow 1991, Rullmann 1997, Barker and Herburger 2000 and Giannakidou 2003).

In the same spirit, Barker & Herburger (2000) and Giannakidou (2003) have pointed out the presence, in Negative Concord languages, of n-words introducing an 'easy' presupposition as well (Spanish *ni siquiera* and Greek *oute kan* respectively) and have taken these expressions as well to provide compelling support for the hypothesis of an NPI *even* in English.

This chapter argues that, after closer scrutiny, at least the German, Italian and Dutch facts are not only compatible with a scope theory of *even*, but actually provide additional support for it. In addition to this I will point out that Barker and Herburger's and Giannakidou's arguments based on evidence from NC languages seem to rely on arguable assumptions on the meaning and the of n-words and the constraints they are subject to in these languages.

The chapter is structured as follows. In section 4.1, I will start by providing a more detailed illustration of Rullmann and Rooth's argument and of the data which it relies on. In section 4.2 I observe that, just like *even*, the alleged NPI *even*s in German, Italian and Dutch trigger a negative bias interpretation, a fact that, as argued earlier, an ambiguity theory cannot account for. Furthermore, in section 4.3, I observe that Rooth and Rullmann's argument needs to stipulate a non-compositional analysis of these items, i.e. an analysis that treats, e.g., *auch nur* as an idiom that is not further analyzable from the semantic point of view. The obvious drawback of such an assumption is that the fact that German, Italian and Dutch make use of the same combination of focus particles (*also* and *only*) to express the meaning of *even* in negative contexts would fall out as a mere coincidence.

Given this, in section 4.4, I will propose an alternative analysis of the alleged $EVEN_{NPI}$s in these languages. I will argue that the analysis I propose is preferable to Rooth's and Rullmann's in at least the following important respects. First, it provides us with an account of the bias these items trigger in questions, while Rooth & Rullmann's does not. Second, it treats these items compositionally, i.e. in terms of the meaning of *auch* and *nur,* thus explaining why the combination of these two items produces the effect of *even* in negative contexts. In addition to this, the analysis will prove appealing because it derives the restricted distribution for these items from their lexical properties, along the lines of Lahiri'98 account of Hindi NPIs, rather than stipulating it. Instead of assuming an ambiguity of English *even,* my analysis builds on the assumption that, in the languages in question, expression generally glossed as *only* in the three languages are ambiguous. In other words the proposal is to trade in an ambiguity of English *even* for and ambiguity of German *nur,* Italian *solo* and Dutch *maar.*

Novel empirical evidence in favor an ambiguity of *only* comes from Shank's (2002) work on Straits Samish, a Salish language spoken in British Columbia presented in section 4.5.

Section 4.6 discusses Barker and Herburger (2000)'s argument based on the above mentioned facts in Negative Concord languages. For our purposes it will suffice to notice that *ni siquera* and *nemmeno* differ from English *even* in respects in which n-words in these two languages differ from NPIs like *any, ever* in English and from minimizers in general. However, whether n-words in Negative Concord languages can be taken as evidence regarding the meaning of NPIs (like *any*) in non NC-languages is a complicated question whose answer crucially depends on what is the correct analysis of NC to begin with (c.f. Ladusaw 1992, Zanuttini 1991, Valldouví 1994, Giannakidou 1997 and 2000, Herburger 2002, Guerzoni & Ovalle 2002 etc.). In this section I bring about some considerations that might be useful in determining how this issue relates to our conclusions regarding English *even.* I'll conclude that on the basis of what little we know about n-words words meaning *even,* Barker&Herburger's observations do not seem to seriously challenge a scope view on English *even.*

Finally, in section 4.7 I will discuss Giannakidou's (2003) argument for the ambiguity hypothesis as well. Giannakidou claims that Greek contains not two but three different items meaning *even.* One of her *evens*, is a negative word, like *ni siquera,* and *neppure.* Assuming that this is correct, the consideration in section 4.6. about the latter should extend to this Greek complex expressions as well. The second particle is just a PPI *even* (like K&Ps). The third *EVEN* is claimed by Giannakidou to be a 'concessive' *even.* This latter particle is claimed to be a narrow scope polarity sensitive item which in addition triggers negative bias in questions. In the last section I will show that, in spite of what Giannakidou claims, her data and even her analysis of this last item do not really provide an argument for the ambiguity thesis. To the contrary, they support the scope theory as well.

4.1 The Cognates of *Even*: Rooth' (1985) and Rullmann's (1997) Argument

In affirmative sentences *sogar* in German, *addirittura* in Italian and *zelfs* in Dutch appear to make the same contribution as English *even:* they introduce a 'hard' presupposition in (5).

(1) John even greeted $[\text{Mary}]_f$.

(2) Der Hans hat **sogar** $[\text{die Maria}]_f$ begruesst. *German*
The John has even the Mary greeted

(3) Giovanni ha **addirittura** salutato [Maria]f. *Italian*
John has even geeted Mary

(4) Johan heeft zelfs $[\text{Maria}]_f$ begroeten *Dutch*
John has even Mary greeted

(5) **Presupposition**: *Mary was the least likely person to be greeted (by John) & somebody else was greeted (by John).* **'hard'**

Just like *even,* all the expressions above do not seem to make a direct contribution to the truth-conditions of the hosting sentence. Each of the sentences in (2), (3), (4), above is truth-conditionally equivalent to its counterpart without the focused particle, given below:

(6) Der Georg hat die Maria begruesst.
The John has the Mary greeted

(7) Giovanni ha salutato Maria.
John has greeted Mary

(8) Johan heeft Maria begroeten
John has Mary greeted
'John greeted Mary'

When we turn to negative sentences (or other NPI-licensing environments) we find out that these languages exploit different expressions to convey the presuppositions of *even*: [1] German *auch nur* (lit. 'also only), Italian *anche solo* (lit. 'also only'), and Dutch *zelfs maar* (lit 'even only')/*ook maar* (also only).

Natural translations of (9) in German, Italian and Dutch are given, (9), (10) and (11), respectively:[2]

(9) Nobody **even** greeted [Mary]f.

(10) Niemand hat **auch nur** [die Maria]$_f$ begruesst. *German*
Non one has also only the Mary greeted

(11) Nessuno ha salutato **anche solo** [Maria]$_f$. *Italian*
No one has greeted also only MAry

(12) Niemand heeft **ook maar** [Maria]$_f$ begroeten. *Dutch*
Non one has also only Mary greeted
'Nobody greeted even Mary'

(13) **Presupposition:** *Mary was the MOST likely to be greeted & someone else wasN' T greeted.* **'easy'**

These sentences as well are truthconditionally equivalent to their variants given below:

(14) Niemand hat die Maria begruesst.
Nobody has the Mary greeted

(15) Nessuno ha salutato Maria.
Nobody has greeted Mary

---

[1] Interestingly these expressions is felicitous with adverbial negation *not*. Neither the analysis I develop in this chapter nor Rooth's and Rullmann's approach can offer any explanation for this mysterious restriction.
[2] *Sogar, addirittura* and *zelfs* are judged very marginal if not completely unacteptable in the surface scope of a local negation. This might suggest that these items are positive polarity items (just like English *even*) which however (unlike English *even*) cannot covertly move to escape negation.

(16) Niemand heeft Maria begroeten.
Nobody has Mary greeted
'Nobody greeted Mary'

While all the above items lack truth-conditional import, they all introduce a presupposition depending on what is focused in the sentence, which appears to be the same as the one due to the presence of English *even* in the same environments. Specifically sentences like (2), (3), just like (1), are felicitous only if the following information is either already taken for granted in the utterance context, or the addressees have no objection to treat it as if it was:

(17) That John greeted Mary was less likely/more noteworthy than for him to greet any other person among the contextually relevant people.

The sentences in (10), (11) and (12) are felicitous only if (18) is taken for granted, just like their English counterpart with *even* in (9).

(18) For somebody to greet Mary was MORE likely/LESS noteworthy than for somebody to greet any other contextually relevant person.

In other words, (2), (3), (4) ultimately carry a 'hard' presupposition, while (10), (11), and (12) ultimately carry an 'easy' one.

(19) *Mary was the least likely person to be greeted (by John) &* **'hard'**
somebody else was greeted (by John).

(20) *Mary was the MOST likely to be greeted &* **'easy'**
someone else wasN'T greeted.

Finally, recall that when negation is not local to *even*, we detect an ambiguity between the two readings 'easy' and 'hard', in English. This ambiguity is lexically resolved in the languages in question. I illustrate this point for German in (22):

(21) a. It surprised us that even John was there.

READING I: That John was there was least likely/ most noteworthy

READING II: That John was there was the most likely/least noteworthy.

(22) a. Es hat uns überrascht , das sogar der Hans da war. *German*

It has us surprised that also only the John there was

'It surprised us that even John was there'.

ONLY READING I!

b. Es hat uns überrascht, das auch nur der Hans da war.

It has us surprised that also only the John there was

'It surprised us that even John was there'.

ONLY READING II!

The defenders of the ambiguity thesis have interpreted the above facts as follows: while *sogar, selfs* and *addirittura,* mean what ordinary *even* means; *auch nur, ook maar* and *anche solo* mean what Rooth's $even_{NPI}$ does:

(23) $[\![sogar/zelfs/addirituutra]\!]^w(p) = [\![even]\!]^w(p)$:

$[\![sogar/zelfs/addirituutra]\!]^w(p)$ defined iff $\forall q \in C[q \neq p \rightarrow q >_{likely} p] \& \exists q \in C[q \neq p \& q(w)=1]$,

if defined then so $[\![even]\!]^w(p) = p(w)$ **hardP**

(24) $[\![auch\ nur/anche\ solo/ook\ maar]\!]^w(p) = [\![even_{npi}]\!]^w(p)$:

$[\![auch\ nur/anche\ solo/ook\ maar]\!]^w(p)$ is defined iff

$\forall q \in C[q \neq p \rightarrow q <_{likely} p] \& \ \exists q \in C[q \neq p \ \& \ q(w)=0]$ **easyP**

if defined then $[\![auch\ nur/anche\ solo/ook\ maar]\!]^w(p) = p(w)$

Given this, they argue that since there are languages that mark explicitly the distinction between the two meanings by using different lexical items, in English too there ought to be two semantically distinct lexical items (Rooth's *even* and $even_{NPI}$), which so happen to be homophonous, but still introduce two different presuppositions.

What seems to add even more plausibility to Rooth's hypothesis, is that just like the easyP presupposition induced by $even_{NPI}$, also the distribution of *auch nur* and its Italian and Dutch cognates, is limited to the scope of entailment reversal expressions, a property that is known to be characteristic of Negative Polarity Items like *any*: (cf. Rullmann 1997)

(25) a. Es hat uns überrascht , das auch nur der Hans da war. *German*
It has us surprised that also only the John there was
'It surprised us that even John was there'.
b. * Auch nur der Hans war da.
Also only the John was there
'Even John was there'.

(26) a. Ci sorprese che anche solo Giovanni era presente. *Italian*
Us surprised that also only John was present.
'It surprises us that even John was there'
b. * Anche solo Giovanni era presente.
'Even John was there'.

(27) a. Ik denke niet dat hij ook maar EEN meter ver kan springen. *Dutch*
I think not that he even ONE meter far can jump
'I don't think that he can jump even ONE meter'.
b. *Ik denke dat hij ook maar EEN meter ver kan springen.
I think that he even ONE meter far can jump
'I think that he can jump even ONE meter'.

Summing up, Rooth's and Rullmann's argument goes roughly as follows: in English declarative affirmative sentences, the presence of *even* ultimately produce a 'hard' presupposition, while in negative environments it can induce an 'easy' presupposition, but other languages differ from English in that they exploit different lexical items to generate the two different meanings in the two types of environment. Thus, given the syntactic problems the scope theory encounters (see previous chapter) and on the basis of economy driven considerations regarding the lexicon of Universal Grammar, it is probably the case that also in English, the above ambiguity is lexical in nature.

4.2. Why Scope : The Bias of *Auch Nur* in Questions

If the data presented in the previous section do indeed show that, across languages, specific lexical items directly introduce an 'easy' presuppositions, which, in addition, are limited in their distribution to the same contexts where English *even* appears to trigger this presupposition, we should be strongly tempted to conclude, like many scholars have, that after all English as well involves two semantically distinct *evens*: *even* and $even_{NPI}$. There are, however, good reasons not to take the above data as to indicate that *auch nur*, *anche solo* and *ook maar* are NPI *evens* after all. This section illustrates one of them.

So far, the literature regarding *auch nur* or *ook maar* has mostly focused on their appearances in declaratives (cf. Rooth 1985, von Stechow 1991, Hoeksema and Rullmann 1997). However, in order to fully understand the significance of the existence of these items, we should investigate their effect in interrogative environments as well. Unsurprisingly, all these items are acceptable in questions and trigger an 'easy' presupposition:

(28) a. Hat der Hans auch nur [die Maria]$_f$ begruesst? *German*
Has the John also only the Mary greeted
b. Giovanni ha anche solo salutato [Maria]$_f$? *Italian*
John has also only greeted Mary?
c. Heeft Johan ook maar Maria begroeten? *Dutch*
Has John also only Mary greeted?
' Did John even greeted Mary?'

(29) **Presupposition:** *For George to greet Mary was MORE likely/LESS noteworthy than for him to greet any other contextually relevant person.* **'easy'**

Both Karttunen & Peters' and Rooth's theory of *even* correctly predict this much. However, to the best of my knowledge, the following fact has been so far overlooked: Interestingly, the above questions obligatorily receive a negative bias interpretation, unlike their counterparts without *auch nur, anche solo,* and unlike their counterparts containing *sogar* and *addirittura*:

(30) a. Hat der Georg auch nur [die Maria]$_f$ begruesst? *Negatively biased*
Has the Georg *auch nur* the Maria greeted?
b. Hat der Georg die Maria begruesst? *Neutral*
Has the Georg the Maria greeted?
c. Hat der Georg sogar [die Maria]$_f$ begruesst? *Neutral*
Has the Georg *sogar* the Maria greeted?

(31) a. Giorgio ha anche solo salutato [Maria]$_f$? *Negatively biased*
Giorgio has *anche solo* greeted Maria?
b. Giorgio ha salutato Maria? *Neutral*
Giorgio has greeted Maria?
c. Giorgio ha addirittura salutato [Maria]$_f$? *Neutral*
Giorgio has *additirrtura* greeted Maria?

Thus, here as well we seem to be facing another instance of the generalization discussed in the last two chapters: the emergence of an 'easy' presupposition coincides with a biased interpretation. While this coincidence might not be too surprising from the perspective of a scope-theory, we saw in chapters 2 and 3 that the ambiguity theory fails to account for it.

Recall that according to the scope theory 'easy' presuppositions are due to *even* scoping above negation. Given this, only negative answers can be felicitous, if that presupposition is true. If one could show that the presupposition introduced by *auch nur* and *anche solo* also results from wide scope relative negation, the bias of (28)a and (31)a would also follow (cf. section 4.4).

On the other hand, as we saw in Chapters 2 and 3, *auch nur, anche solo* and *ook maar* had the meaning of Rooth's *even*$_{npi}$ (in (24)), both answers to the questions containing these items would be in principle felicitous and the bias would remain unexplained. In fact, recall, that being NPIs and therefore ungrammatical in affirmative sentences does not, per se, suffice to trigger bias towards the negative answer, as questions with NPI *any* and *ever* are not biased:

(32) a. Did George greet anybody? *Neutral*

b. Have you ever been to LA? *Neutral*

To sum up, when we limit our attention to declarative environments the behavior of expressions like *auch nur* appears to strongly support an ambiguity of English *even*, but when their effect in questions is taken into account, they actually provide evidence against the ambiguity theory. In order to resolve this apparent inconsistency I propose that we should drop Rooth's and Rullmann's assumptions regarding the meaning of these items and analyze them compositionally, instead. The next section provides one more motivation for doing so.

4.3 Cross-linguistic Motivations for a Compositional Analysis

Besides the case of questions, Rullmann's and Rooth's argument is unsatisfactory in another respect. Recall that the argument crucially relies on the assumption that from the semantic point of view expressions like *auch nur* and *ook maar* are to be taken as un-analyzable units which introduce an 'easy' presupposition:

(33) $[\![$*auch nur/anche solo/ook maar*$]\!]^w(p) = [\![$*even*$_{npi}]\!]^w(p)$:

$[\![$*auch nur/anche solo/ook maar*$]\!]^w(p)$ is defined iff

$\forall q \in C[q \neq p \rightarrow q <_{likely} p] \& \exists q[q \neq p \& q(w)=0]$ **easyP**

if defined then $[\![$*auch nur/anche solo/ook maar*$]\!]^w(p) = p(w)$

However, in the languages under consideration, the items allegedly corresponding to *even*$_{NPI}$ are complex expression, unlike those related to normal *even*. Moreover, in these three languages they consist of a focus particle meaning *also* or *even* (i.e. an 'additive focus particles, according to Koenig's 1991 classification) followed by another focus particle which typically translates as *only* (i.e. an 'exclusive' particle).

The assumption that *auch nur, anche solo* and *ook maar* and the like are non decomposable idioms, as Rooth, Rullmann and von Stechow must have it, might be missing an important cross linguistic generalization: in languages where it is acceptable, the combination of an additive particle immediately followed by an exclusive one is an NPI and coveys the same meaning as *even*. If this generalization is correct, in order to capture it, a compositional semantics of *auch nur* and the like is called for.

4.4 A *Lahirian* analysis:
'Easy' Presupposition, NPI-hood, Bias and Compositionality

This section proposes a novel account of *auch nur, ook maar* and *anche solo,* which covers the facts in questions discussed in section 4.2. Since the account is fully compositional, it also explains why *also+only* in some languages has the effect of introducing an 'easy' presupposition, thus satisfying the desiderata introduced in section 4.3. Finally, and most importantly, this analysis will be argued to be superior to the analysis that the ambiguity camp needs to assume, in that it derives the restricted distribution of these items, from their lexical properties, rather than just stipulating their NPI-hood. In this sense, the proposal is very much in the spirit of Lahiri's work on Hindi NPIs, to which the idea presented here owes a considerable intellectual debt.

4.4.1. Ambiguity of 'nur'[3]

The intuition behind my analysis is the following: we can avoid assuming an ambiguity of English *even* by hypothesizing one for *nur* (and *solo*), instead. Before introducing the details of the analysis, let's see why an ambiguity of *nur* is called for.

The first step towards compositional analysis of *auch nur* consist in identifying what should be the building blocks of its meaning, i.e. what the two focus particles *auch* and *nur* mean when taken in isolation.

On the one hand *auch* and *anche,* are equivalent to English *also*, in that they make no contribution to the assertion and introduce an additive existential presupposition:

[3] In some cases, just for the sake of keeping the exposition simple, I will often talk about German alone to illustrate the proposal. I trust that the reader will be able to see how it extends, *mutatis mutandis*, to Italian and Dutch as well.

(34) a $[\![\textit{auch/also/anche}]\!]^w$ (C) (p) is defined iff $\exists q[q \in C \,\&\, q \neq p] \,\&\, q(w)=1$

b. if defined, then $[\![\textit{auch/also/anche}]\!]^w$ (C) (p) = p (w)

On the other hand, generally *nur*, like *only*, contributes exclusivity to the truth-conditions besides introducing a 'factive'-like presupposition, i.e. the presupposition that the prejacent is true (as in (35) (i)), and the scalar presupposition illustrated in (35)(ii) (cf. Lerner and Zimmermann 1981):

(35) $[\![\textit{nur/only/solo}]\!]^w$ (C) (p) is defined iff

(i) p(w)=1 — *Factivity*

and (ii) $\sim\exists q \in C\, [q \neq p \rightarrow q >_{likely/insignificant...} p]$ — *Scalarity*

if defined then $[\![\textit{nur/only/solo}]\!]^w$ (C) (p) = $\forall q \in C\, [p \not\subseteq q \rightarrow q\,(w) = 0]$ — *Exclusivity*

(36) a. Maria ha solo incontrato [Giovanni]$_f$

b. Die Marie hat nur [den Johan]$_f$ getroffen

c. Assertion: *Mary didn't meet anybody different from John.*

d. Factive Presupposition: *Mary met John.*

e. Scalar Presupposition: *That Mary met John* is very little noteworthy.

Whether the scalar presupposition is always part of the meaning of *only* is a matter of controversy (see discussion in, e.g., König 1991). As the core of my proposal that *nur* is ambiguous lies in how the labor of assertion and presupposition is divided between *factivity* and *exhaustivity,* I will initially ignore the issue. I will return it in section 4.3.3.

Before presenting my proposal, it is worth pointing out an immediate advantage in analyzing the meaning of *auch nur* as the combination of the meaning of *auch* and the meaning of *nur* Given what *auch* and *nur* mean when taken in isolation, a compositional analysis would help us understanding why *auch nur* is unacceptable affirmative contexts. This is so because the *exclusivity* conveyed by *nur* and the *additivity* presupposed by *auch* are incompatible. In an affirmative sentence this systematically results in a contradiction between assertion and presupposition, as shown in (37):

(37) *Der Hans hat auch nur [[die Maria]$_f$]$_f$ getroffen.
The John has also only the Mary met
Assertion: John met nobody other than Mary.
Presupposition of *auch/also*: John met some $x \neq M$

There is however, an immediate problem that a compositional view needs to face. In the contexts under consideration (i.e. in construction with *auch*) the truth conditional exclusive component illustrated in (35) is systematically absent. Consider once more the sentence repeated (38)a.

(38) Niemand hat auch nur [[die Marie]$_f$]$_f$ begruesst.
Nobody has also only Mary greeted
'Nobody greeted even MARY'

Indeed, as mentioned above, this sentence, modulo presuppositions, is equivalent to (39).

(39) Niemand hat die Marie begruesst.
'Nobody greeted Mary'

However, no matter what scope is assigned to *nur* relative to negation, the lexical entry in (35) would not generate these truth conditions for (38)a. If *nur* takes scope under the negative quantifier, the assertion according to (35), should be (40)b.[4]

(40) a. LF 1: [niemand$_1$ [auch [nur [t_1 hat [[die Maria]$_f$]$_f$ begruesst. (*niemand> nur*)

[4] Notice that scoping *auch* differently will not generate different truth-conditions, as this particle does not contribute to the truth conditions.
(i) a. [auch [niemand$_1$ [[nur[die Maria]$_f$]$_2$ [t_1 hat [t_2]$_f$ begruesst]]]]
b. Assertion: Everybody greeted somebody different from Mary)

b. Assertion: Everybody greeted somebody other than Mary

$\lambda w.\forall x$ [x person in w $\rightarrow \sim\sim \exists q[q(w)=1 \in \{p:\exists y[$y is a person in w & y$\neq$M & p= *that x greeted y*}

= $\lambda w.\ \forall x$ [x is person in w $\rightarrow \exists q[q(w)=1 \in \{p:\exists y[$y is a person in w & y$\neq$M & p= *that x greeted y*}

= $\lambda w.\ \forall x$ [x is person in w $\rightarrow \exists y[$y is a person in w & y$\neq$M & x greeted y in w]

On the other hand, if *nur* takes scope over negation, the predicted TCs would be as in (41)b

(41) a. [Nur [niemand hat auch [[die Maria]$_f$]$_f$ begruesst] *(nur> niemand)*

b. Assertion: Everybody other than Mary is s.t. somebody greeted him

$\lambda w. \sim\exists p$ [p(w)=1 & p$\in$ {p: $\exists$y [y is a person in w & y$\neq$M & p= *that nobody greeted y*}

$\lambda w. \sim\exists$ y [y is a person in w & y$\neq$M & nobody greeted y in w]

$\lambda w.\ \forall$ y [y is a person in w & y$\neq$M $\rightarrow$ it is not the case that nobody greeted y in w] =

$\lambda w.\ \forall$ y [y is a person in w & y$\neq$M $\rightarrow$ somebody greeted y in w] = (41) b

Neither of these two truth conditions matches with the speakers' intuitions regarding the meaning of this sentence. Therefore *nur* here cannot mean what it usually does.

Once we have granted that *nur* in *auch nur* means something different form what it usually means, the following question arises: what precisely is its meaning in this construction and how is it related to its usual meaning?

I propose that the meaning of *nur* in this construction is as shown in (42), where the 'factive'[5] presupposition and exclusive truth conditional import are swapped (compare with (43) repeated from above):

(42) a. $[\![nur_2 / solo_2]\!]^w$ (C)(p) is defined iff

(i) $\sim\exists\, q \in C\ [q \neq p\ \&\ q(w)=1]$ *Exclusivity*

and (ii) $\forall q \in C\ [q \neq p \rightarrow p >_{likely/insignificant...}\ q]$ *Scalarity*

b. If defined, then $[\![nur_2 / solo_2]\!]^w$ (C)(p) = p(w) *Factivity*

[5] This term traditionally refers to embedding verbs presupposing the truth of their propositional complements (cf. Karttunen 1973). Here I use the term in a different and looser way to indicate the propositional content of the presupposition itself triggered by any proposition-taking function that presupposes the truth of its argument.

(43) a. $[\![$*nur/only/solo* $]\!]^{w}$ (C) (p) is defined iff

(i) p(w)=1 *Factivity*

and (ii) $\forall q \in C$ [$q \neq p \rightarrow p >_{likely/insignificant...} q$] *Scalarity*

b. if defined then $[\![$*nur/only/solo* $]\!]^{w}$ (C) (p) = $\forall q \in C$ [$p \not\subseteq q \rightarrow q (w) = 0$] *Exclusivity*

Notice that rather than a garden variety ambiguity, what I am proposing here is better described as a case in which some expressions meaning *only* are taken to be **unspecified** with respect to which of *exclusivity* and *factivity* is asserted and which is presupposed.

Notice that $[\![$ *nur*$_2]\!]$ has the effect of a partial identity function, because its truth conditional import leaves its argument unchanged: the truth value of the prejacent in the evaluation world. Given this, like *auch,* also *nur2* merely introduces presuppositions. This by itself accounts for the fact that (38)a is truth conditionally equivalent to (39) (repeated below), i.e. to its counterpart without he two focus particles *auch* and *nur.*

(44) Niemand hat auch nur [[die Marie]$_f$]$_f$ begruesst.

(45) Niemand hat die Marie begruesst.

'Nobody greeted Mary'

Before illustrating how the hypothesis of an unspecified *nur* and a fully compositional analysis can account for the remaining facts regarding *auch nur*, I will offer here some evidence that English *just*, unlike *only,* can acquire, in some environments, the meaning of *nur*$_2$. Although I am not in the position to provide a satisfactory explanation of why this phenomenon is possible in these environments and in these environments only, the facts below show that a non truth-conditionally exclusive meaning of *just* must exists.

Generally, English *only* and *just,* and German *nur* are different form *nur2*, in that under negation they always asserts exclusivity:

(46) a. Der Hans hat nicht nur [die Marie]$_f$ Begruesst.

b. John didn't meet only [Mary]$_f$.

TCs: John met people different from Mary.

(47) a. I didn't meet only Mary ⇔ I didn't meet just Mary

TCs: I met somebody different from Mary

However, there are at least some uses of *just*, where exclusivity seems to play no role at the level of truth conditions:

(48) Can you spare just 5 minutes for me tomorrow?

In (48) *just* does not seem to contribute exclusivity to the truth-conditional meaning of the question. In fact, this interrogative questions whether the prejacent or its negation is true, rather than questioning whether it is true that the addressee does not have more than 5 minutes.

(49) Can you spare just 5 minutes for me tomorrow?

Assertion: Whether [you can spare at least 5 minutes] *Factivity*

In addition, the question carries the presupposition that 5 minutes are not much to ask for and that the speaker knows that the addressee does not have more than that much time.

(50) Presuppositions: You cannot spare more than 5 minutes *Exclusivity*

Or "I am not asking for more'

There is no contextually relevant alternative n to 5, s.t. it is easier for the addressee to spare n minutes than to spare 5 minutes. (5 is the minimum relevant amount)

In other words, *just*, in this case appears to receive the switched interpretation of nur_2.

In this respect *just* patterns differently from *only*. Compare (48)c with (51):

(51) Can you spare only five minutes for me tomorrow?

My informants detect a very sharp difference in meaning between this question and the variant with *just*. (51) is often judged to be odd. As for the speakers to which the question makes sense at all, they observe that it requires a context where it is already clear that the addressee can spare 5 minutes and not more, and it expresses surprise or the regret that he cannot spare more. Here are possible linguistic contexts speakers have suggested for the two questions:

(52) Person A: I can spare five minutes for you tomorrow.
Person B: (pissed off) Can you really spare only five minutes for me tomorrow?!

(53) Continuations:
a. Can you spare just five minutes for me tomorrow? I don't need more; five is enough.
b. Can you spare only five minutes for me tomorrow? That's a shame, because I'd like more.

Other speakers have offered the following paraphrases for the variant with *only:*

(54) Is it the case that you can't spare more than five minutes for me?

If *only*, unlike *just*, has its usual exclusive truth-conditional meaning in this context we can understand these reactions. Under this interpretation of *only* the question is expected to be truthconditionally equivalent to (55)a, with, in addition, the two presuppositions of *only*:

(55) a. Can you not spare more than 5 minutes tomorrow?
b. Can you spare only 5 minutes for me tomorrow?

Assertion:	Whether the addressee can't spare more than 5 mins.	*Exclusivity*
Presuppositions:	The addressee can spare 5 minutes	*Factivity*
	5 minutes is the minimum relevant amount of time	*Scalarity*

In virtue of containing negation this question carries the past epistemic implicature that the speaker used to take for granted that the addressee can in fact spare more that 5 minutes the day after the question is uttered (see Büring and Gunlogson 2001 and Han and Romero 2002). Han and Romero (2002) propose that negative questions of this sort have the function of asking whether the speaker should really update the common ground as to correct that previous false belief, specifically the paraphrases of our example would be:

(56) Are you sure that I should add to the CG that you cannot spare more than 5 minutes for me tomorrow?

Hence the effect of incredulity and regret some speakers detected.

As for the remaining speakers, that found the question odd all together, they judged it in isolation, and therefore tried to make sense of the question as a request for help or expressing the wish of the speaker to meet the addressee for 5 minutes, just like the variant with *just*. In fact, as an expression of wish, the exclusive component makes the question pretty odd:

(57) # I'd like you to help me for less than five minutes.

In other cases, where this kind meaning is perfectly adequate to the situation both *only* and *just* are felicitous under this use of the question:

(58) a. Can you use the shower for only/just five minutes?

b. Can you eat only/just half of the leftover, and leave me the rest?

To the face of the above facts, it seems to be the case that *only* tends to maintain its regular excusive meaning, to the expense of making a hosting question sometimes unusable for some purposes, while *just* is more flexible and can receive the 'swapped' interpretation of *nur2*, when the pragmatics of the question and the linguistic context require it.

Interestingly, this pattern of *just* repeats itself in other linguistic contexts, like imperatives and conditionals:

(59) Please, give just a minute!/ Hold on just a minute!

$\neq$ Please do not hold on for more than a minute

(60) If Bill smokes just 3 cigarettes, his mother gets upset.

$\neq$ If Bill smokes not more than three cigarettes his mother gets upset

In order to see that *just* in (61) does not necessarily assert exclusivity, notice that, unlike (61) b, the sentence entails any alternative where *just 3* is substituted with a bare numeral bigger than 3.

(61) a. If B. smokes just 3 cigarettes his mother gets upset =>

b. If he smokes 4 his mother gets upset

(62) a. If bill smokes not more than 3 cigarettes his mother gets upset

$\neq>$ If Bill smokes 4 cigarettes his mother gets upset.

These readings are at best very marginal with *only.* Once again, the exclusive meaning re-emerges when it is more natural:

(63) a. Please, take just one of my books (I need the others)!

b. If John passes just one class his mother gets upset.

What appears to be going on in the cases above is the following: *just* generally has the same meaning as *only,* for example it asserts exclusivity under negation. However, where the pragmatics of the type of utterance is somehow incompatible with such a meaning, then exclusivity is dropped, and presumably it becomes only presupposed.

To conclude, although it is hard to find cases where English *only* fails to contribute exclusivity to the truth conditions, at least in questions, imperatives and conditionals the particle *just* seems to receive precisely the swapped reading I proposed for *nur*$_2$

I will now turn to the two presuppositions of *nur*$_2$ and investigate their effects in sections 4.4.2 and 4.4.3 respectively.

4.4.2 The Exclusive Presupposition of 'Nur$_2$': NPI-behavior and Bias Explained

Given (42)-i, *nur*$_2$ presuppose exclusivity. In this subsection I will show the NPI-like distribution of *auch nur* and its bias in questions follows from the interaction of this presupposition with the additive presupposition of *auch*.

The *exclusivity presupposition* of *nur*$_2$ as defined in (42)-i above is repeated below:

(64) $[\![nur_2 / solo_2]\!]^w$ (C)(p) is defined only if $\sim\exists q \in C [q \neq p \& q(w)=1]$

Notice that exclusivity (whether asserted or **presupposed**) is systematically incompatible with the additive presupposition of *auch,* whenever they share the same focus and the same argument p. In one case we expect a clash between assertion and presuppositions, in the other case a clash between presuppositions.

(65) a $[\![auch/also/anche]\!]^w$ (C) (p) is defined iff $\exists q[q\in C \& q \neq p] \& q(w)=1$

b. If defined $[\![nur / solo]\!]^w$ (C)(p) =1 iff $\sim\exists q \in C [q \neq p \& q(w)=1]$

c. $[\![nur_2 / solo_2]\!]^w$ (C)(p) is defined only if $\sim\exists q \in C [q \neq p \& q(w)=1]$

Let's illustrate this with an example. In the following affirmative sentence, if *nur* is regular *nur,* the presupposition introduced by *auch* would be incompatible with the assertion:

(66) a. * Auch nur [[der Hans]$_f$]$_f$ war da.

Assertion: Nobody other than John was there.

Presupposition of *auch*: Some x different form John is s.t. only x was there.

Clash!

If, instead, *nur* is *nur*$_2$ it is its presupposition that is incompatible with the presupposition of *auch*, as shown in (67):

(67) a. * Auch nur [[der Hans]$_f$]$_f$ war da.

Assertion: John was there.

Presupposition of *nur*: No individual different from John was there } Clash!

Presupposition of *auch*: Some x different form John is s.t. (only) x was there.

Thus under no interpretation of *nur* the sentence would never be felicitous. As a consequence, the compositional analysis I am proposing here makes immediately the desirable prediction that *auch* + *nur* (under any of its readings) cannot occur in affirmative declaratives.

In negative (or DE) contexts, this clash can be resolved, under the following additional assumption: *auch* in *auch nur* can outscope the DE expressions. According to this assumption, the sentence in (68)a has at least two possible LFs, depending on the scope of *auch* relative to negation:

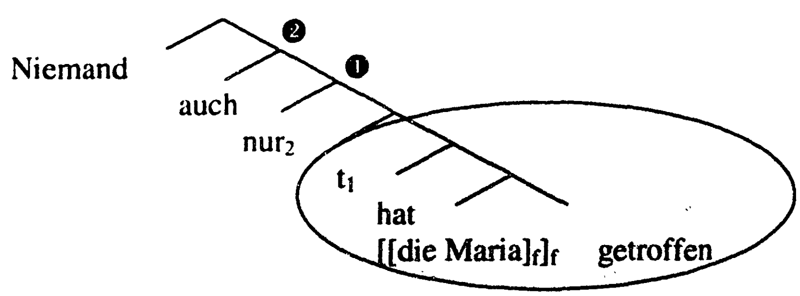
(68) a. Niemand hat auch [nur [die Marie]$_f$]$_f$ getroffen.
Nobody has also only the Mary met
b. LF 1: [niemand$_1$ [auch [nur [t_1 hat [[die Maria]$_f$]$_f$ getroffen]]]]
c. LF 2: [auch [niemand$_1$ [[nur [t_1 hat [[die Maria]$_f$]$_f$ getroffen]]]]

No matter whether *nur* is regular *nur* or *nur₂* LF1 is systematically infelicitous. I'll illustrate the two options in turn.

If *nur* is *nur*$_2$ the presuppositions of LF1 are incompatible. The case is parallel to the affirmative sentence in (67), with one difference: instead of deriving incompatible requirements regarding John, we derive incompatible requirements regarding the variable in the of the trace position of the negative quantifier.

(69) a. LF 1:

Niemand > *auch*> *nur*$_2$



=1 iff g(1) met Mary

For every assignment function g:

a **Presupposition of *nur*$_2$ at node ❶**: there is no person y ≠ Mary s.t. g(1) met y.

b. **Presupposition of *auch* at node ❷**: g(1) met one person different from Mary

d. **Presupposition at node ❷**: g(1) didn't meet anybody different from M & g(1) met somebody different from M. (⊥)

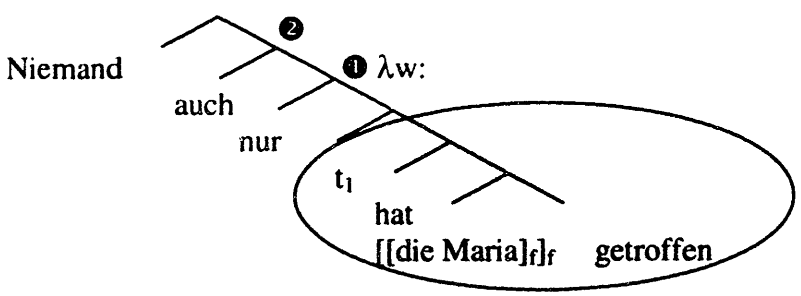
In order to simplify the picture as much as possible, in (69)b I left out the effect of the presupposition of *nur* on the presupposition of *auch*. Since the component of the presupposition of *auch* that is problematic here is the one relative to the truth-conditional part of the prejacent, this omission does not compromise the final result. [6]

Given this incompatibility between the presupposition of *auch* and the presupposition of nur_2, the value of node ❷ is always undefined, and therefore the entire structure is systematically infelicitous.

If *nur* in LF1 has, instead, its regular meaning then the incompatibility is between its factive presupposition and the effect of its truth-conditional component on the presupposition of *auch*. Since the assertive exclusive part of *nur* is negated by the higher quantifier, the assertion is ultimately compatible with the presupposition of *auch*. However the presupposition of *auch* ends up entailing the falsity of the prejacent:

(70) a. LF 1:

Niemand > *auch*>*nur*



=1 iff g(1) met Mary

For every assignment function g:

For every assignment function g:

a **Presupposition of *nur* at node ❶**:	g(1) met Mary.
b. **Presupposition of *auch* at node ❷**:	There is a person x $\neq$M s.t. <u>g(1) met only x => g(1) didn't meet Mary</u>
d. **Presupposition at node ❷**:	g(1) met M & g(1) met only somebody different from M. ($\perp$)

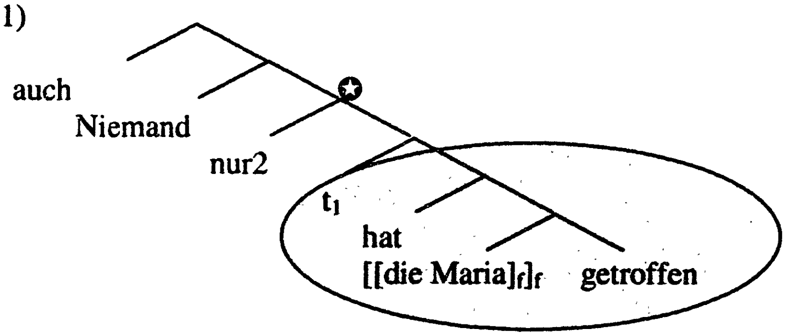
Nur/only presupposes the truth of the prejacent. *Auch/also*, in virtue of containing *nur/only* in its

[6] When this component is taken into account the presupposition of *auch* is even stronger than (69)b.:

g(1) met only one person, and that person was not Mary argument, has a presupposition that ENTAILS the FALSITY of the prejacent. Therefore this LF1 is systematically excluded as well.

Let us turn to LF2. If *nur* is nur_2, presuppositions and assertion of this LF are all compatible with each other.

(71) *auch* > Niemand



=1 iff g(1) met Mary

a. **Assertion:** Nobody met Mary

b. **Presupposition of *auch*:** There is some x different from M. that nobody met x.

c **Presuppositions of nur_2 at ✪:** There is no x $\neq$ Mary s.t. g(1) met x.

Since *auch* outscopes the quantifier, its presupposition is not assignment dependent, and it is as given in (71)b.[7] Nur_2, on the other hand, remains inside the scope of the quantifier. Therefore, at the node where it meaning applies, its value is assignment dependent, as shown in (71)c. To see that the final presupposition of *nur* is not incompatible with the presupposition of *auch,* we need to determine how this presupposition projects.

There are two main views on the projection of presuppositions in quantificational environments, one is Beaver's (2001) theory, which derives in the end an existential presupposition in the scope of negative quantifiers, the other is Heim's (1988), which, instead derives a universal one. Thus, if we endorse Beaver's theory, when *niemand* applies to its partial argument the exclusive presupposition of nur_2 projects as in (72), assuming Heim's (1988) as in (73).

[7] Here again I simplified the presupposition of *auch* by ignoring the effect of the presupposition of *nur.* If the presupposition of *nur* is taken into account then the presupposition of *auch* will depend on how the one of *nur* project in the scope of the negative quantifier in the following way:
Presupposition of *auch*: There is some x$\neq$M s.t. nobody met anybody different from x and nobody met x. (Heim)
Presupposition of *auch*: There is some x $\neq$M s.t, somebody didn't meet anybody $\neq$ x and nobody met x. (Beaver)

(72) **Presupposition of *nur₂* at the top node:** Somebody met nobody $\neq$ M

(73) **Presupposition of *nur₂* at the top node:** Everybody met nobody $\neq$M

$\Leftrightarrow$ Nobody met anybody different from Mary

Both options are compatible with the assertion and the presupposition of *auch*. For reasons that will become clear later, in the rest of this discussion I will assume Heim's theory.

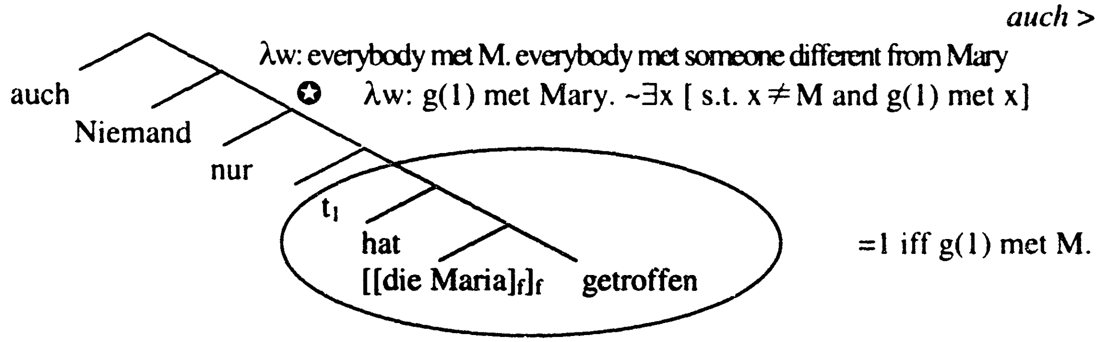
(74) a. **Presuppositions at top node**: Nobody met anybody different from Mary & there is some x different from Mary that nobody met.

b. **Assertion at top node:** Nobody met Mary

Let's see now what happens if we had assumed the regular meaning for *nur* in a configuration like LF2. Interestingly, also if we attributed to *nur* the typical exclusive meaning, the presuppositions and the assertion of LF2 would be all compatible with each other:

(75)

auch > Niemand



a. **Assertion:** Nobody didn't meet anybody but Mary $\Leftrightarrow$ Everybody met someone different from Mary

b **Assertion of *nur* at ✪:** There is no x $\neq$ Mary s.t. g(1) met x.

c. **Presupposition of *nur* at ✪:** g(1) met Mary.

d. **Presupposition of *auch*:** There is some x different from M. s.t. everybody met x and everybody met someone different from x => Everybody met someone different form Mary

However, if we assume Heim's theory of projection under quantification, that everybody met someone different form Mary is already entailed by the presupposition of *auch*! But if the context already contains this information the utterance of this sentence is 'pragmatically tautological', i.e. it never adds any new information to what is already known. Therefore the sentence, under this reading, systematically violates the pragmatic principle, proposed by Stalnaker, that an utterance should never leave c unchanged.[8]

The fact that regular *nur* always generate results that are pragmatically unacceptable (or require the additional process of local accommodation, see ft. note 8) when co-occurring with *auch* invites the following speculation: *Nur* is unspecified with respect to what it asserts and presupposes between *factivity* and *exclusivity*. However, asserting exclusivity is the default. The swapped meaning emerges when something goes wrong with the default. If this speculation turns out to be on the right track, it would help us understanding why this second meaning of *nur* is restricted to environments where *nur* is in the scope of *auch* and the two particles share the same focus.

The above account generalizes to all and only DE contexts. I will provide just one more example here. When *auch nur* occurs in the complement of *doubt*, the reading where *auch* out-scopes this predicate has compatible presuppositions, while there is no reading that has compatible presuppositions if the predicate is *think*.

(76) a. Maria dubita che anche $solo_2$ GIOVANNI sarà presente. *Italian*
Mary doubts that also only John will be present
b. * Maria pensa che anche $solo_2$ GIOVANNI sarà presente.e
Mary thinks that also only John will be present

The two possible LFs of ((81) and their presuppositions are given in (77) and (78), respectively:

(77) a. LF1:[Maria dubita [che [anche [$solo_2$ [[Giovanni]$_f$]$_f$ sarà presente]]]]] *doubt>also*
b. Presupposition of *anche*: M. believes that there is some x ≠ J s.t. only x will be there
c. Presupposition of *$solo_2$*: M. believes that there is no x ≠ J s.t. x will be there Clash!

[8] Notice, however, that sometimes the reading under consideration becomes available. An example is given below:
(i) Nobody took only[syntax]$_f$ and nobody also took only [semantics]$_f$.
It is possible that actually what makes the reading available in this case is local accommodation of the presupposition of *only:*
(ii)..and nobody, who took semantics also took only semantics.

(78) a. LF2: [Anche [Maria dubita [che [$solo_2$ [[Giovanni]$_f$]$_f$ sarà presente]]]]] *also>doubt*

b, Presupposition of *anche*: There some x ≠ J s.t. M. doubts that only x will be there

c. Presupposition of *$solo_2$*: M. believes that there is no x ≠ J s.t. x will be there No clash!

Given this, under the reading *also>doubt* the sentence is correctly predicted to be acceptable.

Now consider the two possible LFs of (81) and their presuppositions:

(79) a. LF1:[Maria pensa [che [anche [solo [[Giovanni]$_f$]$_f$ sarà presente]]]]] *think>also*

b. Presupposition of *anche*: M. believes that there is some x ≠ J s.t. only x will be there

c. Presupposition of *$solo_2$*: M. believes that there is no x ≠ J s.t. x will be there Clash!

(80) a. LF2: [Anche [Maria pensa [che [solo [[Giovanni]$_f$]$_f$ sarà presente]]]]] *also> think*

b. Presupposition of *anche*: There is some x ≠ J s.t. M. thinks that only x will be there

c. Presupposition of *solo*: M. believes that there is no x ≠ J s.t. x will be there Clash!

(81) a. Maria dubita che anche solo Giovanni sarà presente. *Italian*

Mary doubts that also only John will be present

b. * Maria pensa che anche solo Giovanni sarà presente.

Mary thinks that also only John will be present

Under no scope relation of *anche* relative to the main predicate *think* the sentence carries compatible presuppositions.

In conclusion, the exclusive presupposition of *nur_2* correctly predicts *auch nur* to be acceptable only in the presence of a DE operator. In other words, it allows us to provide an account of the NPI-like distribution of this item in terms of its lexical properties alone, very much in the spirit of Lahiri's (1998) analysis of Hindi NPIs.

Before concluding this section, I'd like to point out that Rullmann's (1997) following objection against a scope analysis of *auch nur* does not extend to the present proposal:

The problem facing the wide scope theory is that it has to ascribe properties to NPI forms like 'so much as' or Dutch 'zelfs maar' which seem to be in conflict with each other. On the one hand, being NPIs, these items have to appear in the scope of an NPI trigger in the surface syntactic structure, but on the other hand they must take scope over it in the semantics. As far as I know, this combination of properties would make them unlike all other NPIs, which have to appear in the scope of their trigger both syntactically and semantically. (Rullmann 1997, p.12)

According to the analysis I presented in this section *nur* scopes under negation, as it typically does. The presence of *auch* requires a scale reversal operator for it to out scope, in order to resolve a conflict in presuppositions. Thus, the necessity for *auch* and *nur* to take opposite scope with respect to a DE expression is derived from their meaning and no specific requirement needs to be stipulated about it. The only requirement that needs to be stipulated here is probably a surface requirement ruling out cases where *auch* overtly out scopes negation. Given this Rullmann's argument does not apply .

Notice, in addition, that the account, just like Lahiri's, explains the acceptability of *auch nur* in the latter type of environments in terms of the scope of *auch* with respect to negation. Given this, besides accounting for the restricted distribution of this item, the above analysis of *auch nur* presents an additional advantage over the analysis implicitly assumed by Rooth and Rullmann. In virtue of being an analysis in terms of scope relative to negation, it straightforwardly accounts for the bias *auch nur* induces in questions.

(82) a. Hat der Georg auch nur [die Maria]f begruesst? *Negatively biased*

Has the George also only the Mary greeted

b. For every world w, $[\![\textit{yes}]\!]^{w}$ is defined iff

Presupposition of *nur*: No individual x ≠M is s.t. George greeted x in w

Presupposition of *auch*: Some individual x ≠M is s.t. George greeted x in w

c. For every world w, $[\![\textit{no}]\!]^{w}$ is defined iff

Presupposition of *nur*: No individual x ≠M is s.t. George greeted x in w

Presupposition of *auch*: Some individual x ≠M is s.t. George didn't greet x in w

The affirmative answer to (82)a is associated with two incompatible definedness conditions.

Thus, there is no world where these conditions are satisfied at the same time and the answer is doomed to be infelicitous and therefore excluded in every context. On the other hand, the negative answer has compatible and therefore satisfiable presuppositions. As expected, the question as a whole is always interpreted as biased towards the negative answer.

4.4.3 Scalar Presupposition: Schwarz (2002)

Recall that, in addition to factivity, *only, nur,* and *solo* carry a 'scalar' presupposition (cf. König 1991) roughly stating that the target proposition is the least noteworthy, interesting, informative or most likely among the 'focus-alternatives':

(83) $\sim\exists q \in C\ [q \neq p \rightarrow q >_{likely/insignificant...} p]$ (p the lowest point on the relevant scale!)

Just like *nur,* also *nur2* introduces such a presupposition, i.e. (84)-ii:

(84) For every w,

$[\![nur_2 / solo_2]\!]^w$ (C)(p) is defined iff

(i) $\sim\exists\, q \in C\ [q \neq p \;\&\; q(w)=1]$ *Exclusivity*

and (ii) $\forall q \in C\ [q \neq p \rightarrow p >_{likely/insignificant}{}^{w}\ q]$ *Scalarity*

I will first provide some speculations as to how a scalar presupposition of *nur₂* can be independently motivated and then illustrate how the presence of this presupposition accounts for the facts regarding *auch nur.* Koenig (1991) observes that this type of presupposition is often associated with exclusive particles meaning *only* across languages. In English, for example, *just* appears to always have this scalar import.

However, the effect of this scalar presupposition in more prominent in some cases and less in others as shown by the contrast between examples below.

(85) a. He is only a sergeant.

b. It is easy for you because you live in a big city, I only live in Munich!

(86) a. I met only Mary.

b. Only doctors can park here.

In yet a third type of cases it seems to disappear.

(87) Only the Prime Minister came.

Examples of this latter kind have been taken as evidence that *only* is ambiguous between a scalar an a non-scalar meaning. The argument goes roughly as follows: If *only* was always scalar, we would expect, incorrectly, a sentence like (87) to presuppose that the presence of the Prime Minister is more likely or less significant than the presence of any other contextually relevant person. If this was so the sentence would be infelicitous in most contexts.
Lerner and Zimmermann (1981), however, argued that the above instability of the scalar presupposition is only apparent and that the presupposition is always present. Their proposal is that the differences considered above are due to the nature of objects *only* quantifies over and therefore of the scales that are relevant in each case.

For example, the type of scale with respect to which a sentence like (85) is evaluated presumably corresponds to a military hierarchy. What the sentence presupposes, according to scalarity, is that being a sergeant for the subject of the sentence is more likely, less important or noteworthy than occupying any other position in the military ranking. In other words the use of *only* here indicates that the scale that is taken to be relevant is one were there isn't any lower rank than sergeant. Given exclusivity, the sentence also asserts that the subject does not occupy any higher position in the military ranking than sergeant.

According to Lerner and Zimmermann cases like (87) are evaluated with respect to completely different scales. Specifically, they show that the absence of a scalar presupposition is only apparent if we assume that in these cases *only* quantifies over sets, which are ranked with respect to their cardinality. For example the scalar presupposition *only* introduces in (87) is as illustrated in (88).

(88) For every $m \in$ N, s.t. $m \neq |$ { the prime minister }$|$

That n people came, where $n= |$ { the prime minister }$|$ $>_{\text{LIKELY}}$ That m people came

The scalar presupposition here is that one person came is more likely than that any bigger number of people came. This presupposition is different from the one considered above in that it is detached from the lexical content of the focus. In fact, if (86)a is interpreted with respect to the same scale, it carries exactly the same presupposition:

(89) For every $m \in N$, s.t. $m \neq |\{ \text{Mary} \}|$

That n people came, where $n = |\{ \text{Mary} \}| >_{\text{LIKELY}}$ That m people came

Because of this, such a presupposition is satisfied in completely different kind of contexts, i.e. in contexts where all that matters is that the number of individuals referred to in the prejacent is the lowest in the set of contextual alternative numbers. Since how these individuals are ranked with respect to the alternatives is totally irrelevant, the absence of the presupposition stating that the presence of the Prime Minister is more likely or less significant than the presence of any other contextually relevant person is accounted for. In addition, since all the alternatives considered entail the prejacent, the presupposition is always satisfied, hence its apparent suspension.

This view also explains why for examples like (86) to be felicitous it doesn't have to be the case that Mary is the most likely person for me to meet. The sentence can be evaluated with respect to one of two different possible scales. The first scale is one where propositions pf the form *I met x*, where x is an individual, are ranked with respect to likelihood:

(90) C : { p: $\exists$x [person (x) & p = *That I met x* }

a. < I met Susan,

I met Bill,

....,

I met Mary>

If this is the relevant scale, the sentence would in fact carry the presupposition that Mary was for me the most insignificant person to meet. However, if the option that *only* quantifies over sets is chosen than the relevant scale is as follows:

(91) C: { p: $\exists n \in N$ & p = *That I met n people* }

< I met 15 people,
I met 14 people,
....,
I met 1 person>

As we saw above, if this scale is taken to be the relevant ranking for the evaluation of the sentence containing *only*, such a sentence carries a trivial presupposition. This explains the apparent lack of a scalar presupposition.

Notice that if both quantificational options are possible it really hard to test whether the scalar presupposition is indeed present. Recall that typically one tests the presence of a presupposition by testing the felicitv of the sentence under consideration in a context where the hypothesized presupposition is false. If the sentence is infelicitous in such contexts then the sentence does carry that presupposition. In order to test the scalar presupposition of *nur* we then would need to find contexts where it would fail to be true no matter what objects *nur* quantifies over.

As we noticed above, however, when the focus is a singular definite or proper name, the scalar presupposition is trivially satisfied, if the scale is a rank of sets according to their cardinality. What we need then, is cases with plural foci:

(92) Today I only met [Bill, Susan and Mary]

Scenario1: I have 10 students. But the ones that come for appointments are always Bill, Susan, Mary is the next most frequent visitor. Yesterday I met Bill and Susan, and today again I only met [Bill, Susan and Mary]

Scenario 2: I have 10 students. But the ones that most often come for appointments are Bill and Mary, while Susan is one of the students who come least often. Yesterday I met Bill and Susan, and today again # I only met [Bill, Susan and Mary]

Scenario 3: I have 10 students. But they never all come for office hours. Generally I receive groups of 2 people. Among the students Bill, Susan and Mary are most frequent visitor. Jen, Chris and Max come very seldom. Yesterday I even met Chris and Max, but today I only met [Bill, Susan and Mary].

Scenario 1, above, is one where the scalar presupposition is falsified if the relevant ranking was based on cardinality, but verified if it is a scale of individuals and groups thereof ranked with respect with how likely it is for me to meet them. Scenario 3, is, on the other hand, is one where the presupposition is verified if the scale is a rank of cardinalities of sets of individual, but falsified if the rank is one of individuals. The felicity of the sentence *I met only Mary, Bill and Susan* in both kinds of context seems to suggests that both options are always available. Context 2, on the other hand is such that the scalar presupposition would be always false, no matter what type of objects are ranked in the relevant scale. Thus the sentence is infelicitous.

Turning now to the function the scalar presupposition plays in accounting for the effects of *auch nur,* notice that the scalar presupposition defined above is exactly the mirror image of the scalar presupposition of English *even.* And in fact, it is due to the presence of this presupposition of *nur*$_2$ under negation that *auch nur* is a natural translation of *even* above negation:

(93) a. Nobody greeted even MARY.

b. LF: [even [Nobody$_1$ [t_1 greeted [Mary]$_f$]]]

c. Assertion: Nobody greeted Mary

d. Scalar Presupposition: For every x among the relevant alternatives to Mary, the proposition *that nobody greeted x* is more noteworthy or less likely than *that nobody greeted Mary.*

⇔ 'Mary was the MOST likely to be greeted by someone or other'

(94) a. Niemand hat auch nur$_2$ [die Marie]$_f$] begruesst.

b. LF: [auch [niemand$_1$ [nur$_2$ [t_1 hat [die Maria]$_f$ begruesst]]]]]

c. Assertion: Nobody greeted Mary.

d. Scalar Presupposition: For every y, there is no x among the relevant alternatives to Mary, s.t. the proposition *that y greeted x* is more noteworthy / significant or less likely than *that y greeted M.*

⇔ 'For everybody it was more likely to greet Mary then greeting anybody else'

The scalar presupposition in (94)d entails (93)d.[9] The two cases are completely equivalent if, as many have suggested, the scalar presupposition of *nur* is actually somewhat weaker than I assumed above:

((95) For every w,
⟦nur_2 / $solo_2$⟧^{w} (C)(p) is defined only if

and (ii) MOST q in C are less likely/more noteworthy than p *Scalarity*

If this turns out to be the correct presupposition for *only*, then the scalar presupposition in (94), given in (94) d.' below, would be nearly indistinguishable (93)d.:

(94) d.' Scalar Presupposition: For every y, for most x among the relevant alternatives to Mary, the proposition *that y greeted x* is more noteworthy / significant or less likely than *that y greeted M.*
'For everybody it was more likely to greet Mary then greeting most other people'

Besides accounting for the apparent equivalence of *auch nur* and English *even*, positing a scalar presupposition as part of the import of nur_2 presents one additional advantage in that it provides us with an understanding of the following puzzle, first noted by Schwarz (2002).

[9] Notice that this is the presupposition if Heim 's theory of projection is assumed. According to Beaver's (2001) theory the resulting scalar presupposition would be too weak l
(i) there is a person x s.t. for every y different from Mary, *that x met Mary* is MORE likely than *that x met y*.
This would be problematic for both the present proposal where nur_2 introduces a narrow scope 'easy' presupposition and the ambiguity hypothesis where $even_{NPI}$ does the same thing. However, if Beaver's theory turned out to be preferable, there is a possible solution to the problem. The solution is to treat the 'easy' presupposition as independent from the assignment function, e.g., by assuming that *nur* is a property taking operator presupposing that the prejacent property is the least likely for every relevant individual to have:

[[nur_2]]^w (C) ($P_{<s,et>}$) (x) is defined iff	[[*nur*]]^w (C) ($P_{<s,et>}$) (x) is defined iff
(i) $\forall Q \in C$ [$Q \neq P \rightarrow Q(w)(x) = 0$]	(i) P(w) (x) =1
(ii) $\forall Q \in C$, $\forall y$ [$\lambda w.P(w)(y)=1 >_{LIKELY} \lambda w.Q(w)(y)=1$]	If defined then [[nur_2]]^w (C) ($P_{<s,et>}$) (x) = 1 iff
If defined then [[nur_2]]^w (C) ($P_{<s,et>}$) (x) = 1 iff P(w) (x) =1	$\forall Q \in C$ [$Q \neq P \rightarrow Q(w)(x) = 0$]

This fix however, would leave cases where the focus is a subject unexplained:
(ii) Das hat uns überrausht das auch nur [die Maria]$_f$ da war.

Discussing the possible disadvantages of an analysis of *auch nur* in terms of scope, Schwarz points out that such an analysis would predict that a sentence containing *auch nur* in the surface scope of a DE expression should be equivalent to its counterpart with *sogar* overtly outscoping the DE expression. However, he notes, this equivalence is not always attested. While (96) a and (96) b seem to beequivalent, when we turn to an example where the focus is the bottom of the scale we detect a difference between *sogar* and *auch nur,* as shown in (97):

(96) a. Wir haben jeden zugelassen, der auch nur eine $[\text{drei}]_f$ hatte.
We have everyone admitted, who also only a C had
'We admitted everyone who even had a C.
b. Wir haben sogar jeden zugelassen, der eine $[\text{drei}]_f$ hatte.
We have even everyone admitted, who a C had.
'We admitted even everyone who had a C' (Schwarz 2002)

(97) a. #Wir haben jeden zugelassen, der auch nur eine $[\text{eins}]_f$ hatte.
We have everyone admitted, who also only an A had
b. ! Wir haben sogar jeden zugelassen, der eine $[\text{eins}]_f$ hatte.
We have even everyone admitted, who had an A
!' We damitted even everyone who had an A' (Schwarz 2002)

(97)b. is simply odd because it presupposes that to admit everyone who had the best grade is less likely than to admit everyone who had any other lower grade. This typically is not the case. In selective admissions, the better the grade one gets the more likely he is to be accepted. However one could easily construct a context where things go the other way around. For example, imagine we are talking about the admissions to a support class, organized for mentoring students who have learnability problems. In such a scenario, the above presupposition would be true, and in fact the sentence in (97)b. would become felicitous. (98) a., on the other hand always remains unacceptable, no matter how we manipulate the context looks.

Similarly, changing the predicate from *admit* to *reject,* does not improve the status of (98)a, but it makes (97)b perfectly fine, since now its presupposition is more likely to be satisfied (rejecting everyone with the best grade is in most typical circumstances less likely that rejecting everyone with the second best grade, and than rejecting everyone with the third best grade, and so on for all possible grades).

(99) a. # Wir haben jeden abgelehnt, der auch nur eine [eins]$_f$ hatte.
We have everyone rejected, who also only an A had
b. Wir haben sogar jeden abgelehnt, der eine [eins]$_f$ hatte.
We have even everyone rejected, who had an A
'We rejected even everyone who had an A' (Schwarz 2002)

On the basis of these facts, Schwarz concludes that an analysis of *auch nur* in terms of scope ought to be rejected. Clearly the scope analysis Schwarz has in mind is one that attributes to this complex expression as a whole the same meaning of English *even* and of *sogar* and derives its presupposition from its scope above DE expressions is unsatisfactory. While I agree with Schwarz conclusion on this non compositional version of a scope analysis of *auch nur,* I would like to point out that the variant of the scope analysis proposed in this chapter actually predicts the above contrasts.

Notice that, according to the present proposal, while *auch* must take scope of the DE expression for the sentence to be acceptable, the scalar presupposition of *nur*$_2$ is computed locally and therefore it is blind to higher scalar reversing expressions. Given this *nur*$_2$ can never combine with a focus denoting something very noteworthy or unlikely, because this would generate a very odd presupposition.

(100) a. # Wir haben jeden abgelehnt, der auch nur eine [eins]$_f$ hatte.
We have everyone rejected, who also only an A had
b. # Scalar Presupposition of *nur*$_2$: For every grade x different from A and every relevant person y, it is less noteworthy *that y got an A* than *that y got an x.*

In (99)b., on the other hand, the scalar presupposition of *sogar* takes scope over the entire sentence, and therefore, even though it scopes above a scale reversal operator, it carries a very different presupposition.

(101) a. Wir haben sogar jeden abgelehnt, der eine $[\text{eins}]_f$ hatte.

We have even everyone rejected, who had an A

'We rejected even everyone who had an A

b. Scalar Presupposition of *sogar*: For every grade x different from A, it is less likely/more noteworthy *that we rejected everybody who got an A* than *that we rejected everyone who got an x.*

There is however one potential objection to this explanation: manipulating the contexts as to make the presupposition in (100) true should rescue the sentence, but it doesn't. One such a context would be, e.g., one where the professor always gives to everyone the best grade, and thus where that grade it's the most expected for everybody. The sentence remains unacceptable in such a context as well. I believe this fact follows from Schwarz (2003) recent discovery that the import of *auch nur* contribute in fact an *at least* to the assertion. Given this, the alternatives we consider are always related by entailment. For example, for the interpretation of (100), the relevant alternatives will look roughly as follows: *Every body got at least an A, Everybody got at least a B, everybody got at least a C*}. Since the prejacententails all the alternatives, there can be no context where it could be the most likely proposition.

In conclusion, given the scalar presupposition associated with nur_2 we understand the apparent equivalence between *auch nur* and Rooth's $even_{NPI}$. In addition, this presupposition allows us to solve Schwarz puzzle, without giving up an analysis of *auch nur* in terms of scope. Given that only such an analysis explains the bias of *auch nur* in questions, this is clearly a desirable result.

4.5 Evidence for an Unspecified *only*: Samish

The aspect of the proposal presented in the previous section that is by far the most unconventional is the idea that (at least in some languages) *only* is unspecified with respect to which of exclusivity or factivity is its contribution to the truth conditions and which one is presupposed.

The idea, as unconventional as it might sound, has been already argued to be conceptually plausible. In fact, one finds, in the literature regarding presuppositions, that a number of scholars have entertained the hypothesis that what we see as two different components of the meaning sentences involving a presupposition trigger are (or can be) after all the product of two factors:

> *One is the tendency to limit assertion to one atomic proposition per rooted sentence. The other that almost any thought to be expressed will involve many atomic propositions* [...] *new information will be presupposed if it is not necessary to assert it.* (Abbott 2000, p.1419).[...] *Grammatical presuppositions are a consequence of a natural limit on how much can be asserted in any given utterance, where what is asserted is what is presented as the main point of the utterance* [...] *Anything else will have to be expressed in another way, typically by being presupposed* (Ibidem, p.1431-1432).

The implications of this view on the lexical meaning of expressions that have been so far taken to be presupposition triggers is made explicit by Bart Geurts:

> *The content of an utterance is complex, NOT ONLY AT A SENTENCE LEVEL but also below that. EVEN THE CONTENT OF A SINGLE WORD will rarely be a simple matter. In view of this complexity, it is natural to assume that the interlocutors will concentrate their attention to selected parts of the content conveyed by an utterance; the rest is of secondary importance, IT IS BACKGROUNDED. There may be many factors that can influence this selection process.* (Geurts, undated)

Crucially, one immediate implication of this view is that we should find lexical items whose meaning is the conjunction of, say, α and β, that sometimes assert α and presuppose β, and sometimes assert β and presuppose α (cf. von Fintel 2001).[10] In this sense, at least the defenders of the position described above are committed to the possibility, in principle, that an unspecified item like *nur* and *solo,* as I hypothesized exists.

Notice, in addition, that although a traditional view on presupposition is not committed in the same way to the existence of unspecified items of this sort, it also does not exclude it in any principled way.

This section shows that the existence of such an item is not only conceptually feasible but

[10] The above quote form Geurts suggests that when the selection between what is asserted and what is presupposed tends to always favor the same component of the meaning of the relevant expression, there should be independent factors (e.g. , see Geurts discussion of aspectual and factive predicates-ibidem p. 27-28). However, if for all cases we need to find different and independent factors to account for the systematic lack of balance between what an expression contributes to the assertion and what component of its meaning is doomed to be backgrounded, the view would to lack empirical plausibility. In other words, unless we attest cases where presupposition and truth conditions of a presupposition trigger can be switched, it is not clear at all that the above proposal should be any more appealing when compared with the alternative theory that the information IS after all encoded in the lexical entry of each presupposition trigger.

also empirically attested: the relevant evidence comes from work by Scott Shank on Samish, to whom all the interesting observations reported below are due.

4.5.1 'Only' in Straits Samish (Shank 2002-03)

Shank has conducted fieldwork on a dialect of Salish spoken in British Columbia, Straits Samish, and has made the following interesting discovery. Samish has a particle, *ʔal'*, that means *only* or *just* in affirmative sentences, as shown in (102):[11]

(102) ʔəw̓ ɬíxʷ ʔal' apələs kʷsə nəsʔíɬən
lnk three ʔal' apple det 1s.pos-nom-eat
'I just ate three apples'

Assertion: I didn't it more than three apples

Presuppositions: I ate three apples
For me to eat three apples is less noteworthy than for me to eat more.

However, in the scope of negation *ʔal'* receives a very different interpretation, much closer to the meaning of *even*:

(103) ʔəw̓ ʔə́w̓ə ʔal' s ʔápən kʷsə kʷil'
link not ʔal' irr ten det show up
'Not even ten people showed up'

(104) a. ʔəw̓ ʔə́w̓ə ʔal' s- íʔ leŋ-ət-s kʷsə siləʔ-s
link not ʔal' irr-prt see-tr-3.sbj det grandparent-3s.pos
'He didn't (go to) see even his grandparents'

Just like *nur* above, in some environments *ʔal'*, means something different from what it usually means. Since this second meaning emerges in all an only DE environments, Shank concludes, that there is a second NPI *ʔal'* distinct from the *ʔal'* in affirmative contexts, and that

[11] All the Samish data and glosses are from Shank (2002).

this second lexical item is an NPI (*ʔal'*$_{NPI}$). The question that emerges next is what precisely does *ʔal'*$_{NPI}$ mean and how does its meaning relate, if at all, to the meaning of regular *ʔal'*, which is given below:

(105) $[\![ʔal']\!] = [\![just]\!]$ (i.e. scalar *only*)

For every w

$[\![ʔal]\!]^{w}(C)(p)$ is defined iff

(i) $p(w) = 1$

and (ii) $\forall q \in C\ [q \neq p \rightarrow p >_{likely/insignificant}^{w} q]$ *Scalarity*

if defined, then $[\![ʔal]\!]^{w}(C)(p) = 1$ iff $\sim\exists\, q \in C\ [q \neq p\ \&\ q(w)=1]$ *Exclusivity*

Shank's considerations regarding this question strongly suggest that Samish *ʔal'* is actually ambiguous between nur_1 and an NPI with the meaning of nur_2.

As the glosses above indicate, there is a close similarity between the contribution of *ʔal'*$_{NPI}$ and the import of *even* in negative environments. Given this, Shank notices, we might at first believe that *ʔal'*$_{NPI}$ is equivalent to Rooth's *even*$_{NPI}$,however he discards this hypothesis on the basis of the following general considerations: '*it abandons the possibility that there is any interesting connection between the two ʔal's*' and it forces us to hypothesize an ambiguity between an exclusive and an additive meaning, so far unattested in languages. Besides Shank's conceptual objection to the hypothesis he claims that the *negative existential* contribution this particle introduces (given in (106)) is stronger than the negative existential presupposition of Rooth's *even*$_{NPI}$ (in (107)). Interestingly the former corresponds to the *exclusive presupposition* of nur_2:

(106) $\sim\exists\, q \in C\ [q \neq p\ \&\ q(w)=1]$

(107) $\exists\, q \in C\ [q \neq p\ \&\ q(w)=0]$

For the purpose of keeping as close a relation as possible between the meaning of *ʔal'* and *ʔal'*$_{NPI}$, Schank explores the following alternative analysis for *ʔal'*$_{NPI}$:

(108) For every possible world w:

$[\![ʔal'_{NPI}]\!]^w(C)(p)$ is defined iff

(i) $p(w) = 0$ *Neg-factivity*

and (ii) $\forall q \in C\ [q \neq p \rightarrow p >_{likely/insignificant}{}^{w}\ q]$ *Scalarity*

(109) If defined, then $[\![ʔal'_{npi}]\!]^w(C)(p) = 1$ iff $\exists\ q \in C\ [q \geq_{notheworty} p\ \&\ q(w)=1]$ *Neg-Exclusivity*

This meaning relates with regular *ʔal'* in a way that is similar to the relation between *even* and Rooth's *even*$_{npi}$: the assertion is the negation of its truth conditional exclusive import *only,* and the presupposition is the negation of its *factive* presupposition. In addition the two lexical entries share the same scalar presupposition. When interpreted in the scope of negation, this NPI *ʔal'*, generates the following results:

(110) a. ʔəẃ ʔə́ẃə ʔal' s- íʔ leŋ-ət-s kʷsə siləʔ-s
link not ʔal' irr-prt see-tr-3.sbj det grandparent-3s.pos
'He didn't (go to) see even his grandparents'
Assertion: He didn't see his anybody that was less likely than or as likely as his grandparents for him to see.
Presuppositions: He didn't see his grandparents
To see his grandparents was less noteworthy than to see anybody else

At this point Shank considers more closely the different ingredients of the above lexical entry in order to establish whether they all are needed and if they achieve the result of correctly capturing the effect of the presence of *ʔal'*$_{NPI}$ in a sentence.

First, he notices that the existential truth-conditional import under negation has the same effect as exclusivity. In addition the truth conditional status of *exclusivity* of negative sentences involving this particle predicts that the truth of alternatives that are more noteworthy than the pre adjacent should make the sentence false. For example if the person referred to with *he* saw some other more noteworthy people to be seen, then (111) should be false:

(111) ʔəẃ ʔə́ẃə ʔal' s- íʔ leŋ-ət-s kʷsə siləʔ-s
link not ʔal' irr-prt see-tr-3.sbj det grandparent-3s.pos
'He didn't (go) se even his granparents'

The task of testing this prediction is very hard. Specifically, Shank notices, that is near to impossible to detect whether in the above scenario the sentence is infelicitous or simply false. This suggests that it is at least a plausible option that *exclusivity* is instead presupposed, rather than asserted by *ʔal'*.

Let us now turn to what I dubbed the *negative factive presupposition* in (108)(ii)., i.e. the presupposition that the prejacent (*that he saw his grandparents*, in our example) is false. Shank points out that the falsity of the prejacentis also always asserted. This is so because the truth conditional import (in (109)) entails the truth of a proposition as likely as the pre-adjacent. But given that the particle always occurs under negation, the resulting assertion always entails that there is no true proposition as likely as the pre-adjacent, which in turns always entails the falsity of the prejacent itself. Therefore, in cases where the truth conditions are satisfied, the presupposition does not really doing any work. In cases where they are not, according to the judgments reported by Shank, the sentence is false rather than infelicitous, as the presence of such a presupposition would predict. Given this, the factive component of the meaning of *ʔal'*$_{npi}$ appears to be rather part of the assertion than a presupposition. This is why Shank eliminates the *factive* presupposition and suggest that the following gets closest to the meaning of *ʔal'*$_{npi}$:

(112) For every possible world w:

a $[\![ʔal'_{NPI}]\!]^w(C)(p)$ is defined iff

$$\forall q \in C\ [q \neq p \rightarrow p >_{likely/insignificant}{}^{w}\ q]$$ *Scalarity*

b. If defined, then $[\![ʔal'_{npi}]\!]^w(C)(p) = 1$ iff $\exists\, q \in C\ [q \geq_{notheworty} p\ \&\ q(w)=1]$ *Neg-Exclusivity + Factivity*

According to this lexical entry a negative sentence with *ʔal'*$_{NPI}$ asserts the falsity of the prejacent (*factivity*) and of all the alternastives (*exclusivity*) and carries the same scalar presupposition as *ʔal'* . This very similar to the effect of *nur*$_2$ hypothesized in the previous section. Compare (112) with (113):

(113) $[\![nur_2 \,/\, solo_2]\!]^w(C)(p)$ is defined iff

(i) $\sim\exists\, q \in C\, [q \neq p\ \&\ q(w)=1]$

and (ii) $\forall q \in C\, [q \neq p \rightarrow p >_{likely/insignificant...}\ q]$)

If defined, then $[\![ʔnur_2 \,/\, solo_2]\!]^w\, (C)(p) = p(w)$

The only difference between the two meanings lies in whether *exclusivity* is ultimately asserted or presupposed. However, given that Shank himself does not establishes that the first option is the correct one, it is at least very plausible, that after all *ʔal'*$_{NPI}$ has a meaning where *exclusive* assertion and *factive* presupposition of regular *ʔal'* are simply swapped, just like *nur*$_2$.

This analysis has obvious advantages. First it is compatible what a sentence containing *ʔal'*$_{NPI}$ seems to assert and presupposes, as shown in (114).

(114) ʔəẇ ʔə́ẇə ʔal' s- íʔ leŋ-ət-s kʷsə siləʔ-s

link not ʔal' irr-prt see-tr-3.sbj det grandparent-3s.pos

'He didn't (go) se even his granparents'

Assertion: NOT (he saw his grandparents)

Scalar presupposition: For every alternative x to his grandparents the likelihood that he saw x is SMALLER than the likelihood that he saw his grandparents ⇔ (104)d above

Exclusive presupposition: There is no alternative x to his grandparents such that he saw x.

(this is the correct 'existential presuppostion , not the one of $[\![even_{npi}]\!]^w$ anyway!, see (104)c above)

On the other hand, it still maintains that there is a strict connection between the meanings of the two *ʔal*'s: also in Samish, *only* is underspecified with respect to what is its turth conditional import and what its definedness conditions.

4.5.2 Conclusions and Open Questions

The Samish facts considered above seem support the hypothesis presented in the previous section that in some languages one can find expressions unspecified with respect to what of factivity and exclusivity of *only* is asserted rather than presupposed.

This proposal opens a number of interesting questions. The first question regards the distribution of the two possible meanings for *only* in different languages. In other words, it would be desirable to understand why *only*$_2$ in Samish is dependent on negation and why it is restricted to environments where it co-occurs with *auch* in German, Italian and Dutch. More recent fieldwork by Shank provides us with a possible explanation (Shank p.c.). What this work shows is that the 'link' particle occurring at the beginning of each sentence in the language (i.e. *ʔəw̓*) is an additive particle. In addition, it seems to be the case that whenever a focus occurs in its scope this particle tends to associate to it. This would allow us to extend to Samish the explanation proposed in this chapter for *auch nur*. If this turns out to be the correct approach to the NPIhood of *ʔal'*, Samish would turn out to be a language that wears its LF on its sleeves, as far as the scope of *also* and *nur*$_2$ relative to negation are concerned.

The second question is to what extent the under-specification hypothesis can be extended to English *just*. In I will leave all this questions open for future research.

4.6. N-Words Meaning *Even*$_{NPI}$

After Rullmann revived Rooth's argument based on *auch nur*, additional cross-linguistic evidence in favor of the ambiguity theory of *even* has been claimed to come from Negative Concord (NC) languages like, e.g., Spanish and Greek (cf. Barker and Herburger 2000 and Giannakidou 2003). The argument appears for the first time in Barker & Herburger (2000), where the following Spanish data are reported:

(115) a. Dudo que Andres sepa incluso [calcular el ineres compuesto]$_F$.
(I) doubt that Andres knows *incluso* calculate the interests compund
b. Dudo que Andres sepa ni siquiera [calcular el ineres compuesto]$_F$
(I) doubt that Andres knows *ni siquiera* calculate the interests compund
'I doubt that Andrew can even calculate the compound interests'

The data in (115) indicate that also Spanish resolves the ambiguity of *even* by employing distinct lexical items. While the sentence with *incluso* presupposes that computing compound interest is hard, the one with *ni siquiera* conveys the opposite presupposition. In this sense *incluso* patterns with *sogar* (and *zelfs, addirittura*) while *ni siquiera* appears patterns with *auch nur* (*ook maar* and *anche solo*) (compare the data in (115) with the German examples in (22)).

However Barker and Herburger point out that there is an important difference between the Spanish and the German facts. They acknowledge that if we bite the bullet and decide to disregard the syntactic considerations that would argue against it, the difference between *sogar* and *auch nur* (and between their respective Dutch and Italian counterparts) could be viewed in terms of scope.

Spanish, on the other hand, they say, precludes this possibility. This is so because *ni siquiera* is an n-word (cf. Laka 1991), just like *nadie* (n-body), *nada* (n-thing).

The property of n-words that B&H have in mind when making this claim argument is that they generally are doomed to be interpreted in the scope of negation, in this resembling NPIs like *any* and *ever*,[12] (116) illustrates this point this for the Spanish n-word *nadie* (nobody/anybody). (117) shows for *ni siquiera.*

(116) a. * (No) vino nadie. *nadie*
Not came n-body

[12] This is claimed to be true of non sentence initial n-words (see Ladusaw 1992, Herburger 2000 and Alonso Ovalle and Guerzoni 2002). The difference between sentence initial n-words in Romance, which do not require a negation and appear to introduce one, and non-initial ones, which require a trigger and are not negative, is a very complicate matter which has received much attention in the literature on Negative Concord (cf. Longobardi 1984, Laka 1990, Zanuttini 1991, Ladusaw 1992, van der Wouden and Zwarts 1993, Vallduvi 1994, Acquaviva 1997, Giannakidou 1997 and 1999,Tovena 1998, Guerzoni 2000, Herburger 2002, Alonso Ovalle & Guerzoni 2002). Barker and Herburger's argument focuses on the NPI-like behavior of non initial n-words. For the sake of keeping the discussion focused on their argument, I will follow Barker and Herburger's assumption that initial occurrences of n-words are irrelevant for the comparison between *ni siquiera* and *even* and I will leave them out of the picture.

(117) a. *(No) vino ni si quiera [Hector]$_f$ *ni siquiera*

Not came n-even Hector

'Not even Hector came'

The above examples show that these two expressions, just like *any,* are unacceptable in affirmative sentences. Additional contexts admitting both *any* and n-words are the complement of *without*, and of *before* , as opposed to the complement of *after* and embedded clauses introduced by *doubt*, as opposed to those introduced by *believe.*

(118) a. María salió sin haber saludado a nadie

'Mary left without greeting anyone'

b. María salió antes/*apres de haber saludado a nadie.

'Mary left before/*after greeting anybody'

c. María duda/*crehe de que tú puedas ayudar a nadie.

'Mar doubts/*things that you can help anyone'

Ni siquiera exhibits exactly the same pattern, thus fully qualifying as belonging to the n-words class:

(119) a. María salió sin haber saludado ni siquiera [a Hector]$_f$.

'Mary left without greeting even Hector'

b. María salió antes/*apres de haber saludado ni siquiera [a Hector]$_f$.

'Mary left before/*after greeting anybody'

c. Dudo/ *me creho que Andres sepa ni si quiera [calcular el ineres compuesto]$_f$.

'I doubt that Andrew can even calculate the counpount interests'

In all these cases *ni siquiera* appears to introduce an 'easy' presupposition, like English *even* in one of its readings.

It is worth noticing that the phenomenon Barker & Herburger bring to our attention goes well beyond Spanish. Other NC languages contain n-words that carry the presuppositions of *even*$_{NPI}$. Just to mention some examples, Italian *neppure, nemmeno* French *ne serait-ce que*, and

Greek *oute kan* share the semantics and distribution of *ni siquiera*. Specifically, they require a licenser from the above identified class. Moreover, they introduce the 'easy' presupposition and the negative existential presupposition of Rooth's $even_{NPI}$. Finally, just like *ni siquera* all these expressions involve negative morphology which is semantically inert in non initial position.

(120) illustrates the behavior of Italian *neppure/nemmeno* (lit. n-also, n-less) (compare with the distribution of other n-words in Italian illustrated in (121)). (*oute kan* exhibits the same pattern, as shown in Giannakidou 2003)

(120) a. *(Non) ho visto neppure/nemmeno Maria.
(I) not have seen n-also/n-less Maria
'I didn't see even Mary' / 'also didn't see Mary'
b. Lucia partí **senza** aver **nemmeno** salutato [sua madre]$_F$. ✓ *without*
Lucia left without greeting n-also her mother
'Lucia left without greeting even her mother'
c.*Calandrino reintrò a casa **prima** che lo avesse visto **neppure** [sua moglie]$_F$. * *before-clauses*
Calandrino arrived home before that him had seen n-also his wife
c. **Non penso** che che Andrea possa calcolare **neppure** gli interessi composti. ✓*Negative Embeding*
(I) dount that A. can calculate n-also the compound interests

(121) a.Lucia partí **senza** salutare **nessuno**. ✓ *without*
Lucia left without greeting n-body.
'Lucia left without greeting anyone'
b. Calandrino reintrò a casa **prima/*dopo** che lo avesse visto **nessuno**. ✓ *before-clauses*
Calandrino arrived home before/*after that him had seen n-body
'Calandrino arrived home before/*after anybody saw him'
c. Lucia **dubita/*pensa** che la possa aiutare **nessuno**. ✓ *doubt*
Lucia doubts/thinks that her can help n-body.
'Lucia doubts/*thinks that anybody can help her'

That more Negative Concord languages involve n-words meaning $even_{NPI}$ appears to corroborate Barker and Herburger argument. Importantly this group of expressions differs from the expressions considered in the last section (i.e. *auch nur*, *anche solo* and *ook maar*) in that they are in every relevant respect just like other n-words.

As I mentioned above, Barker and Herburger capitalize on this distinction to argue that Spanish provides strong evidence in favor of an ambiguity theory than German or Dutch: while *auch nur* can be viewed as a wide scope version of *sogar*, *ni siquiera*, like other n-words, simply cannot be interpreted outside the scope of negation, thus representing a knock down counterexample to the scope theory.[13]

[13] How convincing this argument is obviously depends on the specific analysis of N-words one decides to adopt. Although some scholars have proposed that n-words must indeed be interpreted in the scope of negation, like NPIs (cf. Ladusaw 1992 and Laka 1990) others have argued that n-words are never NPIs (see Zanuttini 1991) or are special NPIs that need to be licensed outside the scope of negation (see Giannakidou 1999). Finally, a third camp

There are at least two potential objections to this conclusion. The first objection has to do with the assumption that all n-words should be forced to take scope under negation. This is not so clear at least for expressions like Italian *neanche, neppure* (n-also). These two words contain a negative morpheme pre-fixed to *anche* and *pure,* which mean *also,* as shown in (122).

(122) (Ho visto Maria e) ho visto anche/pure Giovanni.
(I saw Mary and) I saw also John.
Assertion: I saw John
Presupposition: there is somebody else different from Mary that I saw.

Besides their scalar uses where they convey the same presupposition as *even* in negative contexts, *neppure* and *neanche* can indeed be used also to merely convey a negative additive presupposition, that, crucially is the same as that of *also* scoping over negation:

(123) (Non ho visto Maria), e non ho visto neanche/neppure Giovanni.
(I didn't see Mary), and I didn't see John either/ and I also didn't see John.
Assertion: I didn't see John.
Presupposition: There is somebody else that I didn't see.

As for as Spanish *ni siquiera,* an analysis in terms of scope does also not seem to be in principle excluded. To the contrary, it turns out that such an analysis is even be desirable. Here is why. Just like *neppure* also *ni siquiera* contains, besides negative morphology, an expression that can occur by itself. The distribution of *siquiera* is identical to that of *even* NPIs. Most notably this expression, just like English minimizers, triggers bias in questions. As we know by now, this effect is hard to account for if *siquiera* was equivalent to Rooth's $even_{npi}$.

The second and perhaps more serious objection regards the claim that the differences between *auch nur* and *even* on the one hand and *ni siquiera, oute kan, nemmeno,* should make the

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has proposed that they are very much like NPIs, but to account for their more limited distribution one needs to attribute them a somewhat different meaning from round of the mill NPIs like *any* and *ever* (cf. Alonso Ovalle & Guerzoni 2002).

argument for an NPI *even* based on the latter stronger than one based on the former. This claim obviously relies on the assumption that *ni siquiera* is equivalent to Rooth's $even_{NPI}$. These two items, however, exhibit a number of other important differences, that might ultimately deprive Barker & Herburger's argument of much of its strength.

In the rest of this section I will illustrate why. I will first point out that, in general, n-words and NPIs differ in their distribution in ways that can very plausibly be attributed to a difference in meaning between the two groups. I will then show that the distribution of *ni siquiera* and that of the 'easy' presupposition triggered by *even* differ exactly in the same way. On the basis of these considerations I will conclude that the alleged equivalence between *ni si quiera* and $even_{NPI}$ is at least ungrounded and therefore it is unclear whether *ni siquiera* should represent support for the hypothesis that this second English *even* exists.

As we mentioned above, Barker and Herburger (2000) focus on the well known fact that the distribution and meaning of (non-initial) n-words in NC languages like Spanish, Italian and Greek closely resemble NPIs in non NC languages, like *any*.

Besides the similarities with NPIs of the *any* kind that we saw above, non initial n-words are significantly more restricted in their distribution: (124) shows that merely Downward Entailing (DE) environments license NPIs, but they do not license n-words;

(124) *DE Quantifiers:*

a. Less than three students have eaten anything.

b. * Meno di tre studenti hanno mangiato niente.[14]
Less then three students have eaten n-thing

c. * Menos de tres alumnes comiron nada.
Less than three students ate n-thing

(125) and (126) show that even some anti-additive[15] contexts (see Zwarts 1993) fail to license n-words;

[14] We include only the Italian examples, but Spanish exhibits exactly the same patterns.

[15] Anti-additive operators are DE operators which resemble more closely negation in their logical properties, than merely DE ones, in that they also support the following entailment:
$Op (A \vee B) \rightarrow Op (A) \wedge Op (B)$.

Anti-additive determiners: 'every' and of 'no'

(125) a. **Every** time Dante had **any questions** Virgil was there to answer.

b. * **Ogni** volta che Dante aveva **nessuna domanda** Virgilio era là per rispondere.

Every time Dante had n-questions Virgil was there to answer

c. Ogni volta che Maria ha mosso un dito per aiutare, ha combinato un disastro.

Every time Mary has lifed a finger to help, she made a disaster

' Every time Mary lifet a finger to help, she massed the all thing up'

c. * Todo alumno que hyciera/haya hecho nada, fue/sera premiado

Every student that did-subj/past-suj, n-thing, was/ will be prised

(126) a. **No** one who had committed **any crime** could fool Sherlock.

b. * **Nessuno** che aveva/ avesse commesso **nessun crimine** proteva ingannare Sherlock.

Ń-body who commit-PAST-IND/SUBJ. n-crime, could fool Sherlock

c. * Ningun alumno que hacyera/haya hecho nada, sera premiado.

No student who did (subj)/has done (subj) n-thing, will be prised.

In (127) we see that n-words are infelicitous in the antecedent of conditionals:

If clauses:

(127) a. If Mary noticed **anything**, it would be a problem

b. * Se Maria si accorgesse **niente**, sarebbe un problema.

If Mary noticed n- thing, it would be a problem

c. Se Maria ti **torcerà anche solo un capello**, dovrà vedersela con me.

If Mary will twist to you also only one hair, she will have to deal with me

'If Mary will hurt you even the least bit, she will have to deal with me'

d. *Si Maria de diera quanta de nada, esariamos en probelmas.

If Mary noticed (subj) n-thing, we will be in troubles

e. Si Maria haya movido un dedo per ayuvarte, es un miracolo

If Mary lifted a finger to help you, it's a miracle.

Finally (128) (129)and (130) show that n-words are unacceptable in 'factive' environments that do license *any* and minimizers like *a red cent.*[16]

'Only NP'

(128) a. Only Mary saw **any student.**

a. It: * Solo Maria ha visto **nessuno studente.**

b. Sp: * Sólo Maria ha visto **a ningún estudiante**

Only Mary saw n-one student

c. It: Solo Maria ha **alzato un dito per aiutarmi.**

d. Sp: Sólo Maria ha **movido un dedo para ayudarme.**

'Only Mary lifted a finger to help me'

Adversative factives: 'be surprised', 'regret', and 'be sorry':

(129) a. I'm surprised that you saw anybody.

b. It.: *Mi soprende che ti abbia visto **nessuno/**

c. Sp.: *Me sorprende que te haya visto nadie.

To me surprise:3s that you had:subj/ind seen n-body

'That nobody has seen you surprises me'

d.It.: Mi sorprende che tu abbia **alzato un dito** per aiutarmi.

e.Sp.: Me sorprende que hayas **movido un dedo** por ayudarme.

me surprise:3s that you had:subj lifted a finger to help me

' I am surprised that you lifted a finger to help me'

(130) a. Maria is sorry/regrets that you saw **anybody**.

b. It. * A Mary spiace che tu abbia/hai visto nessuno

c. Sp. * Mary lamenta que tú hayas visto a nadie

Mary regrets that you have (ind./subj.) seen n-body

d. It. A Maria dispiace di aver alzato anche solo un dito per aiutarmi.

Mary regrets to have lifted even only a finger to help me.

'Mary regrets having lifted a finger to help me´

[16] For an account of why this is so see Von Fintel (1999).

e. Sp. María lamenta haber levantado un sólo dedo para ayudarme.
Mary regrets have lifted a single finger to help me.
'Mary regrets having lifted a finger to help me'

To the best of my knowledge, the only existing attempt to provide a comprehensive and unified account for the facts above is Alonso Ovalle& Guerzoni (2002).[17] This work argues that the dissimilar distribution of the two classes, of NPIs and n-words, is due to a difference in meaning. Specifically, we proposed that while *any* is a mere existential expression sensitive to Downward Entailingness, the distribution of n-words can be derived by positing that they are existentials at the level of assertion but negative existential at the level of the presuppositions.

The contexts where n-words are banned are those where this presupposition is incompatible either with what the hosting sentence as a whole asserts or with presuppositions introduced by other expressions (i.e. *only* and factives) (Alonso Ovalle and Guerzoni for the details of the proposal). The empirical motivation for the negative presupposition of n-words comes precisely form the observation that all those environments which do license *any* but ban n-words share the following property: they all involve a presupposition which turns out to be incompatible with the negative existential statement presupposed by n-words.

What is of interest for our present purposes is that Alonso Ovalle and Guerzoni's work clearly show that it is at least very plausible that *any* and n-words exhibit differences that ultimately follow from a difference in meaning. This possibility by itself undermine any conclusion regarding the meaning of an item in non NC-languages drawn from the meaning of an n-word, even if when the two appear in the same configurations the ultimate effect of their presence on the meaning of the whole sentence is the same:

[17] These differences are addressed also in Giannakidou 1997, 2000 and 2003 and Penka 2002. Giannakidou's is to stipulate the existence of a class of polarity items whose distribution is regulated by stronger semantic requirements on the hosting contexts than those on *any*. The constraint is that n-words should occur in the scope of anti-veridical operators (i.e., roughly, operators taking a proposition as an argument and entailing its negation). The proposal is at best descriptively adequate, but does not provide an explanation as to why n-words should be ruled by these constraints. Penka (2002) proposes a syntactic account for the even more restricted distribution of n—words in German and Dutch, The account does not extend to Romance languages where n-words are not restricted only to environments containing in the syntax an instance of sentential negation, but appear to be fine whenever such a negation is present semantically.

(131) a. I didn't see anybody.

b. Non ho visto nessuno.

This brings us back to Barker and Herburger's argument. Recall that this argument relies on the assumption that we can actually draw conclusions on the meaning of certain occurrences of English *even* on the basis of the meaning of *ni siquiera*. This assumption however is unjustified. Notice, in fact that the difference in distribution *ni siquiera* and the 'easy' presupposition in English, is the same as that between n-words and *any*. While the former is unacceptable in the scope of weakly negative quantifiers, in the restrictor of *every* and *no*, in the scope of *only* and in the complement of Strawson-Downward Entailing factive predicates, the latter is triggered by the presence of *even* in each of these environments:

(132) *DE Quantifiers:*

a. Less than three students had even a bite.

b. * Meno di tre studenti hanno mangiato neppure un boocone.[18]

Less then three students have eaten n-also a bite

c. Meno di tre studenti nanno mangiato anche solo un boccone.

Less then three students have eaten n-also a bite

d. * Menos de tres alumnus comieron ni si quiera un pedazo.

Less then three students ate n-even a piece

Anti-additive determiners: 'every' and of 'no'

(133) a. Every linguist who read even *Syntactic Structures* was hired by a multinational.

b. Ogni linguista che abbia letto ***nemmeno/anche solo** *Syntactic Structures*

Every linguist that have:SBJ.3s read n-even/also only *Syntactic Structures*

e' stato assunto da una multinazionale.

is been hired by a multinational.

c. *Todo alumno que hyciera/haya hecho ni siquiera un poco fue premiado.

Every student who did(subj)/ has done(subj) n-even a bit was prized

[18] We include only the Italian examples, but Spanish exhibits exactly the same patterns.

(134) a. **No** one who had committed **even one crime** could fool Sherlock.

b. **Nessuno** che aveva / avesse commesso ***neppure/ anche solo** un
No one thathave:PAST.IND/PAST.SUBJ.3s committed n-even/also only one
crimine poteva ingannare Sherlock.
crime could fool Sherlock

c. *Ningun alumno que hyciera/haya hecho ni siquiera un poco fue premiado.
No student who did(subj)/ has done(subj) n-even a bit was prized

(135) *If clauses:*

a. If Mary noticed even one mistake of yours, it would be a problem

b. Se Maria si accorgesse ***nemmeno/ anche solo** di tuo un errore, sarebbe un problema.
If Mary noticed n- even/ also only one your mistake, it would be a problem

c. *Si Maria se diera quenta de ni siquiera un error, es un problema.
If Mary noticed(subj) of n-even a mistake, it's a problem

(136) *'Only NP'*

a. Only Mary saw **even** one student.

b. It: *Solo Maria ha visto **neppure** uno studente.

c. Sp: * Sólo Maria vio a **ni si quiera** ún estudiante.
Only Mary saw n-even one student

d. It: Solo Maria ha visto **anche solo** uno studente.
Only Mary saw also only one student
' Only Mary saw even one student'.

Adversative factives: 'be surprised', 'regret', and 'be sorry':

(137) a. I'm susprised that you saw even one student.

b. It.: Mi soprende che ti abbia visto ***neppure/ anche solo** uno studente.

c. Sp.: *Me sorprenderia que vos viera **ni siquiera** ún estudiante.
To me surprise(subj) that you seen(subj) n-even one student

(138) a. Maria is sorry/regrets that she bought even one book in that shop.

b. It. * A Mary spiace di aver comprato ***neppure/anche solo** un libro in quel negozio.

c. Sp. * Mary lamenta que

Mary regrets to have have bought n-even/also only one book in that shop.

Finally, and most interestingly, unlike *even* and *auch nur/ anche solo, ni siquiera,* and *nemmeno* are simply ungrammatical in questions:

(139) a. *Hai preso nemmeno un 5?

b. Hai preso anche solo un 5? *Negative bias*

(140) a. * Vino ni siqiuera Hector?

b. Vino siqiuera Hector? *Negative bias*

By analogy with the general difference between n-words and *any,* it might very well be the case that also the above differences between *ni siquiera* and *even* are due to their different semantics. Once again, this possibility by itself is sufficient to block any conclusion regarding the meaning of *even* that is drawn on the basis of the meaning of *ni siquiera.*

In conclusion it is not completely clear that Barker and Herburger facts alone really provide an argument against the scope theory of English *even.*

4.7 Giannakidou (2003): three *evens* in Greek.

In the previous I argued that an argument for the ambiguity theory based on the existence of n-words introducing an 'easy' presupposition is likely to run into empirical problems, as the scope theory is still needed to account for this presupposition in environments where n-words are banned. This problem of course would disappear if we could attest the existence of a third type of polarity expressions with the following three properties: (i) they systematically introduced an 'easy' presupposition, (ii) they were acceptable in the same contexts as NPIs and (3) they could be proven to always take narrow scope with respect to their licenser.

Giannakidou (2003) claims that such an expression does in fact exist in Greek: *esto kan,* which she dubs 'concessive even'.

On the basis of considerations regarding its distribution, she claims that concessive *even* (*esto*) is semantically distinct from the focus particle introducing a 'hard' presupposition in affirmative contexts (*akomi ke*) and from the negative word *oute kan* introducing an 'easy presupposition' in anti-veridical contexts.[19] The facts that lead Giannakidou to this conclusion are reported in (141)-(146). (141) shows that, unlike *akomi ke* but like *oute kan*, *esto* is unacceptable in episodic affirmative sentences.

(141) a. I Maria efaje **akomi ke** to pagoto.
The Mara ate even the ice cream
'Mary ate even the ice cream'
b. * Maria efaje **oute kan** to pagoto
The Mara ate even the ice cream
c. * Maria efaje **esto** to pagoto
The Mara ate even the ice cream

On the other hand, in negative sentences *esto* patterns like *akomi ke*; as shown in (142) both expressions are ungrammatical with negation:

(142) a. ??Maria **dhen** efaje **akomi ke** to pagoto.
Mary not ate even the ice cream
b. Maria **dhen** efaje **oute kan** to pagoto
Mary not ate even the ice cream
'Mary didn't eat even the ice cream'
c. ??Maria efaje **esto** to pagoto.
Mary not ate even the ice cream

An exception to the last generalization is the case where *esto* associates with a superlative, in such a case it becomes acceptable under negation but it still differs from *oute kan* in what seems to be the presupposition it introduces:

[19] Roughly, a propositional operator Op is anti-veridical iff it support the following entailment: (Op (p) --> ~ p), namely sentential negation *without* and *before* (see also Zwarts 1995).

(143) a. I Maria dhen akouse **oute kan** #ton paramikro thorivo/ ton dinatotero thorivo.

The Mary not heard even # the slightest sound/the loudest sound

b. I Maria dhen akouse **esto** ton paramikro thorivo/?? ton dinatotero thorivo

In questions *esto* introduces negative bias, unlike both *oute kan,* which is imply ungrammatical in questions, and *akomi ke,* which is fine but does not trigger bias:

(144) a. Efajes **esto** to pagoto? *Negatively Biased*

b. *Efajes **oute kan** to pagoto?

c. Efajes **akomi ke** to pagoto? *Neutral*

Finally, in both antecedent of conditionals and restrictor of universal quantification, *esto* is acceptable while *oute kan* is not. Notice that according to one of my informants *akomi ke* patterns exactly like *esto* in this case, and it is even preferred in this environment.

(145) a. An diavasis **esto ke** tus Chicago Sun Times, kati tha mathis

If (you) read even the Chicago Sun Times, you will learn something.

b. *An diavasis **oute kan** tus Chicago Sun Times, kati tha mathis

c. An diavasis **akomi ke** tus Chicago Sun Time, kati tha mathis.

If (you) read even the Chicago Sun Times, you will learn something.

(146) a. Kather estiatorio pu xreoni **esto/akomi ke** mia draxmi ja ena potiri nero, xriazete kalo

Every restaurant that charges even one drakma for a glass of water, needs a good

mathima apo tin eforia. *Easy*

Lesson from the IRS.

b. *Kather estiatorio pu xreoni **oute kan** mia draxmi ja ena potiri nero, xriazete kalo

Every restaurant that charges evena drakam for a glass of water, needs a good

mathima apo tin eforia.

Lesson for the IRS.

On the basis of these facts Giannakidou draws the two following conclusions: (i) the three items in Greek are semantically distinct form each other and therefore (ii) English *even* is three ways ambiguous between a Positive Polarity, a Negative Polarity and a Concessive lexical entry as well. The PPI *even* has the meaning of normal (i.e. K&Ps) *even* and corresponds to *akomi ke*:

(147) $[\![$*akomi ke*$]\!]$(C)(p)=$[\![$*even*$]\!]$(C)(p)i.e. it is defined iff

(i)	p is the least likely	*'Hard' Scalar Presupposition*
(ii)	there is some true $q \in C$ and $q \neq p$	*Existential Presupposition*

The NPI *even* is claimed to be equivalent to Rooth's NPI *even*, and is realized in Geek as the n-word *oute kan:*[20]

(148) $[\![$*oute kan*$]\!]$(C)(p)is defined iff

(i)	p is the MOST likely	*'Easy' Scalar Presupposition*
(ii)	there no true $q \in C$ ans $q \neq p$	*Negative Existential Presupposition*

Finally, the concessive *even* is claimed to be a mix between the two in that it carries a 'hard' scalar presupposition, like *akomi ke*, but a negative existential presupposition, like *oute kan,* and is claimed to be equivalent to *esto (ke)*

(149) $[\![$*esto ke*$]\!]$(C)(p)=$[\![$*even*$]\!]$(C)(p) is defined iff

(i)	p is the least expected	*'Hard' Scalar Presupposition*
(ii)	there is some true other $q \neq p$	*Existential Presupposition*

I have two main objections towards Giannakidou's proposal. The first concerns the claim that, the different distribution of the three particles above follows from their presuppositions as

[20] Contrary to Giannakidou's claim this item is not equivalent to Rooth's $even_{NPI}$. In fact the latter carries the weaker existential presupposition that there is some alternative q to pre that is false. Interestingly, the negative presupposition of *oute kan* is the exclusive presupposition of nur_2.

given above. The second has to do with the claim that *esto* has the meaning given above and at the same time it is obligatorily interpreted with narrow scope.

Let's start with the first objection. Consider the facts in (141) and (142) repeated here:

(150) a. * Maria efaje **oute kan** to pagoto

b. * Maria efaje **esto** to pagoto

(151) a. ??Maria **dhen** efaje **akomi ke** to pagoto.

c. ??Maria **dehn** efaje **esto** to pagoto.

According to the lexical entries above, (150) and a. and (150)b both assert that Mary ate ice cream (i.e. (152)a) and presuppose (152)c, in addition (150) a presupposes (152)b and (150)b presupposes (152)b':

(152) a. Mary ate the ice cream.

b. The ice cream was the most likely thing for Mary to eat.

b'. The ice cream was the least likely thing for Mary to eat.

c. Mary didn't eat anything different form the ice cream

As for the cases in (151), both (151)a and b assert (153) and presuppose (153) b; and in addition (151)a presupposes (153)c, and (151) b presupposes (153) c'.

(153) a. Mary didn't eat the ice cream.

b. The ice cream was the most likely thing for Mary to eat.

c. Mary ate something else besides the ice cream.

c'. Mary didn't eat anything different form the ice cream.

There is nothing odd about the combination of the assertion and presuppositions of any of the sentences above. One can very well imagine contexts where Mary ate the ice cream and nothing else and where it was more likely that she would eat it rather than anything else, or that she ate the ice cream nothing else and that that the ice cream was the least expected choice...and so on.

To be more concrete let see this for the sentences with *esto.* Recall that *esto* is claimed to be unacceptable both in negative sentences and in plain affirmative sentences. Let's consider what the assertion and the presuppositions would be in these environments, according to the lexical entry in (149) above. The two sentences in (154)a and b have the same set of presuppositions(i.e. those given in (154)c), because negation is a hole, but the former asserts that Mary ate the ice cream while the latter asserts that she didn't:

(154) a. * Maria efaje **esto** to pagoto

The Maria ate even the ice-cream

Assertion: Mary ate the ice-cream.

b. * Maria dhen efaje **esto** to pagoto.

The Mara not ate even the ice-cream

Assertion: Mary didn't eat the ice-cream.

c. Scalar Presupposition: The ice-cream was the least expected food choice for Mary

Negative Existential Presupposition: Mary didn't eat anything besides ice-cream.

Let's consider assertions and presuppositions of (154)a first. There is nothing wrong with this combination. In fact we can easily thing about contexts in which the sentence is felicitous and true, i.e. any context where Mary indeed eat ice-cream and nothing else and that she ate ice-cream rather than something else is most surprising. One can well imagine a context like this. Suppose, e.g., that Mary ate ice-cream and that speaker and addressee know this. In addition they both know she actually really dislike ice cream. However she had her wisdom tooth removed and the dentist told her that she can eat only ice-cream for two days, but speaker an addressee do not know about this, all they know is that she had nothing like ice cream all night and they are very surprised. Given this, the presuppositions of *esto* do not by themselves ban this particle from plain episodic affirmative sentences.

Let's turn now to (154)b. This sentence would be predicted to be felicitous an true in any contexts in which Mary didn't eat the ice-cream and actually didn't eat anything else, and moreover the ice-cream was the food that we least expected Mary to eat. This sentence, given what is already presupposed, makes a weird but not incoherent contribution. In fact, it says that the most expected think happened although we already knew that less expected things on the same scale had happened. Still, we can imagine contexts where uttering such a sentence would make perfectly sense. For example B's response in (155) is such a case.

(155) A: We all saw that Mary didn't eat the pasta and the meet, and also she didn't eat the salad, although she loves all this stuff so much...and since she hates ice cream the most, I wonder whether she eat that.

B: Right, she didn't eat the ice-cream either.

In conclusion, the presuppositions Giannakidou attributes to *esto* do not derive its unacceptability in negative sentences either.

Giannakidou's analysis of this particle is problematic in another more crucial respect: the lexical entry of *esto* does not account for the presuppositions it actually triggers, unless it scopes outside of a DE expression. Consider once more the case of conditionals and universal quantifiers, repeated below. If *esto* did actually introduce the same scalar presupposition as *akomi ke* (i.e. a 'hard presupposition) and was, as claimed, interpreted inside the if-clause in (156)a. and inside the restrictor of the universal quantifier in (157)a., then the predicted presuppositions of the entire sentences would be 'hard' presuppositions (i.e. (156) c and (157)c, respectively). However the sentences are described by Giannakidou as rather carrying 'easy' presuppositions, like (156)b and (157)b:

(156) a. An diavasis **esto ke** tus Chicago Sun Times, kati tha mathis *easy*

If (you) read even the Chicago Sun Times, you will learn something.

b. Actual Presuppostion: For all the relevant alternatives x to the CST, reading the CST and learn something is the less expected than reading x and learning something;

c. Predicted Presupposition: For all the relevant alternatives x to the CST, reading the CST is less expected than reading x.

(157) a. Kather estiatorio pu xreoni **esto ke** mia draxmi ja ena potiri nero, xriazete kalo
Every restaurant that charges even a drakma for a glass of water, needs a good
mathima apo tin eforia.
Lesson for the IRS.

b. Actual Presupposition: For every amount of money bigger than a drakma, it is less expected *that every restaurant that charges even a drakma for a glass of water, needs a good lesson for the IRS* than that *Every restaurant that charges x for a glass of water, needs a good lesson for the IRS.*

c. Predicted Presupposition (???): For every x and for every amount of money y bigger than a drakma, that x charges a drakma for a glass of water is less likely than that x charges y for a glass of water.

In fact, here is how Giannakidou describes the scalar presuppositions of (156):

(158) $\forall$x [x $\neq$ CST → S-expectation (reading x and learning something > reading the CST and learning something)]

Notice that (158) is equivalent to (156)b, and not to (156), contrary to what we would predict if we applied Giannakidou's analysis. Notice, in fact that in order for material in the matrix close (i.e. 'learning something' in the above example) to be contributing to the presupposition of *esto*, the particle must take scope over the whole conditional, an option that Giannakidou argues against.

The analysis runs into a similar problem when questions are considered. Recall, indeed that questions with *esto* are negatively biased:

(159) a. Efajes **esto** to pagoto? *Negative Bias*

In addition to this, according to my informants, the presence of *esto* induces the 'easy' presupposition that the addressee eating ice cream is MORE expected than the addressee eating anything else. Once again, the lexical entry for *esto* which by itself introduces a hard presupposition instead, cannot account for this presupposition, unless *esto* scopes over the trace of *whether.*

Given all this for the analysis to be coherent, either of the two following claims must be dropped: that *esto* takes local scope or that it directly introduces a scalar 'hard' presupposition.

Obviously the first option is preferable, because not only it accounts correctly for the presuppositions in the above examples but also it would derive the bias of *esto* in questions straightforwardly.

In any event, the conclusion is Greek fails to provide any new compelling evidence in favor of an ambiguity hypothesis.

4. 8 Conclusions

In this chapter I discussed three different pieces of evidence that have been argued in the literature to support Rooth's ambiguity theory of English *even.* The first comes form German, Dutch and Italian where the combination of an exclusive particle with an additive one results in an NPI introducing an 'easy' presupposition. Specifically I suggested that the ambiguity is not one of *even,* but one of *nur:* this focus particle is underspecified with respect to what it asserts and what it presupposes. I have shown that one can find cross-linguistic support to this claim as well. A compositional analysis of the sort proposed here has proven to have the important advantages over an analysis that takes *auch nur* and its Dutch and Italian variants to be unanalyzable idioms with the same meaning as Rooth's $even_{NPI}$ First it accounts for the NPI-like behavior of *auch nur,* second it explain why the three languages under consideration all exploit the same combination of ALSO and ONLY to achieve the result of *even* under negation.

This proposal opens a number of interesting questions. One question is to what extent an un-specified meaning can be extended to English *only.* A second question regards the distribution of the two possible meanings for *only* in different languages. Why is $only_2$ in Samish just dependent from negation, but it is restricted to environments where it co-occurs with *auch* in German, Italian and Dutch?

Secondly, I considered expressions that belong to the n-words paradigm and argued that it is unclear whether we can draw conclusions on the meaning of *even* from the meaning of these expressions.

Finally I focused on 'concessive' *even* in Greek and I have suggested that actually for this item as well an analysis in terms of scope would not only be possible, but would probably be preferable.

Given these considerations, my conclusions are that, at the moment, there seems to be no strong cross linguistic evidence supporting an ambiguity of *even*. If anything, there is cross-linguistic evidence undermining it.

Appendix

Chapter 1

(1) DEFINITION: A set P is a partition on W iff:

(i) $P \subseteq \mathcal{P}(W)$

& (ii) For any $w \in W$, $\exists p \in P$ & $w \in p$ *(jointly exhaustive in W)*

& (iii) For any $w \in W$, $\forall p, p' \in P$ [$w \in p$ & $w \in p'$] then $p=p'$ *(mutually exclusivein W)*

(2) DEFINITION: A relation R is an equivalence relation in W iff:

(i) $R \subseteq W \times W$ (R *is a relation between elements of* W)

& (ii) $\forall w \in W$, wRw (R is *reflexive* in W)

& (iii) $\forall w,w' \in W$, if wRw' then w'Rw (R is *symmetric* in W)

& (iv) $\forall w,w',w''$, if wRw' & w'Rw'' then wRw'' (R is *transitive* in W)

(3) ABBREVIATIONS:

$PART_w = \{p \subseteq \mathcal{P}(W) : p \text{ is a partition}\}$

$E_w = \{ R \subseteq W \times W: R \text{ is an equivalence relation}\}$

(4) THEOREM:

There is a one to one correspondence between $PART_{w\ and}$ and E_W.

PROOF

Let h be a function from $PART_w$ to $\mathcal{P}(W \times W)$ s.t.

$\forall part \in PART_w$, $h(part) = \{ \langle w, w' \rangle : \exists p \in part \ \& \ w \in p \ \& \ w' \in p\}$ (D')

h is a one to one correspondence iff

A. image (h) $\subseteq E_w$

& B h is one to one

& C. h is onto E_w

PROOF of A:

A holds iff $\forall$ part $\in PART_w$

(i) h (part) is *reflexive*

(ii) h (part) is *symmetric*

(iii) h (part) is *transitive.*

PROOF of (i):

1. $\exists w\ [\ w \in W\ \&\ \langle w,w\rangle \notin h\ (part)]$ (*per absurdum*)

2. $\exists\ w\ [\ w \in\ W\ \&\ \sim \exists p \in part\ [\ w \in p]]$ (from 1 and D' above)

3. $\forall w\ [\ w \in\ W \rightarrow \exists p \in\ part\ [\ w \in\ p]]$ (from *exhaustivity* of part)

$\perp$

==> $\forall$ part $\in$ $PART_w$ h(part) is *reflexive*

PROOF of (ii):

1. $\forall w,w' \in W\ [\langle w,w'\rangle \in\ h(part) \leftrightarrow \exists p \in part\ [w \in p\ \&\ w \in p']]$ (from D')

2. $\forall w,w' \in W\ [\langle w,w'\rangle \in\ h(part) \leftrightarrow \exists p \in part\ [w' \in p\ \&\ w \in p]]$ (from 1)

3. $\forall w,w' \in W\ [\langle w,w'\rangle \in\ h(part) \leftrightarrow \langle w',w\rangle \in h(part)]]$ (from 2 and D')

==> $\forall$ part $\in$ $PART_w$ h(part) is *symmetrical*

PROOF of (iii):

1. $\forall\ w,w', w''\ [\langle w,w'\rangle, \langle w',w'\rangle \in h(part) \leftrightarrow \exists p[w,\ w',w'' \in\ p]]$ (from D and *exhaustivity of part)*

2. $\forall\ w,w',w''[[\langle w,w'\rangle, \langle w',w'\rangle \in h(part) \rightarrow \langle w,w''\rangle \in\ h(part)]]$ (from D)

==> $\forall$ part $\in$ $PART_w$ h(part) is *transitive*

==> h is into E_w

PROOF of B:

B holds iff

$\forall R, R' \in E_w\ \forall part, part' \in\ PART_w\ [R \neq R'\ \&\ h(part)=R\ \&\ h(part')=R' \rightarrow part \neq part']$

1. $\forall\ R \in E_w\ \forall\ part \in\ PART_w\ [\ h(part)=R \rightarrow R = \{\langle w,\ w'\rangle :\ \exists p \in\ part\ \&\ w \in p\ \&\ w' \in p\}]$(from D)

2. $\forall R, R'\ [\ R\ \neq\ R' \leftrightarrow \exists \langle w,w'\rangle\ \ [\langle w,w'\rangle \in R \leftrightarrow \langle w,w'\rangle \notin R']$

3. $\forall R, R'\ \forall\ part, part' \in\ PART_w\ \ [R \neq R'\ \&\ h(part)=R\ \&\ h(part')=R' \rightarrow \exists \langle w,w'\rangle$

4. $[\exists p \in part\ \&\ w\ \in p\ \& w' \in p] \leftrightarrow \sim [\ \exists p \in part'\ \&\ w\ \in p\ \& w' \in p]].$

5. $\forall R, R'\ \forall part, part' \in\ PART_w[R \neq R' \&\ h(part)=R\ \&\ h(part')=R' \rightarrow \exists p[p \in part \leftrightarrow p \in par']$

==> $\forall R, R' \in E_w\ \forall\ part, part' \in\ PART_w\ [\ R \neq R'\ \&\ h(part)=R\ \&\ h(part')=R'\ \rightarrow\ part \neq part']$

==> h is 'one to one'

PROOF of C:

C holds iff $\forall R \in E_w \exists$ part $\in PART_w$ & h(part)= R

. $\forall R \in E_w$ let $part_R$ be s.t. $part_R = \{p: \exists w \in W \ \& \ p= \{w': w R w\}\}$

1. part $\in PART_w$ is (i) *jointly exhaustive* and (ii)*mutually exclusive*

PROOF of (i)(per absurdum):

1. $\exists w \in W [\sim\exists p \in f(R) \ \& \ w \in p]$ (negation of (i))
2. $\exists w \in W [\sim\exists w'$ s.t. $wRw']$ (from 1 and D above)
3. $\sim (wRw)$ (1 and 2)
4. $\forall w [w \in W \rightarrow wRw]$ (from PR1 above)

$\perp$

==> $\forall R \in E_w$, f(R) is *jointly exhaustive*

PROOF of (ii)(per absurdum):

1. $\exists w \in W, \exists p, p' \in f(R) [w \in p \ \& \ w \in p' \ \& \ p \neq p']$ (negation of (ii))
3. $\forall p[p \in \mathcal{P}(W) \ \& \ p \neq p' \rightarrow \exists w' \in W [w \in p \ \& \ w \notin p']$
4. $\exists w, w', p, p' [w \in p \ \& \ w \in p' \ \& \ w' \in p \ \& \ w' \notin p']$ (from 2 and 3)
5. $\forall w, w' \in W, p \in f(R)[(w' \in p \ \& \ w' \in p) <-> wRw']$ (from D above)
6. $\exists w, w' [wRw' \ \& \ w' \in p \ \& \sim wRw']$ (from 4,5)

$\perp$

==> $\forall R [R \in E_w \rightarrow part_R \in PARRT_w]$

2. $\forall R[R \in E_w \rightarrow h(Part_R)= R]$

1. $\forall R \in E_w \exists [h(part_R)=$ (from 1 and definition of h)

$\{<w,w'>: \exists p \in \{q: \exists w \ \& \ p=\{w':w R w\}\} \& \ w \in p \ \& \ w' \in p\}$

3. $\forall R [h(part_R) =\{<w,w'>: wRw'\}= R]$
4. $\forall R \in E_w [h(part_R)= R]$

$\forall R \in E_w \exists$ part $\in PART_w$ & h(part)= R (from **1** and **2**)
==> h is 'onto' E_w

there is a one to one correspondence between $Part_w$ and E_w

QED

Chapter 2

Relevant lexical entries

- $[\![\textit{even}]\!]^w = \lambda p\text{: } \forall q \in C\ [q \neq p \rightarrow q >_{LIKELY^w} p\ ].\ p(w)=1$
- $[\![\textit{whether}]\!] = \lambda f_{<<t,t>,\ t>}.\ \exists h_{<t,t>}\ [\ h= \lambda t.t \vee h=\lambda t.t=0\ ]\ \&\ f(h)=1$
- $[\![?]\!] = \lambda p.\{p\}$
- $[\![\textit{who}]\!] = \lambda p_{<e,t>}.\ \exists x\ [\text{person}(x)\ \&\ P(x)]$

type of $[\![\textit{who}]\!] \rightarrow$ <<e,t>, t > quantifies over entities of type e

type of $[\![\textit{whether}]\!] \rightarrow$ <<tt, t>,t> quantifies over entities of type <t,t>

Abbreviations

FA = Function Application (Heim & Kratzer 1998)

λ-a = λ-abstraction rule (from Heim and Kratzer 1998 but generalized to traces of type ≠ e)

IFA = Intensional Function Application (Heim & Kratzer 1998)

$p >_{LIKELY^w} q$ = given a set of relevant facts in w, p is more likely than q

K= Karttunen's Wh-quantification, but generalized:

<u>Wh-quantifying Rule (generalized):</u>

If α has daughters β and γ, where

$[\![\beta]\!]$ is type <<σ,t> t> and $[\![\gamma]\!]$ is type <σ,<st,t>>, then for every world w and assignment g:

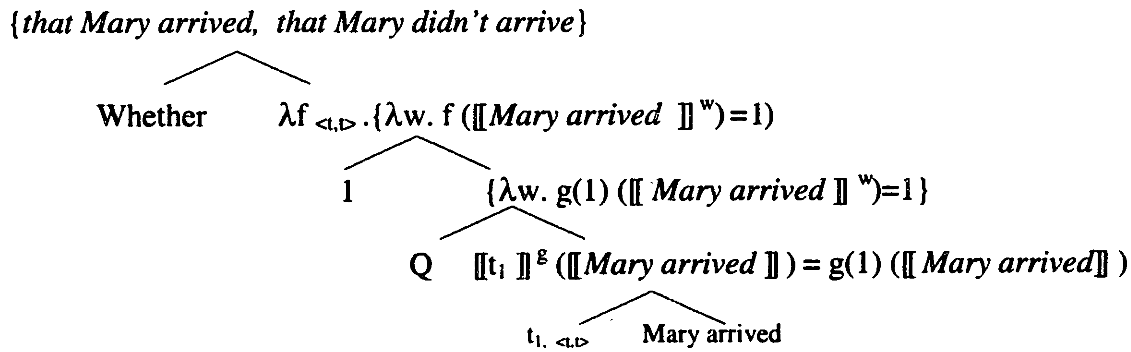
$[\![\alpha]\!]^{w,g} = \{\ p : [\![\beta]\!]^{w,g} (\ \lambda x_{\sigma}\ .\ p \in [\![\gamma]\!]^{w,g} (x)\ ) =1 \}$

IFA*:

Itensional Function Application revised (IFA*):

If α is a branching node and {β, γ} the set of its daughters then for any possible world w and assignment function g, $\alpha \in \text{dom}\ (\ [\![ ]\!]^{w,g})$ iff $\beta \in \text{dom}(\ [\![ ]\!]^{w,g})$ and if $[\![\beta]\!]^{w,g}$ is a function whose domain contains $\lambda w'\text{: } \gamma \in \text{dom}(\ [\![ ]\!]^{w' g})\ .\ [\![\gamma]\!]^{w',g}$, then $[\![\alpha]\!]^{w,g} = [\![\beta]\!]^{w,g}\ (\lambda w'\text{: } \gamma \in \text{dom}\ (\ [\![ ]\!]^{w',g})\ .\ [\![\gamma]\!]^{w',g})$

Computation of the meaning of example (32) on p.72 *Did Mary arrive?*



For every world w and assignment function g

$[\![\textit{whether}]\!] ([\![1.\ Q\ t_1 \text{ Mary arrived }]\!]^{w,g}) =$

$\{p: \exists h_{<t,t>} [\ h= \lambda t.t \lor h=\lambda t.t=0\ ]\ \ \&\ \ p \in [\![1.\ Q\ t_1 \text{ Mary arrived }]\!]^{w,g} (h)\} =$

$\{p: \exists h_{<t,t>} [\ h= \lambda t.t \lor h=\lambda t.t=0\ ]\ \ \&\ \ p \in\ [\lambda f_{<t,t>}. [\![?\ ]\!]([\![t_1 \textit{ Mary arrived}]\!]^{w,g[f/1]})] (h)\}=$

$\{p: \exists h_{<t,t>} [\ h= \lambda t.t \lor h=\lambda t.t=0\ ]\ \ \&\ \ p \in\ [\lambda f_{<t,t>}.\ \{\ \lambda w.\ f\ (\ [\![\textit{Mary arrived}]\!]^{w,g[f/1]}) =1\ \}] (h)\} =$

$\{p: \exists h_{<t,t>} [\ h= \lambda t.t \lor h=\lambda t.t=0\ ]\ \ \&\ \ p \in\ \{\ \lambda w.\ h\ (\ [\![\textit{Mary arrived}]\!]^{w}) =1\ \}=$

Since there are only two possible values for h:

$\{p: p = \lambda w.\ [\lambda t.t]([\![\textit{Mary arrived}]\!]^{w})= 1 \text{ or } p= \lambda w.\ [\lambda t.t=0]\ ([\![\textit{Mary arrived}]\!]^{w})=1\}\}=$

{p : p = *that Mary arrived* or p = *that Mary didn't arrive*}

{*that Mary arrived, that Mary didn't arrive*} Hamblin-set

Computations of the meanings of *Did Kim even solve Problem 2*, (34)a and (34)b on p. 74

Abbreviations

p = *that Kim solved problem 2*

For every world w and assignment function g:

$\{\lambda w.\ AFF([\![even]\!]^{w}(C)(p))=1\ ,\ \lambda w.\ \neg([\![even]\!]^{w}(C)(p))=1$ — TRACE [illegible] > even — by K

Whether — $\lambda f_{<t,t>}.\{\lambda w.\ f([\![even]\!]^{w}(C)(p))=1\ \}$ — by λ-a

1 — $\{\lambda w.\ g(1)([\![even]\!]^{w}(C)(p))=1\}$ — by IFA

? — $g(1)([\![even]\!]^{w}(C)(p))$ — by FA

$t_{1,<t,t>}$ — $[\![even]\!]^{w}(C)(p)$ — by IFA

even C — =1 iff Kim solved Problem 2

Kim — solved [Problem 2]$_{f}$

$\{\lambda w.\ AFF([\![even]\!]^{w}(C)(p))=1\ ,\ \lambda w.\ \neg([\![even]\!]^{w}(C)(p))=1\}$ =

$\{\lambda w.\ \forall q \in C\ [q \neq$ *That Kim Solved Pr.2* $\rightarrow q >_{LIKELY}{}^{w}$ *That Kim solved Pr.2* in w] .Kim solved Problem 2 in w, $\lambda w.\ \forall q \in C\ [q \neq$ *That Kim Solved Pr.2* $\rightarrow q >_{LIKELY}{}^{w}$ *That Kim Solved Pr.2*in w]. Kim didn't solve Problem 2 in w$\}$

For every world w and assignment function g:

[redacted]

$\{\lambda w.\ [\![even]\!]^{w}(C)(\lambda w'{:}AFF\ ([\![K\ solved\ pr.\ 2]\!]^{w'})=1)=1,\ \lambda w.\ [\![even]\!]^{w}(C)(\lambda w'.\ \neg\ ([\![Kim\ solved\ P2]\!]^{w'})=1)=1\}$

Whether $\quad \lambda f_{<t,t>}\{\ \lambda w.\ [\![even]\!]^{w}(C)\ (\lambda w'.\ f\ ([\![Kim\ solved\ Problem\ 2\ ]\!]^{w'}\ )=1)=1\}$ by λ-a

1 $\quad \{\lambda w.\ [\![even]\!]^{w}(C)(\lambda w'.\ (g(1))\ ([\![Kim\ solved\ Problem\ 2\ ]\!]^{w'}\ )=1)=1\}$ by IFA

Q $\quad [\![even]\!]^{w}(C)(\lambda w'.\ (g(1))\ (\ [\![Kim\ solved\ Problem\ 2]\!]^{w'}\ )=1\ )$ by IFA

even C $\quad g(1)\ (\ [\![\ Kim\ solved\ Problem\ 2\ ]\!]\ )$ by FA

$t_{1,<t,t>}$ $\quad$ Kim solved Problem 2

$\{\lambda w.\ [\![even\ ]\!]^{w}(C)\ (that\ Kim\ solved\ Problem\ \ 2)=1,\ \lambda w.\ [\![even\ ]\!]^{w}(C)(\lambda w'.\ ([\![Kim\ solved\ Pr.\ 2\ ]\!]^{w'}\ )=0\ )=1\}$

=

$\boxed{\{\lambda w.\ [\![even\ ]\!]^{w}(C)(that\ Kim\ solved\ \ Problem\ \ 2)=1,\ \lambda w.\ [\![even\ ]\!]^{w}\ (C)(that\ K.\ didn't\ solve\ Problem\ 2)=1\}}$

Y/n questions with *even* in partition semantics (ft. note # 12)

⇨LF1:

❶

? — $[\![even]\!]^w$ (C)(that Mary solved Problem 2)

even C — =1 iff Mary solved Problem 2

Mary solved [Problem 2]$_f$

⇨LF2:

❶

Even — $\lambda w \lambda w'. [\lambda w''. \text{M. solved Pr2 in } w''](w) = [\lambda w''\text{M.solved Pr2 in } w''](w')$

? — =1 iff Mary solved Problem 2

Mary solved [Problem 2]$_f$

$[\![?]\!] = \lambda P_{<st>}. \lambda w.\lambda w'\text{: w and w' } \in \text{ dom (P). P (w) = P(w')}$

In order to interpret LF2 we do need a type shifted lexical entry for 'partition taking' *even* in questions:

For every possible world w:
$[\![even_Q]\!]^w (f_{<s,st>}) = \lambda w. \lambda w'\text{: } w \ \& \ w' \in \text{dom } (\lambda w' \ [\![even]\!]^{w'}(f(w'))). \ [\![even]\!]^{w'}(f(w'))$

Intuitively, here is what this *even* does:

$[\![even_Q]\!]^w$ (

That nobody came
That Bill and nobody else came
That B. & S. & nobody else came
That B., S., M. & no one else came
...
That every student came

)$_C$

=

For every w ∈ c

⟦*even*⟧^{w}(*That nobody came*)
⟦*even*⟧^{w} (*That Bill and nobody else came*)
⟦*even*⟧^{w} (*That B. & S. & nobody else came*)
...
⟦*even*⟧^{w} (*That every student came*)

⇨Meaning of LF1:

For every possible world w:

➊

? ⟦*even*⟧^{w} (C)(that Mary solved Problem 2)

even C =1 iff Mary solved Problem 2

Mary solved [Problem 2]$_f$

⟦➊⟧^{w} =   λwλw': ∀q∈C [q ≠ *that M. solved P2* → q >$_{LIKELY^{w}}$ *That M solved Pr. 2* & q >$_{LIKELY^{w'}}$ *That M solved Pr. 2*] . Mary solved Pr2 in w iff Mary solved Problem 2 in w'

Only if in all the worlds in the context set it is less likely for Mary to solve problem 2 than to solve other problems the above relation is always defined and therefore, the question is felicitous (see Ch.1). Therefore LF1 **presupposes HardP.**

⇨Meaning of LF2:

➊

Even$_Q$ λwλw'. [λw''. M. solved Pr2 in w''](w)= [λw''M.solved Pr2 in w''](w')

? =1 iff Mary solved Problem 2

Mary solved [Problem 2]$_f$

$[\![❶]\!] = \lambda w.\ \lambda w'$: $w' \in dom(\lambda w''\ [\![even]\!]^{w''}$ ($\lambda w'$. M. solved Pr2 in w' iff M.solved Pr2 in w)).
M solved Problem 2 in w' iff Mary solved Problem 2 in w''.

For every w
$[\![❶]\!]$ (w) is defined iff
$\forall x\ [x \neq P2 \rightarrow$ ($\lambda w'$. M. solved x in w' iff M. solved x in w) $>_{LIKELY}$w ($\lambda w'$. M. solved P2 in w' iff M solved P2 in w')]

if defined then $[\![❶]\!]^{w}$ = ($\lambda w'$. M. solved Pr2 in w' iff M. solved Pr2 in w)

Presuppositions of the Possible Answers:

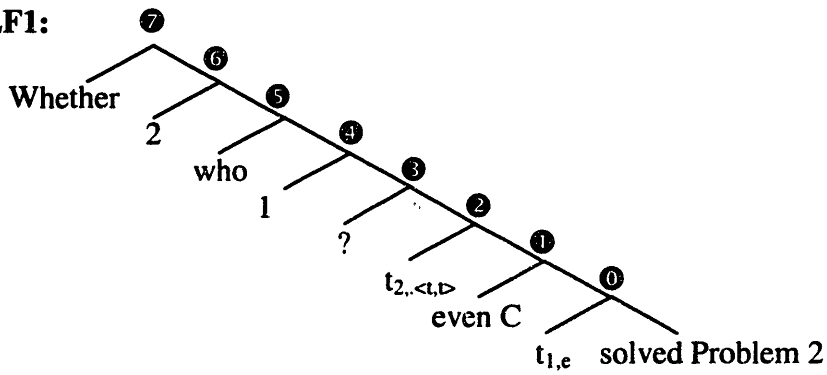
For every w $\in$ c
$[\![yes]\!]^{w}$ is defined iff $\forall x\ [x \neq P2 \rightarrow$ ($\lambda w'$. M. solved x in w') $>_{LIKELY}{}^{w}$ ($\lambda w'$. M. solved Pr2 in w') **HardP**
$[\![no]\!]^{w}$ is defined iff $\forall x\ [x \neq P2 \rightarrow$ ($\lambda w'$. M. **didn't** solve x in w') $>_{LIKELY}{}^{w}$ ($\lambda w'$. M. **didn't** solve Pr2 in w') **EasyP**

If c entails w that Pr 2 is **the easiest** for Mary, the question is **negatively biased**
If c entails that Pr2 is **the hardest** for Mary, the question **is neutral**

Chapter 3

Computation of the meanings of *who even solved Problem 2*, (24)b and (24)c, p.132.

⇨**LF1:**



b. Abbreviations: p= *that g (1) solved Problem 2*, prs. =person, *P2 = Problem 2*

c.

For every world w and assignment function g:

$[\![⓪]\!]^{w,g}$ = $[\![\textit{solved Pr2}]\!](g(1))$ by FA

$[\![❶]\!]^{w,g}$ = $[\![\textit{even}]\!]^{w}$(C)(p) is defined iff p is the least likely proposition in C.
If defined, then $[\![\textit{even}]\!]^{w}$(C)(p)= 1 iff (g(1)) solved problem 2 by IFA

$[\![❷]\!]^{w,g}$ = g(2)($[\![\textit{even}]\!]^{w}$(C)(p)) defined iff p is the least likely proposition in C.
if defined then = g(2)($[\![\textit{even}]\!]^{w}$(C)(p)) =1 ff g(2) ($[\![\textit{solved P2}]\!]$(g(1)) =1 by FA

$[\![❸]\!]^{w,g}$ = {λw: p is the least likely^{w} proposition in C. g(2)($[\![\textit{even}]\!]^{w}$(C)(p))=1} by IFA*

$[\![❹]\!]^{w,g}$ = λx_e. {λw: *that x solved P2* is the least likely in C. g(2)($[\![\textit{even}]\!]^{w}$(C)(*that x solved P2*)) =1 }

$[\![❺]\!]^{w,g}$ = {q: ∃x [prs.(x) & q= λw: **hardP**. g(2)($[\![\textit{even}]\!]^{w}$(C)(*that x solved P2*))=1]} by K

$[\![❻]\!]^{w,g}$ = $\lambda f_{<t,t>}$ {q : $\exists x_e$ [prs(x) & q= λw: **hardP** f($[\![\textit{even}]\!]^{w}$ (C)(*that x solved P2*))=1]}By λ-a

$[\![❼]\!]^{w,g}$ = By K

{q: $\exists x_e \exists h_{<t,t>}$ [prs.(x) & (h ∈ { AFF, ¬} & q = λw: **hardP.** h($[\![\textit{even}]\!]^{w}$(C)(*that x solved P2*))=1]}

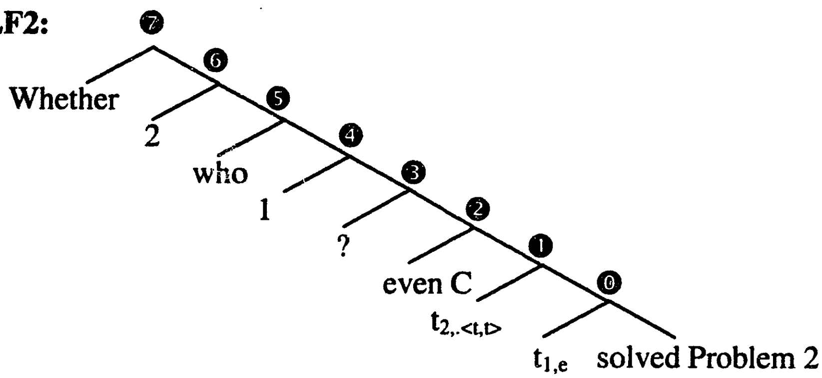
=

{p: $\exists x_e$ [prs.(x) & (p= λw: **hardP.** AFF($[\![\textit{even}]\!]^{w}$(C)(that x solved P2))=1
∨ p =λw: **hardP** ¬ ($[\![\textit{even}]\!]^{w}$(C) (that x solved P2)) =1)]}

=

{p: $\exists x_e$ [prs(x)&[(p= λw: ∀ q∈C [q $>_{\text{LIKELY}}^{w}$ *That x solved P2*] . x solved Problem 2 in w)   or   (p= λw: ∀ q∈C [q $>_{\text{LIKELY}}^{w}$ *That x solved P2*] . x didn't solve Problem 2 in w)]] }

⇨**LF2:**



Abbreviation: *P2= solved Problem 2*

For every world w and assignment function g:

⟦⓿⟧^{w,g} = ⟦*P2*⟧^{w}(g(1)) — by FA

⟦❶⟧^{w,g} = g(2) (⟦*P2*⟧^{w} (g(1))) — by FA

⟦❷⟧^{w,g} = ⟦*even*⟧^{w} (C)(λw'. g(2) (⟦*P2*⟧$^{w'}$(g(1))=1) — by IFA

⟦❸⟧^{w,g} = {λw: (λw'. g(2) (⟦*P2*⟧$^{w'}$(g(1))=1) in the least likely in C.
⟦*even*⟧^{w} (C)(λw'. g(2) (⟦*P2*⟧$^{w'}$(g(1))=1)=1 } — by IFA*

⟦❹⟧^{w,g} = λx_e. {λw: (λw': g(2) (⟦*P2*⟧$^{w'}$(g(1))=1) in the least likely in C.
⟦*even*⟧^{w}(C)(λw'. g(2) (⟦*P2*⟧$^{w'}$(x))=1)=1} — by λ-a

⟦❺⟧^{w,g} = ⟦*who*⟧ (λx_e. {λw: (λw'. g(2) (⟦*P2*⟧$^{w'}$(g(1))=1) in the least likely in C.
⟦*even*⟧^{w}(C)(λw'. g(2) (⟦*P2*⟧$^{w'}$ (x))=1)=1}) — by K

= {p: ∃x [prs(x) & p= λw: (λw'. g(2) (⟦*P2*⟧$^{w'}$(g(1))=1) in the least likely in C.
⟦*even*⟧^{w}(C)(λw. g(2) (⟦*P2*⟧$^{w'}$(x))=1)=1]}

⟦❻⟧^{w,g} = λf . {p: ∃x [prs (x) & p= λw: (λw'. g(2) (⟦*P2*⟧$^{w'}$(g(1))=1) in the least likely in C.
⟦*even*⟧^{w}(C)(λw'. f (⟦*P2*⟧$^{w'}$(x))=1)=1]} — by λ-a

⟦❼⟧^{w,g} = ⟦*whether*⟧(⟦❻⟧) — by K

= {p: ∃x_e, $f_{<t,t>}$ [prs(x) & f ∈ {AFF, ¬}& p=λw: (λw'. f (⟦*P2*⟧$^{w'}$(g(1))=1) in the least likely in C.
⟦*even*⟧^{w}(C)(λw. f (⟦*P2*⟧$^{w'}$(x))=1) =1]}

=

{p: ∃x [pr (x) & [(p = λw: ∀ q ∈ C [q $>_{LIKELY^w}$ (λw'. ⟦*P2*⟧$^{w'}$(x)=1)] . ⟦*P2*⟧^{w} (x)=1)
∨ (p = λw: ∀ q ∈ C [q $>_{LIKELY^w}$ (λw'. ⟦*P2*⟧$^{w'}$(x) = **0**)]. ⟦*P2*⟧^{w}(x)= **0**)]] }

=

{p: ∃x [person (x)) & [(p = λw: ∀ q ∈ C [q $>_{LIKELY^w}$ *That x solved Pr. 2*]. x solved Pr2 in w) or (p = λw: ∀q∈C [q $>_{LIKELY^w}$ *That x **didn't** solve Pr.2*]. x did**n't** solve Pr2)]] }

Equivalence of the *de re* readings of *(whether) which student called* and *(whether) which student called:*

$[\![$*(whether) which student didn't call* $]\!]^{w} =$

$\{p{:}\exists x[[\![student]\!]^{w}(x)=1\,\&\,(p=\lambda w'.\,\mathrm{AFF}([\![not]\!]^{w'}([\![call]\!]^{w'}(x)))=1)\vee p=\lambda w'.\neg\,([\![not]\!]^{w'}([\![call]\!]^{w'}(x)))=1)]\}$

$\{p{:}\ \exists x\ [\ [\![student]\!]^{w}(x)=1\,\&\,($p= *that x didn't call* $\vee$ p = *that it is not the case that x didn't cal*)]}=

$\{p{:}\ \exists x\ [\ [\![student]\!]^{w}(x)=1\,\&\,($p = *that x called* or p = *that x didn't call*)]}=

$\{p{:}\ \exists x\ [[\![student]\!]^{w}(x)=1\,\&\,(p=\lambda w'.\,\mathrm{AFF}\,([\![called]\!]^{w'}(x))=1)\vee p=\lambda w'.\neg\,([\![called]\!]^{w'}(x)=1]\}=$

$[\![$*(whether) which student called* $]\!]$

Equivalence of G&S's *de re* readings of *which student called* and *which student call:*

$[\![$*which students called* $]\!](w)=$

{w': λx. x is a student in w & x called in w= λx. x is a student in w & called in w'} *de re*

$$A \cap B = A \cap C$$

$A\cap B=A\cap C$ iff $A\cap\overline{B}=A\cap\overline{C}$

$A\cap B=A\cap C$ iff $\overline{(A\cap B)}=\overline{(A\cap C)}$

$\overline{(A\cap B)}=\overline{(A\cap C)}$ iff $A\cap\overline{(A\cap B)}=A\cap\overline{(A\cap C)}$

$A\cap\overline{(A\cap B)}=A\cap\overline{(A\cap C)}$ iff $\{x{:}\,x\in A\,\&\,(x\in\overline{A}\vee x\in\overline{B})\}=\{x{:}\,x\in A\,\&\,(x\in\overline{A}\vee x\in\overline{C})\}$

$\{x{:}\,x\in A\,\&\,(x\in\overline{A}\vee x\in\overline{B})\}=\{x{:}\,x\in A\,\&\,(x\in\overline{A}\vee x\in\overline{C})\}$ iff $\{x{:}\,x\in A\,\&\,x\in\overline{B}\}=\{x{:}\,x\in A\,\&\vee x\in\overline{C}\}$

$\{x{:}\,x\in A\,\&\,x\in\overline{B}\}=\{x{:}\,x\in A\,\&\vee x\in\overline{C}\}$ iff $A\cap\overline{B}=A\cap\overline{C}$

Therefore: $A\cap B=A\cap C$ iff $A\cap\overline{B}=A\cap\overline{C}$

By substituting A, B and C:

{w': λx. x is a student in w & x called in w= λx. x is a student in w & called in w'} =

$\{w'{:}\ [\![student]\!]^{w}\cap[\![didn't\ call]\!]^{w}=[\![student.]\!]^{w}\cap[\![didn't\ call]\!]^{w'}\}=$

{w': λx. x is a student in w & x didn't call in w= λx. x is a student in w & didn't callin w'} =

$= [\![$*which students didn't call* $]\!](w)$

QED

Distinctness of G&S's *de dicto* readings of *which student called* and *which student call*

[[*which students called*]](w) =

{w': λx. x is a student in w & x called in w= λx. x is a student in w & called in w'} (1) *de dicto*

↓ ↓ ↓ ↓

$$A \cap B = D \cap C$$

[[*which students didn't call*]](w) =

{w': λx. ~ (x is a student in w & x called in w) = λx. ~ (x is a student in w' & x called in w')} (2) *de dicto*

↓ ↓ ↓ ↓

$$A \cap \overline{B} = D \cap \overline{C}$$

Suppose that $(A\cap B) = (D\cap C)$

Then $\overline{(A\cap B)} = \overline{(D\cap C)}$

Thus

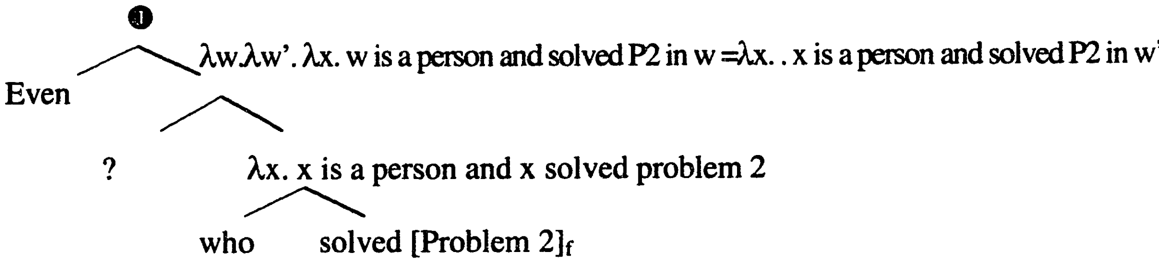
$\{ x: x \in \overline{A} \text{ or } x \in \overline{B})\} = \{ x: x \in \overline{D} \text{ or } x \in \overline{C})\}$ iff

this is compatible with there being an x which belongs to A and to the complement of B, but not to the intersection of D with the complement of C, (for example where D is a superset of A) . Given this the set in (1) is not identical to the set in (2)

QED.

Wh-questions with unbalanced presuppositions in G&S system

LF:



[[❶]] = λw. [[*even*]]^{w} (λw'. λx. w is a person and solved P2 in w =λx.. x is a person and solved P2 in w')

For every w:

[[❶]] (w) is defined iff for every x, s.t. 2≠Pr2
(λw'. λx. w is a person and solved y in w =λx.. x is a person and solved y in w') $>_{LIKELY}^{w}$ (λw'. λx. w is a person and solved P2 in w =λx.. x is a person and solved P2 in w')

If defined, then [[❶]] (w) =(λw'. λx. w is a person and solved P2 in w =λx.. x is a person and solved P2 in w')

In every w where the problem was the most likely for everybody to solve, any answer entailing that someone solved the problem contradicts its own presuppositions. This is so because for any arbitrary individual or set of individuals X the following is false in such a world:

∀y, s.t. y ≠Pr2
(λw'. X solved y in w') $>_{LIKELY}^{w}$ (λw'. X solved P2 in w')

Given this the only felicitous answer to this question in such a world is the following:

λw'. ∀x [λx. x is a person and solved Problem 2 in w'](x)=0

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