Indefinite Intervention Effects

How Focus Intervention Restricts the Scope of Indefinites

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Für Lea Bey und Claudia Otter

"Aufstehen, Krönchen richten, weiterlaufen."

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Abstract

This dissertation proposes an alternative-based semantic analysis of indefinites and their extraordinary behaviour with regard to scope and binding. The empirical basis of this approach is data which shows that these behaviours are restricted by focus evaluating operators in a way that suggests that these are Beck-effects (Beck 1996b, 2006). The analysis itself combines Kratzer and Shimoyama (2002)'s approach to indefinites with a focus evaluating version of Heim (1982)'s existential closure and an Elbournian approach to definite descriptions (Elbourne 2013) to account for a much larger set of data than previous accounts, including the aforementioned Beck-effects. The last part of this dissertation shows how this account can be profitably employed in other areas as well, such as the analysis of polarity items and free choice items.

indefinites, scope, donkey anaphora, focus, intervention effects

Abstract

Die Dissertation stellt eine auf Alternativen basierende semantische Analyse von Indefinita und deren außergewöhnlichem Verhalten in Bezug auf Skopus und Bindung vor. Die empirische Basis dieses Ansatzes sind Daten, die zeigen, dass diese Verhaltensweisen von Fokus evaluierenden Operatoren auf eine Art eingeschränkt wird, die nahelegt, dass es sich dabei um Beck-Effekte handelt (Beck 1996b, 2006). Die Analyse kombiniert den Ansatz von Kratzer und Shimoyama (2002) für Indefinita mit einer Fokus evaluierenden Variante des Heimschen (Heim 1982) Operators zur existentiellen Abquantifikation und einer Elbournschen Herangehensweise an Definita (Elbourne 2013), um eine deutlich bessere empirische Abdeckung zu erzielen als vorhergehende Ansätze, was auch die bereits genannten Beck-Effekte einschließt. Der letzte Teil der Dissertation zeigt auf, wie andere Forschungsbereiche, wie die Analyse von Polaritäts- und Freie Wahl-Elementen, von der Verwendung des Ansatzes profitieren können.

indefinites, scope, donkey anaphora, focus, intervention effects

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Chapter 1

Introduction

It would be a massive understatement to say that the literature surrounding indefinites and their irregular scope taking capabilities is rich and varied. At least since Fodor and Sag (1982), there is a lively debate, not only about which approaches might be fruitful, but also about the data itself, the availability of certain readings and the general nature of different semantic frameworks. Several connected phenomena, such as so-called donkey constructions or donkey anaphora (Geach 1962), display puzzling behaviour that seemingly contradicts commonly accepted mechanisms of natural language, further extending the debate. One set of data, however, has not been discussed nearly as thoroughly as the rest: Indefinites and related phenomena like donkey constructions are sensitive to Beck-effects (Beck 1996b). This has been noted in the literature, but, to my knowledge, not been thoroughly discussed as a phenomenon that might allow a better understanding of the strange behaviour of indefinites.

The goal of this work is to provide an approach to indefinites that correctly predicts the complex pattern of intervention effects, without stipulating more machinery specific to the phenomenon than is absolutely necessary and thereby provide further insight into the nature of indefinites as well as Beck-effects.

1.1 Goals of this Dissertation

There are three elements in this work that I see as its main contribution. The first one is empirical: I will provide data illustrating the behaviour of the

German indefinite "ein", focusing on its ability to take irregular wide scope and form donkey constructions. The data will show that both of these are sensitive to intervention effects by a variety of elements, but not in the same way. The second contribution is the analysis of this data and the approach towards indefinites and intervention effects I develop from this analysis. This approach correctly predicts the behaviour of the German indefinite "ein" and its interaction with critical interveners. In addition, I will show how this approach can be used to gain further insight into other areas and that it integrates well with current approaches in these areas. The third contribution is typological: I will show that different critical interveners have different effects on indefinites and each other. There is a clear pattern, which is gouverned by a set of rules that can be used to categorize critical interveners into different types. This can be used as a tool for further research into quantification and into the role that focus semantics play in natural language.

1.2 Preliminaries

1.2.1 Compositional Interpretation

The general framework used throughout the text is based on Heim and Kratzer (1998) and von Fintel and Heim (2011). For the framework used here, the input for the semantic interpretation is a syntactic phrase structure tree. The machinery for deriving the meaning of such a tree consists of three parts, following Frege (1892)'s principle of compositionality, which states that the meaning of a sentence is determined by the meaning of its parts and the rules by which they are combined: A set of basic denotations that a terminal node in the tree can have and a lexicon that contains the specific denotations of lexical items provide the meaning of the parts. The other half of this principle comes in the form of a set of rules of composition that gouvern how the meanings of non-terminal nodes are derived from the meanings of the terminal nodes.

The framework is type-driven and the definition of semantic types adapted from Heim and Kratzer (1998)[p.28]. For the purposes at hand, I will assume these basic types:

(1) Semantic types:

a. e and t are semantic types.
b. If α and β are semantic types, then $<\alpha,\beta>$ is a semantic type.
c. Nothing else is a semantic type.

(2) Semantic denotation domains:

a. $D_{<e>}$ (= D) is the set of entities.
b. $D_{<t>}$ (= {0,1}) is the set of truth values.
c. For any semantic types α and β, $D_{<\alpha,\beta>}$ is the set of all functions from $D_{<\alpha>}$ to $D_{<\beta>}$.

The rules of composition that will be relevant in the following chapters are as follows. The starting point is functional application:

(3) Functional Application:
If α is a branching node and $\{\beta,\gamma\}$ the set of α's daughters, and $[\![\beta]\!]$ is a function whose domain contains $[\![\gamma]\!]$, then $[\![\alpha]\!]=[\![\beta]\!]([\![\gamma]\!])$

Variables in this framework are interpreted through a variable assignment function. In Heim and Kratzer (1998)[p.111] the corresponding rule refers to pronouns and traces specifically, but the assumption is that pronouns are variables. They carry an index and receive a value via a variable assignment function:

(4) A variable assignment is a partial function g from the set of indices to the set of all denotations, such that, for every $<i,\tau> \in dom(g)$, $g(i,\tau) \in D_\tau$

(5) Traces and Pronouns Rule:
If α is a pronoun or a trace, a is a variable assignment and i is in the domain of a, then $[\![\alpha_i]\!]^a=a(i)$

For the semantics of variable binding, I follow Heim (1993) and Heim and Kratzer (1998) in assuming that there is a λ-operator in the phrase structure tree which creates a λ-abstract and binds coindexed variables in its scope. Heim and Kratzer (1998)[p.186] implement this in the form of the Predicate Abstraction rule, which is stated below:

(6) Predicate Abstraction:
Let α be a branching node with with daughters β and γ, where β dominates only a numerical index i. Then, for any variable assignment a, $[\![\alpha]\!]^{a} = \lambda x \in D.\ [\![\gamma]\!]^{a^{x/i}}$.

Predicate abstraction modifies the assignment function so that other occurrences of the index that triggered predicate abstraction are mapped to the value bound by the first occurrence.

(7) $[\![\alpha_i]\!]^{a^{x/i}} = a^{x/i}(i) = x$

So far, this system is an extensional one, in which statements denote a truth value. This will not suffice for all aspects discussed in this work, some of which will require an intensional system. In an intensional system, a statement denotes a set of situations or possible worlds in which it is true. This is called the intension of a sentence (von Fintel and Heim 2011). In addition to the semantic types specified above, this requires an additional type, type <s>, for possible worlds.

(8) Semantic types:

a. e, s and t are semantic types.
b. If α and β are semantic types, then $<\alpha,\beta>$ is a semantic type.
c. Nothing else is a semantic type.

(9) Semantic denotation domains:

a. $D_{<e>}$ (= D) is the set of entities.
b. $D_{<s>}$ is the set of possible worlds.
c. $D_{<t>}$ (= {0,1}) is the set of truth values.
d. For any semantic types α and β, $D_{<\alpha,\beta>}$ is the set of all functions from $D_{<\alpha>}$ to $D_{<\beta>}$.

Possible worlds can be seen as states which the actual world might be in (Lewis 1986). In an intensional system, a statement denotes a proposition of type <s,t>, a set of possible worlds in which the statement is true. Denotations are evaluated relative to an assignment and an evaluation world. For a detailed intensional system, see von Fintel and Heim (2011).

1.2.2 Focus and Alternatives

Focus involves alternatives. This intuition has been the basis of a variety of approaches to focus. The framework I will use in the following chapters builds on the one developed in Rooth (1985, 1992, 1996). The Roothian approach assumes a two-layered semantics, where every sentence has an 'ordinary' semantic value and a 'focus' semantic value. The focus semantic value is the set of alternative propositions "obtainable from the ordinary semantic value by making a substitution in the position corresponding to the focused phrase" (Rooth 1992[p.76]). I will mark focused elements with a subscript "F".

(10) a. $[\![\text{Mary}_F \text{ snores}]\!]_o{}^g = \lambda$w. Mary snores in w
b. $[\![\text{Mary}_F \text{ snores}]\!]_f{}^g = \{\lambda$w. x snores in w $\mid$ x$\in$D$\}$

Focus sensitive elements like "only" take as their first argument the focus semantic value of their sister constituent and the ordinary one as their second. This is done via a focus constant C. One of Rooth (1992)[p.85]'s focus interpretation principles is (11):

(11) Focusing adverb constraint:
If C is the domain of quantification of a focusing adverb with argument α, then C$\subseteq[\![\alpha]\!]_f$

This way, focus sensitive elements like "only" can use the focus semantic value of their scope as their restrictor.

(12) $[\![$[only C] Mary_F snores$]\!]^g =$
λw.$\forall$p[p$\in$g(C) & p(w) $\rightarrow$ p = λw'.Mary snores in w']

In this case, C needs to be a subset of the focus semantic value, so g(C)$\subseteq\{\lambda$w. x snores in w $\mid$ x$\in$D$\}$.

(13) $[\![$[only C] Mary_F snores$]\!]^g =$
λw.$\forall$p[p$\in$g(C) & p(w) $\rightarrow$ p=λw'.Mary snores in w'] =
λw.$\forall$p[p$\in\{\lambda$w'.x snores in w'$\mid$ x$\in$D$\}$&p(w) $\rightarrow$ p=λw".Mary snores in w"]

In Rooth (1992), the restriction of C is done via the ~-operator. This operator is part of what Rooth (1996) calls a "complex subcategorization frame" employed by focus sensitive items. The two functions of ~ are to presuppositionally restrict C to a subset of the focus semantic value and to 'reset' the focus semantic value afterwards:

(14) ~:
For any g: If α = [[~ C] β], $[\![\alpha]\!]^g$ is only defined if g(C)$\subseteq[\![\alpha]\!]_f{}^g$. If defined,
$[\![\alpha]\!]_o{}^g = [\![\beta]\!]_o{}^g$
$[\![\alpha]\!]_f{}^g = \{[\![\beta]\!]_o{}^g\}$

1.3 Overview

In the second chapter, after a short overview over the chapter, section 2 will start out by giving a rough overview of the behaviour of indefinites with regard to their ability to take irregular scope, collecting the peculiarities that have prominently been discussed in the literature. To this, I will add a collection of intervention effect data and amend the overview to cover this data. I will create a list of elements that a successful approach to indefinites should predict. These are collected in a problem set that I will use as a benchmark for approaches to indefinites. Section 3 will then outline several strands of approaches, seeing how they fare with regard to this benchmark. I will conclude chapter 2 with a short discussion regarding which parts of these approaches should be used as a basis for an approach that covers intervention effects as well as the other items on the list.

Chapter 3 is devoted to developing such an approach. After an overview over the chapter, section 2 starts by outlining the distinguished variable framework that will be the basis for this approach. Section 3 will develop the mechanisms needed for irregular scope and discuss the internal makeup of indefinites and pronouns, as well as establish the mechanism used for binding of pronouns by indefinites. Section 4 will detail the mechanism that allows for intermediate readings of indefinites and outline the interaction between indefinites and

quantifiers. Section 5 will transfer the mechanism to donkey constructions and discuss how their behaviour falls out from the assumptions made in the preceding sections, including so-called proportion problem sentences.

Chapter 4 will be used to show how the approach impacts related areas of research. After an overview over the chapter, section 2 will first discuss one line of approach towards polarity- and free choice items. After this, I will show how the approach developed in chapter 3 can be used to predict the core elements of these phenomena and how it synergizes with the approaches discussed before. Section 4 provides additional intervention data and establishes a pattern of interaction between different critical interveners that suggests a hierarchy between these elements. This hierarchy is gouverned by a small set of rules which are used to make more refined predictions with regard to the behaviour of indefinites.

The last chapter sums up the results of the preceding chapters and comments on possibilities for further research. Appendix I, the formal appendix, collects the additions to the formal framework required for this approach and provides example calculations for the core phenomena discussed throughout this work. Appendix II collects the most important data points that the approach developed in this work aims to account for. In Appendix III, the benchmark developed in chapter 2 is applied to this approach, showing how it accounts for the phenomena discussed. Appendix IV provides examples for each interaction class in the hierarchy of intervention and shows how the rules are applied to derive the available readings.

1.4 What is not in here

This work turned out to be a far larger undertaking than I originally imagined. Technically speaking, the proposal made here is quite small: Indefinites are sources of alternatives that can be evaluated by focus evaluating operators, one of which is existential closure, and this is sensitive to focus intervention effects. The problem is that this becomes visible through and affects so many other phenomena that this work cannot delve into all of them. As a result,

there is a plethora of related research, which is not discussed in this work. The goal of this text is to propose a theory that correctly predicts the behaviour of indefinites, including their specific flavour of sensitivity to intervention effects, so I will try to restrict myself to the parts that are necessary for or illustrate significant advantages of my proposal.

With regard to the framework used here, this work relies on a non-dynamic framework in the style of Heim and Kratzer (1998). There are many contributions on the topic in the dynamic and the variable-free schools, which are not discussed in this work.

The approach presented here is motivated, among other things, by intervention data and simply accepts Beck (2006)'s theory of intervention effects. This is not to say that there are no competing theories or that they are without merit. Mayr (2014)'s influential approach is mentioned, but not discussed to any degree that would do it justice. There are many more approaches and further research on the topic should take the time to evaluate these approaches, applying them to the data presented here and see whether they can be used to generate the same predictive power when employed in an approach like the one presented here. Similarly, Rooth's theory of focus is not the only one available. An alternative could for example have been Reich (2004)'s approach that uses choice functions, which might prove viable for extending a choice function approach towards indefinites to cover intervention effects.

Since the approach presented here uses focus mechanisms to explain how indefinites take scope over quantifiers, an extensive discussion of how quantifiers associate with focus and how exactly that impacts the truth conditions of a sentence would surely have merit. The only thing that will be done in this work about this is to touch on how quantifiers use focus to restrict their domain (von Fintel 1994; Krifka 1990; Eckardt 1999. Similarly, since the above mentioned focus mechanisms are also used to explain the seemingly irregular binding of pronouns in donkey constructions, it would be interesting to discuss the literature that investigates how focus interacts with pronouns, such as Sauerland (2000) and Sauerland (2008). Again, this should indeed be done,

but will not be part of this work.

I will also refrain from discussing question semantics more than absolutely necessary. The only parts of the discussion where questions are relevant are about their sensitivity to intervention effects. With regard to this, I assume Beck (2006)'s analysis and will not delve into it any further.

1.5 Disclaimer

There are certain peculiarities in this work that should be mentioned beforehand. The first of these is how I use the framework throughout this work. To allow for easier reading, I stay in an extensional framework and only switch to an intensional one where necessary. The appendices contain intensional versions of definitions, lexical entries and examples. Whenever I report other peoples work, I will try to do so in their framework and style of notation.

Second, the (un-)availability of certain readings has been a point of discussion throughout the literature on the topic. Some authors used elements like "a certain" to make readings more visible, which I will not do. The readings I am after should be available for most speakers, but some may require a little help through intonation. I will discuss some of the reason for that in chapter 4. The data presented in this work is mostly introspective. I consulted several informants on most items, especially ones that I thought were not that clear-cut, but no proper study or anything comparable was done.

The third is a matter of the language I use. During the process of writing this, I regularly struggled with how to phrase things until I got the valuable advice to write as I teach. In the context of the following chapters, this manifests, for example, through the use of the first person plural. 'We' will develop an approach. 'We' claim or assume something. This is not the pluralis maiestatis, but the language I use in the classroom and it made writing this so much more doable. So feel free to ignore the classroom plural.

Chapter 2

(Some) Existing Approaches

2.1 Introduction

In this chapter, I will attempt to give an overview over the current state of affairs with regard to indefinites and introduce some new data, which is problematic for current approaches. I will start with a rough outline of the known empirical picture in the second section of this chapter and add the new data to this picture. In the third section, I will discuss some major strains of theory that are on the market and see whether they can handle this data. I will then go on to collect the problems that these approaches face and outline what a successful approach should be able to do in order to predict the empirical picture in a satisfying way in the fourth section. The goal of this chapter is to get a good picture of the empirical situation and to see which advantages and shortcomings the current approaches to that picture have. This will then serve as the basis for the approach I will propose in the next chapter.

2.2 The Scope of Indefinites So Far

Like other quantifiers, indefinites can bind pronouns and can take scope over quantifiers that precede them.

(1) Two students recommended a book$_1$ to the woman who wrote it$_1$.
"There is a book x and there are two students y and y recommended x to x's author."

But this seems to be where the similarities end. Indefinites differ from other quantifiers, especially with regard to the scope they can take. They are not restricted by clause boundaries and escape other islands as well. This has been observed in Fodor and Sag (1982) and in many other papers (several of which will be discussed in this chapter) since then.

(2) Everyone heard the rumor that Peter skipped the first three pages of a book.
"There is a book x and for all y: y heard the rumor that Peter skipped the first three pages of x."

While Fodor and Sag (1982) assume that intermediate scope readings are unavailable, Farkas (1994) and Kratzer (1998), among others, convincingly demonstrated that at least functional intermediate readings are available.

(3) a. [Every professor]$_1$ rewarded every student who read some book she$_1$ had reviewed for the New York Times.
b. Every professor rewarded every student who read some book I had reviewed for the New York Times.
(Kratzer 1998, p.10)

While (3-a.) allows for an intermediate scope reading (For every professor, there is a different book such that she rewards every student who read it.), the same reading is, according to Kratzer (1998), only marginally available in (3-b.). These readings are called functional intermediate scope readings, since they do not actually require intermediate scope of whatever mechanism is employed to form the indefinite. Instead, this mechanism can have widest scope and still result in a reading that seems to be an intermediate scope reading. This is caused by the bound variable within the indefinite that creates a different set for the NP, depending on the value of the variable. This will be discussed in more detail later on.

The availability of intermediate scope independent of functional readings was firmly established in Abusch (1994), Chierchia (2001), and Schwarz (2001), among others. Chierchia (2001), for example, shows that assuming that inter-

mediate scope readings are functional is insufficient for deriving intermediate scope readings if the topmost quantifier is downward entailing.

(4) [No professor]$_1$ rewarded every student who read some book she$_1$ had reviewed for the New York Times.

A functional reading would be one, where the indefinite "some book she$_1$ had reviewed for the New York Times" denotes a specific book. But since the indefinite is different, depending on the value the bound pronoun receives, this is a different specific book for each professor. This then creates the impression of an intermediate scope reading. This is problematic.

Assume a professor that reviewed two books for the New York Times, A and B. She rewarded every student that read A, but not everyone who read B. This professor would not make (4) false, since there is still a book, for which she did not reward everyone who read it. So, as Schwarz (2001) points out, a functional intermediate reading for (4), would be equivalent to (5):

(5) [No professor]$_1$ is such that [every book she$_1$ had reviewed for the New York Times]$_2$ is such that she$_1$ rewarded every student who read it$_2$.

This is not a reading that (4) actually has, so 'true' intermediate scope must be available. It has also been observed that an indefinite cannot take scope over a quantifier that binds into the indefinite. Jäger (2007) calls this the 'bound variable problem' and Brasoveanu and Farkas (2011) the 'binder roof constraint'. The observation itself is older, though, and has been discussed in Chierchia (2001), Schwarz (2001), and Schwarzschild (2002) among others. It should be noted, however, that Schwarzschild (2002) shows that an indefinite can seemingly outscope a quantifier binding into it, if the extension relative to all bound variables is the same. He illustrates this using an examples by Cresti (1995):

(6) If every Italian in this room (could manage to) watch a certain program about his country (that will be aired tonight on PBS), we might have an interesting discussion tomorrow.

Chierchia (2001) discusses another restriction: An indefinite that is interpreted non-locally cannot be "overtaken" by a lower quantifier. His example in (7) cannot have the described reading, which we would get, if we construed the indefinite non-locally and then moved "no exam" on top of it via quantifier raising (QR).

(7) Every student who read some book failed no exam.
*"There is no exam x, for which there is a book y such that every student who read y failed x."

So as a first rough generalization, we can say that an indefinite can freely take scope anywhere, as long as it does not outscope a quantifier binding into it and does not take non-local scope below the LF position of a quantifier that did not c-command it at spell out.

Another thing that has been noticed in the literature (Beck 1996a; Mayr 2014 among many others) is that indefinites cause intervention effects in wh-questions. Mayr illustrates this with the following example:

(8) a. Wo haben sich drei Maler wann eine Pizza geteilt?
where have self three painters when a pizza shared
"Where did three painters when share a pizza?"

b. *Wo haben sich drei Maler wann eine Arbeitshose
where have self three painters when a dungaree
angezogen?
put.on
"Where did three painters when put on a dungaree?"

Note that (8-a.) works, since the prominent reading is one where the indefinite is not interpreted as a quantifier but as a group entity. In (8-b.), this is not possible, so the indefinite has to have some kind of quantificational force and causes an intervention effect. This behaviour has been noted before (Beck 1996b, for example).

But even if we have an indefinite that is not interpreted as an entity and does not take wide scope, we can have the effect that the indefinite picks a specific entity relative to a higher quantifier. An example for this is given in

Schlenker (1998, 2006):

(9) Context: Every student in my syntax class has one weak point: John doesn't understand Case Theory, Mary has problems with Binding Theory, etc. Before the final, I say:

a. If each student makes progress in a (certain) area, nobody will flunk the exam.

b. Available:
"There is a certain distribution of fields per student such that if each student makes progress in the field assigned to him/her, nobody will flunk the exam."

c. Unavailable:
*"If each student makes progress in at least one area, nobody will flunk the exam."

We could now argue that the indefinite here is read as a specific entity relative to each student. But we can extend the example a bit to show that this does not have to be the case.

(10) Context: Every student in my syntax class has two weak points: John doesn't understand Case Theory and Islands, Mary has problems with Binding Theory and adjuncts, etc. I structured the exam in a way that allows people to still pass, if they have only one weak point. Before the final, I say:

a. If each student makes progress in a (certain) area, nobody will flunk the exam.

b. Available:
"There is a certain distribution of fields per student such that if each student makes progress in one of the fields assigned to him/her, nobody will flunk the exam."

c. Unavailable:
"If each student makes progress in at least one area, nobody will flunk the exam."

The effect persists, the indefinite seems to quantify over a different set for each

student. So an indefinite allows for its domain of quantification to be relative to a higher quantifier, i.e. bound. Before we delve into donkey constructions, let me collect what we have so far:

- Island-free scope
- Bind pronouns
- Binder Roof Constraint
- Scope barrier for lower quantifiers
- Bound indefinites

A big part of the strange behaviour of indefinites is that they can be used to create donkey constructions, as in (11).

(11) Every farmer who owns [a donkey]$_1$ beats it$_1$.

The problem in these constructions is, that the indefinite seems to be able to bind a pronoun that it does not c-command at spellout. It does not even bind the pronoun from its perceived scope position, since it still takes scope within the antecedent of "every". To make it a bit more complicated, the indefinite can pick a different entity from the pronoun. This is called the proportion problem. These examples have been discussed in Heim (1982), Schubert and Pelletier (1989), and Chierchia (1992a), among others.

(12) Usually, if a man has a quarter in his pocket, he will put it in the meter.
(Schubert and Pelletier 1989)

The sentence in (12) does not mean that a man puts every quarter he has into the meter, but instead has an asymmetric reading: If there is one or more quarters in a mans pocket, there is at least one he puts in the meter. But, as shown in an example taken from Rooth (1987), this is only sometimes the case. The sentence in (13) does not mean that parents with two sons in high school only give one of them the car.

(13) No parent with a son still in high school has ever lent him the car on a weeknight.

So we can add two points to the list:

- Donkey constructions
- Asymmetric readings

2.2.1 Data

In addition to what we already know about the scope taking behaviour of indefinites, there are certain elements that can restrict the scope options of an indefinite. These elements either make wide scope readings of indefinites much harder to get or block them entirely. To my knowledge, these elements have been mentioned or been alluded to in the literature, but the impact on current theories has not actually been discussed in any detail. As we will see, these effects are problematic for most, if not all, current approaches. The elements that create the most pronounced effect are focus sensitive elements like "only" and "even". Beck (2006) and Beck and Kim (2006) identify these elements as critical interveners in constructions that rely on focus or alternatives. For this reason, I will refer to them as (critical) interveners and assume that the restriction of an indefinite's scope options by such an element is an intervention effect.

It should be noted that the German data presented here is introspective data. I consulted a small number of informants and they agreed with my judgements, but the strength of the effects varied quite a bit. No proper study was done.

Intervention in Wide Scope Indefinites

As already mentioned above, critical interveners restrict the scope of indefinites. In an example like (14-a.), the wide scope reading of the indefinite is easily available, while in (14-b.), it is very hard to get, with several speakers reporting it as unavailable:

(14) a. Jeder hat ein Buch gelesen.
everyone has a book read
"Everyone read a book."

Available:

"There is a book that everyone read."

b. Nur Peter hat ein Buch gelesen.
only Peter has a book read
Only Peter read a book.

Unavailable:

"There is a book that only Peter read."

Since "only" also restricts quantifier raising, we should look at a construction where quantifier raising seems to be an unlikely explanation for the wide scope of the indefinite:

(15) a. Jeder hat drei Seiten von einem Buch übersprungen.
everyone has three pages of a book skipped
"Everyone skipped three pages of a book."

Available:

"There is a book of which everyone skipped three pages."

b. Nur Peter hat drei Seiten von einem Buch übersprungen.
only Peter has three pages of a book skipped
"Only Peter skipped three pages of a book."

Unavailable:

"There is a book of which only Peter skipped three pages."

While the wide scope reading can be made a bit more available by stressing the indefinite article, the result is still worse than the a. examples. The effect is clearly visible in examples like (16-a.) and (16-b.). While (16-a.) allows for a reading in which everyone reads a different book, (16-b.) is plain contradictory.

(16) Context: There are two books on the table.

a. Peter hat ein Buch gelesen und Maria hat ein Buch gelesen.
Peter has a book read and Mary has a book read
"Peter read a book and Mary read a book."

Available:

"There is a book that Peter read and there is a book that Mary read."

b. *Nur Peter hat ein Buch gelesen und nur Maria hat ein Buch
only Peter has a book read and only Mary has a book
gelesen.
read

"Only Peter read a book and only Mary read a book."
Unavailable:
"There is a book that only Peter read and there is a book that only Mary read."

The effect vanishes, when the indefinite is moved to the front of the critical intervener.

(17) Ein Buch hat nur Peter gelesen und ein Buch hat nur Maria gelesen.
a/one book has only Peter read and a/one book has only Mary read
"Some book, only Peter read and some book, only Mary read."
Available:
"There is a book that only Peter read and there is a book that only Mary read."

It should also be noted that indefinites still show island escaping behaviour in the scope of such an intervener, they are just unable to leave said scope. While in (18-a.) the intermediate and wide scope readings are available, in (18-b.), the wide scope reading is unavailable, while the intermediate scope reading is still accessible.

(18) a. Jeder glaubt, dass niemand drei Seiten von einem Buch übersprungen hat.
everyone believes that noone three pages of a book skipped has.
"Everyone believes that noone skipped three pages of a book."
Wide scope (available):
"There is a book x and everyone believes that noone skipped three pages of x."
Intermediate scope (available):
"For all y: there is a book x and y believes that noone skipped three pages of x."

b. Nur Peter glaubt, dass niemand drei Seiten von einem Buch übersprungen hat.
only Peter believes that noone three pages of a book skipped has.

"Only Peter believes that noone skipped three pages of a book."
Wide scope (unavailable):
"There is a book x of which only Peter believes that noone skipped three pages of x."
Intermediate scope (available):
"Only Peter is y, such that there is a book x and y believes that noone skipped three pages of x."

Intervention in Donkey Constructions

Similarly, we can observe that the presence of a critical intervener in a donkey construction prevents successful binding of the donkey pronoun.

(19) a. Jeder Bauer, der Maria [einen Esel]$_1$ zeigt, mag [ihn]$_1$.
every farmer who Mary a donkey shows likes it
"Every farmer who shows Mary a donkey, likes it."

b. *Jeder Bauer, der nur Maria [einen Esel]$_1$ zeigt, mag [ihn]$_1$.
every farmer who only Mary a donkey shows likes it
"Every farmer who shows only Mary a donkey, likes it."

The only reading that seems to be (marginally) available for (19-b.) is one, where we are talking about a specific donkey that is the same for all farmers. This can be reproduced, not only using "only", but essentially all critical interveners identified in Beck (1996b). This phenomenon has been observed in the literature: Barker and Shan (2008)(p.27), for example, note the following about universal quantifiers:

> "If a universal occurs in the antecedent, donkey anaphora is no longer possible:
>
> (59) If everyone owns a donkey, it brays.
>
> More precisely, there is no interpretation on which the indefinite takes narrow scope with respect to the universal and still binds the pronoun."

Similarly, Chierchia (1992a)(p.127) notes that negation is problematic:

(20) a. Most farmers that have a donkey$_i$ beat it$_i$

b. *Most farmers that don't have a donkey$_i$ want to have it$_i$

But, as mentioned above, this can be reproduced with other quantifiers as well.

(21) *Jeder Bauer, der niemandem [einen Esel]$_1$ zeigt, mag [ihn]$_1$.
every farmer who noone a donkey shows likes it
"Every farmer who shows noone a donkey, likes it."

(22) *Jeder Bauer, der weniger als drei Besuchern [einen Esel]$_1$
every farmer who less than three visitors a donkey
zeigt, mag [ihn]$_1$.
shows likes it
"Every farmer who shows less than three visitors a donkey, likes it."

(23) *Jeder Bauer, der den meisten Besuchern [einen Esel]$_1$ zeigt, mag
every farmer who the most visitors a donkey shows likes
[ihn]$_1$.
it
"Every farmer who shows most visitors a donkey, likes it."

As was the case for the non-donkey sentences above, the effect vanishes, if the indefinite is scrambled in front of the critical intervener.

(24) Jeder Bauer, der [einen Esel]$_1$ nur Maria zeigt, mag [ihn]$_1$.
every farmer who a donkey only Mary shows likes it
"Every farmer who shows a donkey to only Mary, likes it."

(25) Jeder Bauer, der [einen Esel]$_1$ niemandem zeigt, mag [ihn]$_1$.
every farmer who a donkey noone shows likes it
"Every farmer who shows a donkey to noone, likes it."

(26) Jeder Bauer, der [einen Esel]$_1$ weniger als drei Besuchern
every farmer who a donkey less than three visitors
zeigt, mag [ihn]$_1$.
shows likes it
"Every farmer who shows a donkey to less than three visitors, likes it."

(27) Jeder Bauer, der [einen Esel]$_1$ den meisten Besuchern zeigt, mag
every farmer who a donkey the most visitors shows likes
[ihn]$_1$.
it
"Every farmer who shows a donkey to most visitors, likes it."

Throughout the examples, Barker and Shan (2008)'s observation seems to hold: The only reading that is still somewhat available is one where we are talking about a specific donkey. Interestingly enough, if we embed the whole donkey construction, an intermediate reading where the indefinite takes scope over the donkey construction, but not over a quantifier in the matrix clause, seems unavailable. Only widest scope is available:

(28) Jeder sagt, dass jeder Bauer, der nur Maria [einen Esel]$_1$ everyone says that every farmer who only Mary a donkey zeigt, [ihn]$_1$ mag.
shows it likes
"Everyone says that every farmer who shows only Mary a donkey, likes it."

Unavailable:

"For all x there is a donkey y and x says that for all farmers z: if z shows only Mary y then z likes y."

This seems to be evidence that an indefinite can only outscope a critical intervener when it is interpreted as a specific entity, which makes it effectively scopeless[1]. In this case, the pronoun would not actually be bound but rather corefer.

The binding process however does not seem to be the part that is sensitive to the presence of a critical intervener. Indefinites can bind pronouns in various ways. The two that am interested in here are binding of a c-commanded pronoun, as in (29) and binding in donkey constructions.

(29) [A women]$_1$ saw a picture that she$_1$ liked.

This kind of binding is, unsurprisingly, not sensitive to the presence of a critical intervener:

(30) [A women]$_1$ told only Peter about a picture that she$_1$ liked.

It may be a bit surprising that binding in donkey constructions is also not sensitive to the presence of a critical intervener:

[1] More on these readings ban be found in 3.3.1 - Entity or Intervener.

(31) Der Bauer, der Maria [einen Esel]$_1$ zeigt, erlaubt nur Peter ihn$_1$ zu streicheln.
the farmer who Mary [a donkey]$_1$ shows allows only Peter it$_1$ to pet
"The farmer who shows Mary [a donkey]$_1$ allows only Peter to pet it$_1$."

This makes donkey constructions sensitive in a non-parallel way: A critical intervener above the indefinite will prevent successful binding, but one above the pronoun will not.

(32) a. Der Bauer, der Maria [einen Esel]$_1$ zeigt, erlaubt Peter ihn$_1$ zu streicheln.
the farmer who Mary [a donkey]$_1$ shows allows Peter it$_1$ to pet
"The farmer who shows Mary [a donkey]$_1$ allows Peter to pet it$_1$."

b. *Der Bauer, der nur Maria [einen Esel]$_1$ zeigt, erlaubt Peter ihn$_1$ zu streicheln.
the farmer who only Mary [a donkey]$_1$ shows allows Peter it$_1$ to pet
"The farmer who shows only Mary [a donkey]$_1$ allows Peter to pet it$_1$."

c. Der Bauer, der Maria [einen Esel]$_1$ zeigt, erlaubt nur Peter ihn$_1$ zu streicheln.
the farmer who Mary [a donkey]$_1$ shows allows only Peter it$_1$ to pet
"The farmer who shows Mary [a donkey]$_1$ allows only Peter to pet it$_1$."

Interestingly enough, asymmetric readings of donkey constructions are sensitive to the presence of a critical intervener above the pronoun. In (33), symmetric and asymmetric reading are available, in (34), the asymmetric reading is unavailable.

(33) Jeder, der eine Kreditkarte hat, erlaubt Peter, sie zu verwenden.
everyone who a credit card has allows Peter it to use
"Everyone who has a credit card, allows Peter to use it."

a. Symmetric reading:

"For all x and credit cards y owned by x: x allows Peter to use y."

b. Asymmetric reading:

”For all x: If there is a credit card z owned by x, then there is a credit card y owned by x and x allows Peter to use y.”

(34) Jeder, der eine Kreditkarte hat, erlaubt nur Peter, sie zu
everyone who a credit card has allows only Peter it to
verwenden.
use
"Everyone who has a credit card, allows Peter to use it."

a. Symmetric reading:
”For all x and credit cards y owned by x: x allows only Peter to use y.”

b. Asymmetric reading:
*”For all x: If there is a credit card z owned by x, then there is a credit card y owned by x and x allows only Peter to use y.”

From the data above, we can see that an empirically adequate theory of indefinites needs to take additional elements into account:

1. An indefinite in the scope of a critical intervener can only outscope it, if it is interpreted as a specific entity. Intermediate scope readings are not possible, if the indefinite has to take scope over a critical intervener. Critical interveners for this do not include negation or quantifiers.

2. An indefinite can bind pronouns in its scope, even if a critical intervener is between the indefinite and the pronoun.

3. An indefinite cannot bind a pronoun if a critical intervener is between the indefinite and the lowest position that c-commands both, the indefinite and the pronoun. Critical interveners for this include quantifiers and negation.

I will call interveners, like "only" that cause intervention effects in the scope of indefinites as well as in donkey constructions strong interveners and ones that only cause an effect in donkey constructions, like "every", weak interveners. So the list of things that need to be accounted for can be extended a bit and now looks like this:

- Island-free scope

- Bind pronouns
- Binder Roof Constraint
- Scope barrier for lower quantifiers
- Bound indefinites
- Donkey constructions
- Asymmetric readings
- Strong and weak interveners block asymmetric readings.
- Strong interveners cannot be outscoped by indefinites.
- Strong and weak interveners interrupt donkey binding.
- Non-donkey binding is immune to interveners.

2.3 Current Approaches to Indefinites

In this section, I will outline three major strands of approaches that attempt to analyze the behaviour of indefinites and will test how suited they are to predict the items in the list above. These strands by no means represent the entirety of approaches available in the literature. I chose these, since they are what could be considered 'mainstream' approaches and because they have similarities, be they conceptual or with regard to implementation, to the approach I am going to propose. After discussing each approach, I will discuss how the respective approach handles the problems collected in the preceding sections using the example sentences below. I will discuss how my proposal handles the separate elements of this benchmark throughout the thesis. For a more concise overview of the results, see Appendix III.

The first group of problems concerns the scope-taking behaviour of indefinites:

Island-free scope

(35) I heard the rumor that Peter read a book.
Available:
"There is a book x and I heard the rumor that Peter read x."

Scope restriction through strong interveners

(36) I heard the rumor that only Peter read a book.
Unavailable:
"There is a book x and I heard the rumor that only Peter read x."

Intermediate readings across weak interveners

(37) Every lecturer wants every student to read a book.
Available:
"For every lecturer x, there is a book y and for every student z, x wants z to read y."

Binder-roof constraint

(38) [Every lecturer]$_1$ wants every student to read a book she$_1$ wrote.
Unavailable:
"There is a book y and for every lecturer x, x wrote y and for every student z, x wants z to read y."

The second group concerns the binding capabilities of indefinites:

Pronoun binding

(39) [A visitor]$_1$ wants Peter to call him$_1$.

Binding across interveners

(40) [A visitor]$_1$ wants only Peter to call him$_1$.

Donkey binding

(41) Every guest that saw [a movie]$_1$, liked it$_1$.

a. Existential reading:

"There is some movie x such that every guest that saw x liked x."

b. Universal reading:
"For all movies x, every guest that saw x liked x."

Asymmetric reading

(42) Every visitor who has a [credit card]$_1$ pays the hotel bill with it$_1$.
Available:
"Every visitor who has one or more credit cards uses one of them to pay the hotel bill."

Intervention in donkey binding

(43) Every farmer who shows only Mary [a donkey]$_1$ likes it$_1$.
Unavailable:
"For all farmers x and donkeys y: If x shows only Mary y, x likes y."

(44) Every farmer who shows everyone [a donkey]$_1$ likes it$_1$.
Unavailable:
"For all farmers x and donkeys y: If x shows everyone y, x likes y."

Intervention in asymmetric readings

(45) Every visitor who has [a credit card]$_1$ only pays the hotel bill with it$_1$.
Unavailable:
"Every visitor who has one or more credit cards has one which he only uses to pay the hotel bill."

The third group concerns other interactions between indefinites and quantifiers.

Bound indefinites

(46) Context: Every student in my syntax class has two weak points: John doesn't understand Case Theory and Islands, Mary has problems with Binding Theory and adjuncts, etc. I structured the exam in a way that allows people to still pass, if they have only one weak point. Before the final, I say:

"If every student makes progress in an area, nobody will flunk the exam."
Available:
"There is a certain distribution of fields per student such that if each student makes progress in one of the fields assigned to him/her, nobody will flunk the exam."

Scope barrier for lower quantifiers

(47) Every student who read some book failed no exam.
Unavailable:
"There is no exam, for which there is a book such that every student who read the book failed the exam."

2.3.1 Singleton Approach

One assumption for something that can take scope in seemingly arbitrary positions, would be to assume that it is of a type that is essentially scopeless. This could be a definite description, as Fodor and Sag (1982) proposed, which can then have a referential or an attributive interpretation, or it could be, following Schwarzschild (2002), an existential quantifier that has a singleton domain.

Fodor and Sag (1982)

Fodor and Sag (1982) drew attention to the fact that what restricts other quantifiers in their scope does not have the same effect on indefinites. They present examples like (48) (Fodor and Sag 1982, p.369):

(48) a. John overheard the rumor that each student of mine was called before the dean.
b. John overheard the rumor that a student of mine was called before the dean.

While (48-a.) is about a rumor that contains universal quantification, (48-b.) does not have to be about a rumor that contains existential quantification. Instead, a reading is available, in which there is a specific student of mine,

about whom there is a rumor. The analysis provided is that indefinites are ambiguous: They can either be read as regular quantifiers or as definite descriptions of an entity that the speaker has in mind.

This approach predicts that there can be only readings that either obey the usual rules for quantifier scope or are widest scope readings. They present examples where an intermediary scope would be available, if indefinites were quantifiers that could scope freely, but where they judge this reading to not be available, as in (49) (Fodor and Sag 1982[p.374]):

(49) Each teacher overheard the rumor that a student of mine was called before the dean.
"For each teacher, there is some student or other of mine such that the teacher overheard the rumor that the student has been called before the dean"

Other authors, like Ruys (1992) and Abusch (1994), however, differ with regard to these judgments. These readings are available and can be made quite obvious, when the indefinite contains a bound pronoun:

(50) Each teacher overheard the rumor that a student of his was called before the dean.
"For each teacher x, there is some y, such that y is a student of x. x overheard the rumor that y has been called before the dean"

The approach was subsequently extended by Kratzer (1998), where it is argued that Fodor and Sag (1982)'s analysis is essentially correct, but that we can create pseudoscope effects. The analysis she presents is a choice function analysis, but one where the choice function is not bound by a freely insertable operator, but is instead determined by the context. This makes it an approach that is closer in spirit to what Fodor and Sag (1982) proposed than what Reinhart (1992, 1997) proposed. Even though it is technically speaking a choice function approach, it still reduces the indefinite to a definite description of an entity that the speaker has in mind. This approach will be discussed in more detail in the section on choice function approaches.

The current iteration of this line of approaches is based on Schwarzschild (2002), where it is reasoned that indefinites are not ambiguous in their semantics, but have a domain that can be severely restricted, which creates the impression of a definite description.

Schwarzschild (2002)

Schwarzschild (2002) assumes that indefinites are regular generalized quantifiers that have a domain that can be contextually restricted. If this domain is restricted down to a singleton, the truth conditions created by the existential quantifier become equivalent to the ones that we would get using a definite description, i.e. the existential becomes effectively scopeless. Consider the truth conditions in a. and b. for (51):

(51) Every boy saw a movie.

a. $\forall x[boy(x) \rightarrow \exists y[movie(y) \ \& \ saw(x)(y)]]$

b. $\exists y[movie(y) \ \& \ \forall x[boy(x) \rightarrow saw(x)(y)]]$

If we assume a small group of boys, Xavier (x) and Yusuf (y), as well as a singleton domain of movies, containing only Doctor Zhivago, the situations satisfying the truth conditions for (51) are the ones in (52):

(52) a. x saw Doctor Zhivago, y saw Doctor Zhivago

b. x saw Doctor Zhivago, y saw Doctor Zhivago

The truth conditions are equivalent under such circumstances. One argument against this kind of analysis is the existence of intermediate readings, especially in cases like (53), where the indefinite contains a bound variable:

(53) Every boy smiled at every adult who liked a movie that was his favourite.

Here, there is a reading available in which the favourite movie differs from boy to boy. This is not really a problem for the Schwarzschild analysis, as we can again restrict the domain variable in a way that makes it work. The key is to have exactly one element that corresponds to each value assigned to the bound

variable. Schwarzschild demonstrates this by using examples revolving around "natural" singletons, like favourite movies.

Let us assume Xavier and Yusuf as the boys again. Yusuf's favourite movie is Doktor Zhivago, while Xavier favours Matrix Reloaded. The adults are Aaron and Bernadette. Aaron likes Doktor Zhivago and Bernadette likes both movies. If we look at the narrow scope and intermediate scope truth conditions of (53), we get (54) a. and b..

(54) Every boy smiled at every adult who liked a movie that was his favourite.

a. ∀x[boy(x) → ∀y[adult(y) & ∃z[favourite movie(x,z) & y liked z → x smiled at y]]]

b. ∀x[boy(x) → ∃z[favourite movie(x,z) & ∀y[adult(y) & y liked z → x smiled at y]]]

The situations satisfying the truth conditions are in (55):

(55) a. X smiles at B, Y smiles at A, Y smiles at B

b. X smiles at B, Y smiles at A, Y smiles at B

The logic in Schwarzschild (2002) is, that there is a singleton domain for each boy, i.e. every assignment for the pronoun corresponds to a singleton domain. This allows for scope neutralization of the indefinite relative to the intervening "every adult". Schwarzschild (2002)(p.297) also notes that an indefinite can seemingly outscope a quantifier binding into it, if the extension relative to all bound variables is the same. This is illustrated using an examples by Cresti (1995)(66, 198):

(56) If every Italian in this room (could manage to) watch a certain program about his country (that will be aired tonight on PBS), we might have an interesting discussion tomorrow.

This scope position does not seem to depend on a bound variable, either:

(57) Every boy smiled at every adult who voted for a movie.

Available:
"For every boy, there is a (different) movie such that he smiled at every adult who voted for it."

Since there is no bound variable, the default assumption would be that there should be no intermediate scope, since restricting the domain to a singleton would result in widest scope. Schwarzschild (2002) argues (following Heim 1991; von Fintel 1994; Cresswell 1996; Stanley and Szabó 2000) that the implicit restriction of a quantifier can contain a bound variable and that the different values of this variable allow for the domain of the existential to again be a singleton relative to each value assigned to this variable by "every".

Problems

One problem for approaches along these lines is discussed in Schwarz (2001, 2004): Restricting the domain should allow for functional readings of indefinites. Consider (58) (Schwarz 2001, p. 34):

(58) Every child who hates a certain woman he knows will develop a complex.

This sentence can be used to, for example, express that I think that every child that hates their mother will develop a serious complex. In this scenario, it would be compatible with a child hating their aunt, but not developing a complex, so the reading does not come about due to a narrow scope reading of the indefinite. But since the indefinite cannot take wide scope either - the pronoun being unable to outscope its binder - we have a functional reading. Under a singleton approach, we would assume that the domain of the indefinite is restricted in a way that produces a singleton relative to each value of the bound variable.

Schwarz (2001) points out, that the sentences in (59) (Schwarz 2001, p.47) both have an intermediate reading, but it is not the same for both.

(59) a. No boy finished the cookies someone had brought.
b. No boy finished the cookies a certain woman he knows had brought.

While (59-a.) is false, if some boy ate all the cookies that my friend brought, (59-b.) can still be true, if he did not eat all the cookies that his mother had brought. This difference is hard to predict under a singleton account, or as Heim (2011)(p. 40) puts it: "If this judgment is representative, Schwarzschild's (and Kratzer's) approach is insufficient."

This problem extends to what happens in the presence of a critical intervener. Consider (60).

(60) Jeder Junge hat nur Aaron gesagt, dass er einen Film gesehen
every boy has only Aaron told that he a movie seen
hat.
has
"Every boy told only Aaron that he saw a movie."

In this example, the intermediate reading seems unavailable. Assume the following situation: Yusuf and Xavier saw both movies. Xavier tells Aaron that he saw Matrix reloaded and Bernadette that he saw Doktor Zhivago. Yusuf does it the other way round: He tells Bernadette that he saw Matrix reloaded and Aaron that he saw Doktor Zhivago. For every boy, there is now a movie of which he told only Aaron that he likes it. It seems very odd to utter (60) in this situation.

Under Schwarzschild's analysis, we would expect (60) to have the truth conditions in (61). D_x is used here to represent the domain containing a bound variable, which makes it relative to x.

(61) $\forall x[\text{boy}(x) \rightarrow \forall y[\exists z[\text{movie}(z) \,\&\, z \in D_x \,\&\, x \text{ told } y \text{ that he saw } z] \rightarrow y = \text{Aaron}]]$

With these truth conditions, there is nothing stopping us from restricting the domain for each boy down to a singleton, which would make the indefinite scopeless relative to "only", so we would expect an intermediate reading to be available, which is not the case.

Benchmark

Island-free scope is unproblematic to achieve. The domain of the indefinite is reduced to a singleton, making it effectively scopeless.

(62) I heard the rumor that Peter read a book.
Available:
"There is a book x, such that I heard the rumor that Peter read x."

Scope restriction through strong interveners is a problem. To enable this approach to deal with it, we would need some machinery that prohibits restricting the domain in the scope of a critical intervener.

(63) I heard the rumor that only Peter read a book.
Unavailable:
"There is a book x, such that I heard the rumor that only Peter read x."

Intermediate readings across weak interveners are doable, as the quantifier above the perceived scope site can bind the domain of the indefinite, making it a singleton relative to the value the quantifier assigns.

(64) Every lecturer wants every student to read a book.
Available:
"For every lecturer x, there is a book y, such that for every student z, x wants z to read y."

The **Binder-roof constraint** is doable as well, using the same mechanism as we would for intermediate readings.

(65) [Every lecturer]$_1$ wants every student to read a book she$_1$ wrote.
Unavailable:
"There is a book y, such that for every lecturer x, x wrote y and for every student z, x wants z to read y."

Pronoun binding and **Binding across interveners** are unproblematic. In (66), the pronoun can in both cases be bound through the usual means, i.e.

by QRing the indefinite and thereby creating a binder.

(66) a. [A visitor]$_1$ wants Peter to call him$_1$.
b. [A visitor]$_1$ wants only Peter to call him$_1$.

Donkey binding is at the same time easy and problematic. On the one hand, a singleton approach can provide a good reason for why a salient entity for the pronoun to refer to is available in the context, allowing for (67-a.). The indefinite - whether it is an entity itself or has a singleton restrictor - provides a specific salient entity that the pronoun can then refer to. But on the other hand, if the indefinite is only an entity relative to a higher quantifier, the approach has no way to map the pronoun to the correct entity. In (67-b.), the indefinite could be a specific entity relative to each farmer, but there is no easy way to assign a value to the pronoun.

(67) Every guest that saw [a movie]$_1$, liked it$_1$.
a. Existential reading:
"There is some movie x such that every guest that saw x liked x."
b. Universal reading:
"For all movies x, every guest that saw x liked x."

This also makes it very hard to deal with **asymmetric readings**.

(68) Every visitor who has a [credit card]$_1$ pays the hotel bill with it$_1$.
Available:
"Every visitor who has one or more credit cards uses one of them to pay the hotel bill."

A singleton approach could probably be made to deal with these kinds of examples, but not without additional machinery.

Intervention in donkey binding, on the other hand, is very hard to implement. The baseline assumption to explain donkey constructions under such an approach would be to assume that the indefinite - being essentially an entity - introduces a discourse referent to which the pronoun can refer without the need for c-command. But this would predict that donkey constructions, or at

least having the donkey pronoun bound by the indefinite, should be immune to critical interveners.

(69) Every farmer who shows only Mary [a donkey]$_1$ likes it$_1$.
Unavailable:
"For all farmers x and donkeys y: If x shows only Mary y, x likes y."

(70) Every farmer who shows everyone [a donkey]$_1$ likes it$_1$.
Unavailable:
"For all farmers x and donkeys y: If x shows everyone y, x likes y."

The problem gets worse for **intervention in asymmetric readings**. Whichever machinery is implemented to allow for universal and asymmetric readings, would need to work for universal readings when the pronoun is in the scope of a critical intervener, but disallow asymmetric readings under these circumstances.

(71) Every visitor who has [a credit card]$_1$ only pays the hotel bill with it$_1$.
Unavailable:
"Every visitor who has one or more credit cards has one which he only uses to pay the hotel bill."

Bound indefinites work fine: We need quantifiers to bind the domains of indefinites anyway, so sentences like (72) are what we would expect.

(72) Context: Every student in my syntax class has two weak points: John doesn't understand Case Theory and Islands, Mary has problems with Binding Theory and adjuncts, etc. I structured the exam in a way that allows people to still pass, if they have only one weak point. Before the final, I say:
"If every student makes progress in an area, nobody will flunk the exam."
Available:
"There is a certain distribution of fields per student such that if each student makes progress in one of the fields assigned to him/her, nobody will flunk the exam."

Indefinites creating a **scope barrier for lower quantifiers** is doable as well. Since an intermediate reading requires the quantifier above the perceived scope site to bind the domain of the indefinite, an intermediate reading below a QR landing site of a quantifier that did not c-command the indefinite at spellout would be a weak crossover configuration.

(73) Every student who read some book failed no exam.
Unavailable:
"There is no exam, for which there is a book such that every student who read the book failed the exam."

It seems fair to say that an analysis that assumes that indefinites are, or can be interpreted as, items with semantic properties that make them essentially scopeless, will not be able to account for intervention effects. At least not without adding additional restrictions that are sensitive to elements taking scope over the indefinite, which seems to run counter to what these approaches try to achieve.

	Singleton
Island-free scope	✓
Scope restriction through strong interveners	↯
Intermediate readings across weak interveners	✓
Binder-roof constraint	✓
Pronoun binding	✓
Binding across interveners	✓
Donkey binding	↯
Asymmetric readings	↯
Intervention in donkey binding	↯
Intervention in asymmetric readings	↯
Bound indefinites	✓
Scope barrier for lower quantifiers	✓

2.3.2 Choice Function Approach

Made popular by Reinhart (1997) and Winter (1997, 2001), the exceptional scope taking behaviour of indefinites can also be analyzed via the use of choice

functions. Most choice function approaches assume that indefinites trigger some kind of existential quantification. A crucial consequence of this is that the contribution of existential force is separate from the semantic contribution of the NP. Additionally, existential quantification is not over entities, but instead over choice functions. This allows for a wide range of scope options, without violating rules for movement.

Choice Functions and Skolemization

Reinhart (1997) can be seen as the start of the popularity of choice functions with regard to indefinites. A choice function is a function that picks an entity from a non-empty set.

(74) f is a choice function (CH(f)) iff $\forall$S. S$\neq\varnothing \rightarrow f(S)\in$S

These functions are bound by some closure operator that can be inserted freely into the structure.

(75) More than three students skipped the first three pages of a book.
Wide scope reading:
$\exists f$[CH(f) & $>$3 students x. x skipped the first three pages of f(book)]
Narrow scope reading:
$>$3 students x. $\exists f$. CH(f) & x skipped the first three pages of f(book)

As Reinhart (1997) points out, using choice functions instead of simply quantifying over entities avoids the Donald Duck problem, that would otherwise arise: If the existential force is separated from the rest of the indefinite, the truth conditions for conditional become too weak. Assume the structure in (76-b.) to create the wide scope reading of the indefinite.

(76) a. If Max invites some philosopher, Harry will be angry.
b. $\exists$x[(philosopher(x) & Max invites x) $\rightarrow$ Harry will be angry]

If the antecedent of a conditional is false, the conditional is true, regardless of the content of the consequent. So the structure in (76-b.) is made true by the existence of Donald Duck, who is (some argue) not a philosopher. Choice functions avoid this, since they have to pick an entity from the set that is their

argument. In this case, the corresponding choice function needs to pick an entity that is a philosopher.

An analysis like this has the advantage that it allows for binding from any position and so can also allow for intermediate scope. (77) is Chierchia (2001)'s version of Abusch (1993)'s professor-sentences. (77-a.) is the narrow scope reading, (77-b.) is intermediate scope and (77-c.) is wide scope.

(77) Every linguist has looked at every analysis that solves some problem.

a. $\forall$x. linguist(x) $\forall$y. (analysis(y) & $\exists f$. CH(f) & y solves f(problem)) $\rightarrow$ x looked at y

b. $\forall$x. linguist(x) $\exists f$. CH(f) & $\forall$y. (analysis(y) & y solves f(problem)) $\rightarrow$ x looked at y

c. $\exists f$. CH(f) & $\forall$x. linguist(x) $\forall$y. (analysis(y) & y solves f(problem)) $\rightarrow$ x looked at y

In contrast to the approach of Reinhart (1997) and Winter (1997, 2001), Kratzer (1998) proposes that the choice function variable is left free and supplied by the context. Similarly, Matthewson (1998) proposes that the choice function variable has to be existentially quantified over, but only at the topmost level. Under these assumptions, intermediate readings can be produced by parameterization of the choice functions. If we assume that a choice function variable carries a parameter which, as Chierchia (2001) puts it, can be thought of as a null pronominal element, we can have choice functions picking different entities from the set, depending on their parameter. A paramteterized choice function f_i is then a function that picks an entity from a set, but this might be different entities for different values of its parameter i.

An LF for an intermediary reading would be the one in (78-a.) following Kratzer (1998) and the one in (78-b.) following Matthewson (1998):

(78) Every linguist has looked at every analysis that solves some problem.

a. $\forall$x[linguist(x) $\forall$y[(analysis(y) & y solves f_{x}(problem)) $\rightarrow$ x looked at y]]

b. $\exists f$[CH(f) & $\forall$x[linguist(x) $\forall$y. (analysis(y) & y solves

f_x(problem)) → x looked at y]]

The more salient the parameter is in the context, the more easily the intermediate reading is available. If this parameter is made overt, say in the form of a pronoun, these readings become next to mandatory. In (79), the preferred reading is one where books differ by professor.

(79) Every professor rewarded every student that read some book on his reading list.
(Abusch 1993)

These parameterized choice functions, or skolemized choice functions, have the advantage of deriving correct truth conditions for examples involving bound variables. As discussed in Kratzer (1998), the example in (79) has a set of scenarios, where the regular choice function approach would make incorrect predictions. Assume the following: There are two professors, A and B, that use the same reading list of two books, X and Y. This would mean that the string ⟦book on his$_1$ reading list⟧ would denote the same set for both professors. A choice function always has to pick the same element from the same set. This is a problem. A vanilla choice function approach would now predict that the statement in (79) is only true, if all professors that have the same reading list reward the reading of the same book. But if A rewarded every student that read X and B rewarded every student that read Y, it still seems intuitively correct to utter (79). Using skolemized choice functions, the problem vanishes, since the covert parameter makes sure that we are using a different choice function for each professor.

Apart from this problem, a choice function account that allows existential closure at any position, does not require skolemization, as we can existentially quantify over choice functions in intermediate positions. But under the assumptions found in Kratzer (1998) and Matthewson (1998), namely that the choice function variable is left free or quantified over at the topmost level, skolemization is required.

Both approaches, however, have a problem pointed out in Chierchia (2001)

(and very similar in Schwarz 2001): Consider the example from above (repeated in (80)) again.

(80) Every linguist has looked at every analysis that solves some problem.

Chierchia (2001) describes two scenarios. The first one is the systematic linguists scenario, in which the linguists A, B and C are interested in different problems. Each of them studied every solution for the respective problem that interests them. The second scenario, he dubs the unsystematic linguist scenario. In this scenario, A and B behave as in the first scenario, but C does not. There is no problem, for which C studied every solution. Under these circumstance, (80) is false, but we could utter (81) truthfully:

(81) Not every linguist has looked at every analysis that solves some problem.

This is a problem for accounts along the lines of Kratzer (1998) and Matthewson (1998), as they would derive the following truth conditions:

(82) $\exists f[\ \neg\forall x[\text{linguist}(x) \rightarrow \forall y[\text{solution}(y)(f(\text{problem})) \rightarrow \text{study}(x)(y)]]]$

The problem here is that these truth conditions are too weak. This would make (81) true not only for the unsystematic linguist scenario, but also for the systematic linguists. As long as there is at least one linguist for whom there is at least one problem that he did not study every solution to, the sentence is predicted to be true. Kratzer (2003) argues that this is a problem for an approach along the lines of Matthewson (1998), but not for Kratzer (1998). Her argument is that if we assume a contextually salient parameterization, the problem vanishes. If we, for example, assume that we are pairing linguists with their favourite problem, we get the correct truth conditions again. But this is not entirely unproblematic. Let me propose a third scenario: The confused linguist. In this scenario, C studied every solution to only one problem, but not one that she actually works on or is particularly interested in. This scenario would come out true for (81) if we use a contextually salient pairing, which intuitively does not seem correct.

So Chierchia's problem is alive and well for Matthewson (1998)-, as well as Kratzer (1998)-style approaches. Approaches along the lines of Reinhart (1997) and Winter (2001), which allow intermediate existential quantification over choice functions, fare better, as they allow for truth conditions along the lines of (83):

(83) $\neg\forall x[\text{linguist}(x) \rightarrow \exists f[\forall y[\text{solution}(y)(f(\text{problem})) \rightarrow \text{study}(x)(y)]]]$

These correctly capture our intuitions for the example. But the Reinhart (1997) and Winter (2001) style approaches struggle as well, as pointed out in Kratzer (2003). She presents the example in (84-a.), the truth conditions for which would be (84-b.).

(84) a. Not every student read every paper that some professor wrote.
b. $\neg\forall x[\text{student}(x) \rightarrow \exists f[\ \forall y[\text{paper}(y)\ \&\ \text{wrote}(f(\text{professor}))(y) \rightarrow \text{read}(x)(y)]]]$

This would make the sentence false, if there is a professor that did not write any paper. One could argue that this is not actually the case, since we can assume that "every" has the presupposition that the antecedent is not empty. But accounts that allow for intermediate quantification over choice functions cannot make do without skolemization anyway. As shown by Schlenker (1998, 2006), the example that we used to illustrate bound indefinites, a reduced form of which is in (85), is problematic for vanilla choice function accounts.

(85) a. Context: Every student in my class is struggling with one topic. A struggles with X, B struggles with Y and C struggles with Z.
b. If every student manages to understand some problem, nobody will flunk.

If the choice function variable of "some" is quantified over above "every student" we get the same problem for all students. If we quantify below it, we get the narrow scope reading, in which nobody fails, as long as everyone understands something, regardelss of whether they struggled with it. This problem vanishes, if we use skolemized choice functions, which would allow for truth conditions as in (86):

(86) $\forall s[\exists f[\forall x[$ student(x)(s) & understand(x)(f_x(problem))(s)]] → nobody flunks in s]

We seem to need a local option for existential quantification over choice functions, as well as skolemization to derive all readings.

Restrictions on Existential Closure

Another part of Chierchia (2001)'s puzzle is the observation that there is a pattern of unavailable scope configurations that seems to imply weak crossover effects. A standard example of weak crossover (taken from Heim and Kratzer 1998(p.265)) would be (87):

(87) *The shark next to him$_1$ attacked [every diver]$_1$.

Assuming quantifier raising, the following LF should be available:

(88) every diver λ_1 the shark next to him$_1$ attacked t_1

This is not the case. A lower operator taking scope over a pronoun at LF is not allowed to bind it. As Chierchia (2001) points out, this can be used as an indicator for whether or not we can assume a pronoun-like element as part of the indefinite. He gives variants of the professor example to illustrate this. The sentence in (89-a.) cannot be uttered to describe the situation in b..

(89) a. Every professor competent on some problem examined every student.
b. Student A was examined by every professor competent on X.
Student B was examined by every professor competent on Y.
...

On a Reinhart/Winter approach, we would assume that the following LF is available:

(90) every student λ_1 $\exists f$ every professor competent on f(problem) examined t_1.

This would generate the reading outlined above, which is not actually available.

If we assume a Kratzer/Matthewson approach, we would generate the following LF:

(91) $\exists f$ every student λ_1 every professor competent on f_1(problem) examined t_1.

This would also generate the unavailable reading, but if we assume a pronoun-like element in the indefinite that allows for the parameterization of the choice function, we can discard this option as a weak crossover violation. But this alone does not suffice. Chierchia (2001) refers to Abusch (1993)'s discussion of examples like the following:

(92) If a student cheats on the exam, every professor might institute ethics proceedings.

This sentence cannot mean that for every professor, there is a different student, whose cheating would prompt the professor to institute ethics proceedings. If the if-clause is preposed, as in (93), the reading is available.

(93) Every professor might institute ethics proceedings, if a student cheats on the exam.

This poses a problem, since reconstruction approaches, such as Chierchia (1995), argue that bound pronouns in fronted if-clauses can be bound by reconstructing the if-clause to its assumed base position. One could assume that this is not an option for covert pronouns, but this does not seem to cut it, either. Chierchia (2001) provides the following examples:

(94) a. Every book might sell better, if the cover is sexy.
b. If the cover is sexy, every book might sell better.

These sentences have the same interpretation. Since the cover varies from book to book, the analysis proposed in Chierchia (1995) is that the definite has a parameter that can be bound. This seems to work in the exact same configuration. Chierchia (2001)(p.80) formulates a rough superiority constraint, stating that "Roughly speaking, an indefinite A, when construed non locally, cannot be in the scope of a quantifier B, unless B c-commands A at the spell

out position."

To this, he adds the following two rules (p.84) to capture the behaviour explained above:

(95) a. Indefinites, when interpreted as choice functions, always have a hidden parameter.
b. Existential closure of a function f is restricted to the (top and the) immediate scope of the quantifier that binds the argument of f.

Schwarz (2011)(p. 889) argues that (95-b.) is too restrictive, since it prohibits indefinites scoping below negation without a higher quantifier being present. This would prohibit a reading for (96) in which there is no problem such that every professor competent on it examined John, a reading that Schwarz (2011) argues is available.

(96) John wasn't examined by every professor competent on some problem.

Benchmark

Island-free scope is accomplished by quantifying over choice functions at the desired point in the structure.

(97) I heard the rumor that Peter read a book.
Available:
"There is a book x, such that I heard the rumor that Peter read x."

To be able to correctly predict **scope restriction through strong interveners** we would need some constraint that disallows existential closure over choice functions outscoping a critical intervener. An intervener that has nothing to do at all with existential closure, the choice function variable or its argument. This is especially puzzling, considering that binding other variables, pronouns, for example, is unproblematic across a critical intervener.

(98) I heard the rumor that only Peter read a book.
Unavailable:

"There is a book x, such that I heard the rumor that only Peter read x."

Intermediate readings across weak interveners is done either by quantifying over choice functions at the desired point in the structure or at the top level. In that case, the choice function has a bindable element that creates the same bound-domain-effect that is used in the singleton approach.

(99) Every lecturer wants every student to read a book.
Available:
"For every lecturer x, there is a book y, such that for every student z, x wants z to read y."

Bu there is the problem of overgeneration pointed out in Schwarz (2001). Schwarz (2001) shows that indefinites in the scope of non-upward monotonic quantifiers cannot easily be interpreted using choice functions. Consider the example in (100):

(100) No student read a book I had recommended.

Under an analysis that assumes existential quantification over choice functions at the top level and produces intermediate readings via skolemization, we would expect (100) to have the logical form in (101-a.), which, as Schwarz (2001) shows, is (Strawson-)equivalent to (101-b.).

(101) a. $\exists f$[[no student] λ_1 [t_1 read f_1[book I had recommended]]]
b. [no student] λ_1 [[every book I had recommended] λ_2 [t_1 read t_2]]

The reading in (101-b.) is not one that (100) actually has. If we switch to an analysis that allows for intermediate existential closure over choice functions, we can generate the correct readings, but would need a way to stop LFs like (102-b.) when the higher quantifier binds into the indefinite, i.e. to predict the **Binder-roof constraint**.

(102) a. [No student]$_1$ read a book she$_1$ bought.
b. $\exists f$[[no student] λ_1 [t_1 read f_1[book she$_1$ bought]]]

Again, this is equivalent to interpreting the indefinite as a universal with narrow scope, a reading that the sentence does not have. To salvage this, we would need a constraint that disallows existential closure over choice functions outscoping a quantifier that binds into the argument of the choice function variable. So the binder-roof-constraint can not be derived, but instead has to be stated as a second constraint.

Pronoun binding and **binding across interveners** are unproblematic. We can simply assume that the pronoun contains the same choice function variable as the indefinite.

(103) a. [A visitor]$_1$ wants Peter to call him$_1$.
b. [A visitor]$_1$ wants only Peter to call him$_1$.

Donkey binding is a bit more difficult, but doable as well. We could go the route of Brennan (2012) and assume that the donkey pronoun contains the same choice function variable, but this is only viable in a framework that uses a global choice function (like the dynamic framework used in Von Heusinger 2000, 2004, on which Brennan 2012 relies). If we want to quantify over choice functions, we would have problems creating universal readings as in (104-b.).

(104) Every guest that saw [a movie]$_1$, liked it$_1$.
a. Existential reading:
"There is some movie x such that every guest that saw x liked x."
b. Universal reading:
"For all movies x, every guest that saw x liked x."

Asymmetric readings are very hard to predict in a choice function framework. We would essentially need to tweak the choice functions in a way that, in (105), allows the choice function in "a credit card" to be a different one than the one employed in the pronoun, but at the same time, we would need the first choice function to restrict the set that the second one operates on. In this case, the choice function in "a credit card" would need to make sure that the one in the pronoun operates on the set of credit cards owned by the visitor

whose credit card the first one picked.

(105) Every visitor who has a [credit card]$_1$ pays the hotel bill with it$_1$.
Available:
"Every visitor who has one or more credit cards uses one of them to pay the hotel bill."

Predicting **intervention in donkey binding** is very much dependent on how one would go about modeling donkey binding. Following Brennan (2012), we would need a way that disallows the indefinite to modify the global choice function across a critical intervener. At this time, I see no way to do this, apart from stating it as another constraint. **Intervention in asymmetric readings** just adds to this: While the constraint needed for intervention in donkey binding should only be triggered by an intervener above the indefinite, the one for asymmetric readings would need to only be triggered by an intervener above the pronoun.

Bound indefinites, however, are unproblematic if we use parametrized choice functions. The parameter would be bound by the relevant quantifier and everything works out fine.

Having the perceived scope site of an indefinite as a **scope barrier for lower quantifiers** requires, as mentioned above, yet another constraint.

Summing up, a choice function account cannot account for the data without positing several additional constraints. Intervention effects create the biggest problem. We cannot allow binding of a function variable within a pronoun across a critical intervener, while prohibiting it for variables that are part of an indefinite. Additionally, we have no reason to allow for weak interveners to not restrict the scope of indefinites, while at the same time causing intervention effects in donkey constructions.

	Singleton	Choice functions
Island-free scope	✓	✓
Scope restriction through strong interveners	↯	↯
Intermediate readings across weak interveners	✓	(✓)
Binder-roof constraint	✓	(✓)
Pronoun binding	✓	✓
Binding across interveners	✓	✓
Donkey binding	↯	(✓)
Asymmetric readings	↯	↯
Intervention in donkey binding	↯	↯
Intervention in asymmetric readings	↯	↯
Bound indefinites	✓	✓
Scope barrier for lower quantifiers	✓	↯

2.3.3 Scope through Alternatives

One strand of approaches that seems to be particularly well equipped to handle intervention effects is the one popularized by Kratzer and Shimoyama (2002). These approaches use alternative semantics to model the scope taking behaviour of indefinites. Following Beck (2006), this allows us to predict intervention effects by elements like "only" without further assumptions.

There are several other approaches to intervention effects in the literature (Honcoop 1996; Honcoop 1998; Beck 1996a,b; Pesetsky 2000; Beck and Kim 1997; Mayr 2014; Kotek 2014 among others), but since Beck (2006)'s approach predicts intervention effects wherever alternative semantics are employed, I will rely on that approach for the matter at hand.

Intervention Effects Following Beck (2006)

Picking up on Kim (2002), Beck (2006) uses focus semantics to explain intervention effects. Since the denotation of a question is, following the Hamblin-Karttunen semantics (Hamblin 1973; Karttunen 1977), a set of propositions, Rooth (1992) shows (crediting Dietmar Zaefferer for pointing out the connection between Rooth 1985 and Hamblin 1973) that focus semantics can be of

use in deriving this set.

On that basis, Beck (2006), closely following Kim (2002), proposes the following:

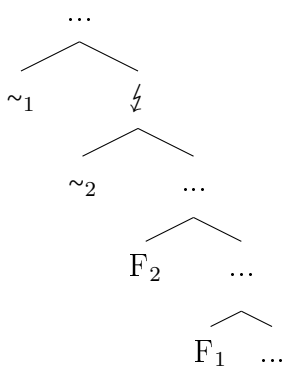
(106) *[Q_i ...[intervener ...[... wh-phrase$_i$ ...]]]

As Beck (2006, p.12) puts it: "Things go wrong when the question contains a focus whose contribution is evaluated within it, i.e. within the scope of the Q operator". Essentially, the intervener is a focus evaluating operator. The reason for why this causes ungrammaticality is found in Rooth (1992)'s ~ operator:

(107) If X=[~C Y] then
a) $[[X]]^o = [[Y]]^o$ if $C \subseteq [[Y]]^f$, undefined otherwise;
b) $[[X]]^f = [[X]]^o$

The ~ unselectively takes all foci in its scope, resetting the focus semantic value to the ordinary one ((107) b)). This essentially means that any and all sources for alternatives within the scope of ~ cannot associate with any focus evaluating operator that lies beyond ~, blocking off for example other focus association:

(108) *Peter only$_1$ introduced only$_2$ Mary$_{f2}$ to Sue$_{f1}$
*[~$_1$... [~$_2$... [...F_2... F_1...]]]



Another focus evaluating operator would be Q, which wants to associate with

the wh-item. However, this fails if ~ intervenes, since ~ resets the focus semantics to the ordinary semantics.[2]

(109) Wer hat (*nur) Peter was gegeben?
who has (*only) Peter what given
"Whom did (*only) Peter give what?"
*[Q_i... [~... [... wh-phrase$_i$ ...]]]

In (109), the alternatives generated by the lower wh-item "what" cannot percolate beyond "only"/~. The alternatives that Q can now use to create a set of proposisitions for the question meaning are those generated by the higher wh-item "who". As a result, a pair-list reading of the question is unavailable.

Hamblin-Style Approach

Building on the analysis presented in Shimoyama (2001), Kratzer and Shimoyama (2002) use a Hamblin-style semantics. This framework, which was originally intended for questions, assumes that indeterminate phrases introduce sets of alternatives that extend until they meet an evaluating operator. On the way there, the expanding alternatives are computed using point-wise functional application, which combines each alternative with the new element point-wise, thereby expanding the alternatives. [3] A simple example given in Kratzer and Shimoyama (2002) is the Japanese sentence "dare nemutta" (lit: who slept. trans: Someone slept.).

(110) $[\![\text{dare}]\!]^{w,g} = \{x: \text{human}(x)(w)\}$
$[\![\text{nemutta}]\!]^{w,g} = \{\lambda x.\lambda w'.\text{slept}(x)(w')\}$
$[\![\text{dare nemutta}]\!]^{w,g} = \{p: \exists x[\text{human}(x)(w) \,\&\, p{=}\lambda w'.\text{slept}(x)(w')]\}$

They extend Shimoyama (2001)'s analysis to German "irgendein". This is done by assuming that DPs headed by "ein" denote a subset of the set that

[2]Note that in this case, * only means that the pair-list reading is unavailable. The sentence is fine, as long as the second wh is interpreted as an existential.

[3]It should be noted at this point that I assume that indeterminate phrases are at least close relatives to indefinites. This is not a trivial assumption, but even if it turns out to be incorrect, this does not mean that the methods employed in Shimoyama 2001; Kratzer and Shimoyama 2002 cannot be applied to indefinites as well. The goal of this section is to see whether this is the case, so I will not discuss further implications of this assumption.

the NP would denote. This is done via a domain variable D, which is provided by the context and restricts the set provided by the NP.

(111) For all variable assignments g and all worlds w,
g(D)⊆D (where D is the set of possible individuals)
$[\![\text{ein}_D\ \text{Mann}]\!]^{w,g} = \{x\text{: man}(x)(w)\ \&\ x \in g(D)\}$

An especially restrictive D would then lead to Schwarzschild (2002)'s singleton indefinites. "Irgend-" is then analysed as a domain widener in the sense of Chierchia (2001) and given the following semantics. The contribution of "irgend-" is essentially that it prevents us from contextually restricting the domain variable D.

(112) a. For $[\![\alpha]\!]^{w,g} \subseteq D_{<e>}$:
$[\![\text{irgend-}\alpha]\!]^{w,g} = \{x\text{: } \exists g'[x \in [\![\alpha]\!]^{w,g'}]\}$

b. $[\![\text{irgend- [ein}_D\ \text{Mann}]]\!]^{w,g} = \{x\text{: } \exists g'[\text{man}(x)(w)\ \&\ x \in g'(D)]\}$
$= \{x\text{: man}(x)(w)\}$

c. $[\![\text{irgend- [ein}_D\ \text{Mann] schlief}]\!]^{w,g} =$
$\{p\text{: } \exists x[\text{man}(x)(w)\ \&\ p = \lambda w'.\text{slept}(x)(w')]\}$

"irgend-" accesses the alternatives generated by the indefinite via the assignment function g. This essentially allows "irgend-" to quantify over subdomains, since g(D)⊆D. This is made more explicit in Chierchia (2006), which introduces D(omain)-alternatives for NPIs. In Chierchia (2013), this mechanism is extended to cover indefinites in general. The assumption made there is that indefinites can have scalar alternatives as well as D-alternatives, but that they are optionally active (Chierchia 2013 p.169 for example).

Expanding further on this, Shimoyama (2006) uses this approach to explain the peculiar behaviour of the japanese particle "mo". This particle expresses universal quantification when it associates with an indeterminate phrase. Interestingly, "mo" can associate with the relevant indeterminate phrase across islands, but not across another "mo" or the question particle "ka". In (113),

"mo" associates with "dono gakusei", which is embedded in a relative clause. (The following Japanese data is taken from Shimoyama 2006.)

(113) [[Dono gakusei-ga syootaisita] sensei] -mo odotta.
which student-Nom invited teacher -MO danced
"For every student x, the teacher(s) that x had invited danced."

This is not restricted to one indeterminate phrase. In (114), there are two indeterminate phrases and "mo" associates with both of them.

(114) [[Dono gakusei-ga dono ie-ni syootaisita] sensei] -mo
which student-Nom which house-to invited teacher -MO
odotta.
danced
"For every student x and every house y, the teacher(s) that x had invited to y danced."

As mentioned above, "mo" and "ka" block this association. If "mo" does not associate with an indeterminate phrase, it is interpreted as "even" or "also". This is what happens in (115).

(115) a. [[[[Taro-ga nan-nan-ni nani-nituite kaita] ronbun] -mo
Taro-Nom what-year-in what-about wrote paper -MO
yonda] sensei] -mo totemo tukareta
read teacher -MO very got.tired
"The teacher who read, for every topic x, every year y, the paper that Taro wrote on x in y also got very tired."

b. [[[Yamada-ga dare-ni nani-o okutta ka] sitteiru] syoonin]
Yamada-Nom who-Dat what-Acc sent Q know witness
-mo damatteita
-MO was.silent
"The witness who knew what Yamada sent to whom was also silent."

Assuming that the wh-items used to form the indeterminate phrases are sources for alternatives, Shimoyama (2006) analyzes "mo" as a quantifier over alternatives. Since the set of alternatives will be a set of entities, "mo" simply takes the form of a universal quantifier.

(116) $[\![\text{mo}]\!]$

For $[\![\alpha]\!]^g \subseteq D_{<e>}$,
$[\![\alpha \text{ mo}]\!]^g = \{\lambda P.\ \forall x[x \in [\![\alpha]\!]^g \rightarrow P(x)]\}$

Let us have a look at that in a simple example:

(117) a. Dono gakusei -mo odotta.
which student -MO danced
"Every student danced"

b. $[\![\text{dono gakusei mo}]\!]^g([\![\text{odotta}]\!]^g)$

c. $[\![\text{mo}]\!]^g([\![\text{dono gakusei}]\!]^g)([\![\text{odotta}]\!]^g)$

For "dono gakusei", we get the set of all alternative students.

d. $[\![\text{mo}]\!]^g(\{x: \text{student}(x)\})([\![\text{odotta}]\!]^g)$

If we now apply "mo", we get the following:

e. $\{\lambda P.\ \forall x[\text{student}(x) \rightarrow P(x)]\}([\![\text{odotta}]\!]^g)$

Combining this with "odotta", the set of dancers, via point-wise function application, we get the following set of propositions:

f. $\{p: p = \forall x[\text{student}(x) \rightarrow \text{dance}(x)]\}$

For a non-local association, this approach works equally well.

(118) a. [[Dono gakusei-ga syootaisita] sensei] -mo odotta.
which student-Nom invited teacher -MO danced
"For every student x, the teacher(s) that x had invited danced."

b. $[\![[[[1 \text{ dono gakusei-ga } t_1 \text{ syootaisita}] \text{ sensei}] \text{ -mo}] \text{ odotta}]\!]^g$

c. $[\![\text{-mo}]\!]^g([\![[[1 \text{ dono gakusei-ga } t_1 \text{ syootaisita}] \text{ sensei}]]\!]^g)([\![\text{odotta}]\!]^g)$

For the complex NP, we get the set of teachers that were invited by one of the student alternatives. Shimoyama (2006) does not specify what kind of predicate abstraction is used, but the result is this:

d. $[\![\text{-mo}]\!]^g(\{\iota x[\text{teacher}(x) \ \&\ y \text{ invited } x]: \text{student}(x)\})([\![\text{odotta}]\!]^g)$

This assumes a definite singular interpretation of the bare NP

"teacher". We can now continue as above and get the following result:

e. {p:p=∀z[z∈{ιx[teacher(x)&y invited x]: student(y)}→dance(z)]}

What makes this approach especially attractive is that it not only allows for association across islands, but can also predict intervention effects by operators that evaluate alternatives. Alternatives do not expand beyond an evaluating operator, so "mo" causes an intervention effect for other operators like itself.

In order to apply this to indefinites and their irregular scope behaviour, we could assume that existential closure is - analogous to "mo" - an existential quantifier over alternatives. For the Japanese question/existential operator "ka", this idea has also been entertained by Shimoyama (2001)[p.64, footnote 36]: "One idea, due to Angelika Kratzer (p.c.), is that *ka* is an operator that takes a non-singleton Hamblin set and returns a singleton set whose sole member is, for example, a question denotation". Similarly, Yatsushiro (2001)[p.193] proposes that "*ka* is an open choice function variable selecting one element of the P-set of its sister constituent" (The P-set is essentially the set of alternatives.).

This would mean that any alternative evaluating operator between existential closure and the indefinite would stop the alternatives generated by the indefinite from reaching the closure operator, correctly predicting an intervention effect.

Shan (2004)'s Problems

A problem with this approach was pointed out in Shan (2004). Shan outlines three problems with regard to binding in alternative semantics. The first two are presented in Shan (2004) and the third one in Romero and Novel (2013), where it is credited to Shan.

Problem 1: The Schönfinkelization of Sets of Alternatives

When using an assignment function for binding, we would usually assume that the denotation of an expression has an argument slot for the assignment

function, making it a function from assignments to its "usual" denotation. Romero and Novel (2013)(p.174ff) present this as follows:

(119) Denotation schema using assignments:

a. For all assignments g of type <a> and expressions α of type <τ>, such that $[\![\alpha]\!]^g = \pi$:

b. $[\![\alpha]\!] = \lambda g_{<a>}.\pi_{<\tau>}$

This is combined with a denotation schema for alternatives:

(120) Denotation schema using sets of alternatives (ignoring assignments):
$[\![\alpha_{ALT}]\!] = \{\pi,\pi',\pi''\}$ (type <τ,t>)

If we want to combine these, we have two options. Either the assignment layer is outside the set of alternatives, as in (121-a.) or inside, as in (121-b.).

(121) a. $[\![\alpha_{ALT}]\!] = \lambda g.\{\pi,\pi',\pi''\}$ (type <a,<τ,t>>)

b. $[\![\alpha_{ALT}]\!] = \{\lambda g.\pi,\lambda g.\pi',\lambda g.\pi''\}$ (type <<a,τ>,t>)

Problem 1 is a problem for option a, which is the one used in Kratzer and Shimoyama (2002). Shan's example is in (122-a.). The assumed LF is in b..

(122) a. Who saw nobody?

b. nobody 1 who saw t_1

The problem that arises here is that the denotation for "who saw t_1" is this:

(123) a. $[\![\text{who}]\!] = \{a,b,c\}$

b. $[\![\text{who saw } t_1]\!] = \{\text{see(a)(g(1))}, \text{see(b)(g(1))}, \text{see(c)(g(1))}\}$

If we now do predicate abstraction in the usual way, we get a type mismatch with "nobody". Predicate abstraction would produce a function into sets. But what "nobody" expects, is a set of alternative functions. Kratzer and Shimoyama (2002) solve this by incorporating a shifting function into their rule for predicate abstraction, which is given in (124):

(124) If α is a branching node, whose daughters are an index i and β, where $[\![\beta]\!]^{w,g} \subseteq D_{<\sigma>}$, then

$[\![\alpha]\!]^{w,g}=\{f:\ f\in D_{<e,\sigma>}\ \&\ \forall a[f(a)\in[\![\beta]\!]^{w,g[a/i]}]\}$

Assume that the set of possible seers is {a,b,c} and the set of people that could be seen is {x,y,z}. If we apply the rule in (124) to what we have in (123-b.), we get (125):

(125) $\{f:\ \forall d[f(d)\in\{see(a)(d), see(b)(d), see(c)(d)\}]\}$

Assume the nonuniform function f' in (126):

(126) $f' = \{<x, see(a)(x)>, <y, see(b)(y)>, <z, see(b)(z)>\}$

This function is clearly an element of the set in (125). This is a problem. If we assume the meaning of "nobody" in (127-a.), we get (127-b.) via point-wise function application as one of the alternative propositions.

(127) a. $[\![nobody]\!]=\{\lambda P.\lambda w.\ \neg\exists d[person(d)(w)\ \&\ P(d)(w)]\}$
b. $\lambda w.\neg\exists d[person(d)(w)\ \&\ f'(d)(w)]$

The problem is that (127-b.) would be true in a world, in which the following holds:

(128) x was not seen by a, but by b and c
y was not seen by b, but by a and c
z was not seen by c, but by a and b

This means that one appropriate answer to the question "Who saw nobody?" would be "a did not see x, b did not see y and c did not see z." Since the approach in Kratzer and Shimoyama (2002) assumes that indefinites behave like wh-items, it would also predict that (129) (in a reading, in which the indefinite takes wide scope), would be true in the situation outlined in (127).

(129) A person saw nobody.

Assuming some kind of existential closure over the set of alternatives generated above, we would essentially say that the assertion of the sentence is that one of the alternatives is true. That alternative could be the non-uniform one outlined above.

The solution to the problem presented in Romero and Novel (2013) is to use type <<a,τ>,t> instead of <a,<τ,t>>. To achieve this, they device an assignment-sensitive version of point-wise function application and use Poesio (1996)'s alternative-friendly, assignment-sensitive version of predicate abstraction.

(130) Point-wise, assignment-sensitive function application:
If α is a branching node, whose daughters are β and γ,
where $[\![\beta]\!]$is of type <<a,<σ,τ>>,t> and $[\![\beta]\!]$ is of type <<a,σ>,t>
then
$[\![\alpha]\!]$ = {λg.f(g)(x(g)): f$\in[\![\beta]\!]$ & x$\in[\![\gamma]\!]$} (type <<a,τ>,t>)

(131) Alternative-friendly, assignment-sensitive PA (Poesio 1996)
If α is a branching node, whose daughters are an index i and β, where $[\![\beta]\!]$ is of type <<a,τ>,t>, then
$[\![\alpha]\!]$ = {λg.λx.f($g^{[x/i]}$: f$\in[\![\beta]\!]$} (type <<a,<e,τ>>,t>)

With this ruleset, we get the following denotations for the example above:

(132) a. $[\![$who saw $t_1]\!]$ =
{λg.see(a)(g(1)), λg.see(b)(g(1)), λg.see(c)(g(1))}
b. $[\![$1 who saw $t_1]\!]$ =
{λg.λx.see(a)(x), λg.λx.see(b)(x), λg.λx.see(c)(x)}

This effectively avoids nonuniform functions and thereby solves problem 1.

Problem 2: Binding inside the Set of alternatives

The second problem pointed out by Shan (2004) comes up when the binder is inside the set of alternatives and binds a variable inside the source of alternatives:

(133) a. Which man sold which of his paintings?
b. (LF) Which man 1 [t_1 sold which of his$_1$ paintings]?

For an example like this, we would assume that "1 t_1 sold which of his$_1$ paintings" produces a different set of alternatives for each painter. This is again the

function into sets, that produced problem 1. Predicate abstraction would then result in type <e,<τ,t>> instead of <<e,τ>,t>, which we need for quantifiers to interact with.

As Romero and Novel (2013) point out, the problem vanishes, if a richer semantics for the sources of alternatives is assumed. They follow Rullmann and Beck (1998a) and assume that the wh-item that is the source of alternatives overall has the semantics of a definite description. So the set of alternatives produced by a wh-item shifts from (134-a.) to (134-b.).

(134) a. $[\![\text{who}]\!] = \{\lambda g.x : x \in D_{<e>}\}$
b. $[\![\text{who}]\!] = \{\lambda g.\iota v[\text{person}(v) \,\&\, v=x] : x \in D_{<e>}\}$

If we assume that a painted x, b painted y, and c painted z, we would get the following set of alternatives for "which of his paintings":

(135) $[\![\text{which of his}_1 \text{ paintings}]\!] =$
$\{\lambda g.\iota v[\text{painting-of}(v)(g(1)) \& v=x],$
$\lambda g.\iota v[\text{painting-of}(v)(g(1)) \& v=y],$
$\lambda g.\iota v[\text{painting-of}(v)(g(1)) \& v=z]\}$

Using Poesio's version of PA, we then get the following:

(136) $[\![1\ t_1 \text{ sold which of his}_1 \text{ paintings}]\!] =$
$\{\lambda g.\lambda u.u \text{ sold } \iota v[\text{painting-of}(v)(u) \& v=x],$
$\lambda g.\lambda u.u \text{ sold } \iota v[\text{painting-of}(v)(u) \& v=y],$
$\lambda g.\lambda u.u \text{ sold } \iota v[\text{painting-of}(v)(u) \& v=z]\}$

Since these are partial functions due to the presupposition of ι, we automatically get alternatives specific to the painter, without changing to the problematic type that caused problem 1.

Problem 3: Binding into the Set of Alternatives

The third problem comes up, when the binder sits above the operator that evaluates the alternatives and binds a variable within the alternatives. The examples provided by Shan (via Romero and Novel 2013) are these:

(137) a. [Every man]$_1$ knows, which of his$_1$ paintings is good.
b. #[Every man]$_1$ knows, which of his$_1$ hearts is good.

The approach to this issue presented in Romero and Novel (2013) relies on the projection pattern of nonshared presuppositions and the Gricean Maxim of Manner.

If we assume the painters a and b and assume that their paintings are x_a and y_a for a and x_b and y_b for b, we get the following set of alternatives for "which of his$_1$ paintings is good":

(138) ⟦which of his$_1$ paintings is good⟧
{λg.ιv[painting-of(v)(g(1))&v=x_a] is good,
λg.ιv[painting-of(v)(g(1))&v=y_a] is good,
λg.ιv[painting-of(v)(g(1))&v=x_b] is good,
λg.ιv[painting-of(v)(g(1))&v=y_b] is good }

This leads to the following truth conditions:

(139) λg.$\forall$z[man(z) $\rightarrow$ z knows {ιv[painting-of(v)(z)&v=x_a] is good,
ιv[painting-of(v)(z)&v=y_a] is good,
ιv[painting-of(v)(z)&v=x_b] is good,
ιv[painting-of(v)(z)&v=y_b] is good }]

All of the alternatives in the set give rise to different presuppositions. Romero and Novel (2013) argue that these project as a complex disjunctive presupposition of the form in (140):

(140) a. λg.$\forall$z[man(z) $\rightarrow$ $\exists$x[painting-of(x)(z)&x=x_a] $\vee$
$\exists$x[painting-of(x)(z)&x=y_a] $\vee$
$\exists$x[painting-of(x)(z)&x=x_b] $\vee$
$\exists$x[painting-of(x)(z)&x=y_b]]
b. λg.$\forall$z[man(z) $\rightarrow$ $\exists_{\geq 1}$x[painting-of(x)(z)]]

They argue that this is similar to what has been observed in Simons (1998) for sentences like (141):

(141) a. John met the king of Titibuk or the president of Titibuk.
PSP: There is a king of Titibuk or there is a president of Titibuk.
b. Every boy[1] brought his[1] dog or his[1] cat.
PSP: Every relevant boy has a dog or a cat.

If we now assume, following Groenendijk and Stokhof (1984), that questions introduce a partition on the set of possible worlds, we can argue that this partition needs to be non-trivial. If a man has no paintings, there is no possible partition. If there is at least one painting, it can be good or bad, so a partition is possible. This can be taken as the basis for the disjunctive presupposition.

If we add to this Grice (1975)'s Maxim of Manner, we can simply say that, since it can be assumed that men tend to have exactly one heart, there is no need to use a construction that evokes alternatives.

A (Strawman) Approach of Scope via Alternatives

So to circumvent Shan's problems in an approach that uses alternatives to predict the scope behaviour of indefinites, we would need the following ingredients:

The indefinite itself would need to be a source of alternatives, but each alternative would need to have the semantics of a definite description.

(142) $[\![\text{a NP}]\!] = \{\lambda g.\iota v[[\![\text{NP}]\!](g)(v) \ \&\ v{=}x] \mid x \in D_{<e>}\}$

The rules for point-wise function application and predicate abstraction would need to be assignment sensitive and/or alternative friendly.

(143) a. Point-wise, assignment-sensitive function application:
If α is a branching node, whose daughters are β and γ, where $[\![\beta]\!]$is of type $<<a,<\sigma,\tau>>,t>$ and $[\![\beta]\!]$ is of type $<<a,\sigma>,t>$ then
$[\![\alpha]\!] = \{\lambda g.f(g)(x(g)): f \in [\![\beta]\!] \ \&\ x \in [\![\gamma]\!]\}$ (type $<<a,\tau>,t>$)
b. Alternative-friendly, assignment-sensitive predicate abstraction
If α is a branching node, whose daughters are an index i and β, where $[\![\beta]\!]$ is of type $<<a,\tau>,t>$, then

$$[\![\alpha]\!] = \{\lambda g.\lambda x.f(g^{[x/i]}: f \in [\![\beta]\!]\} \qquad (\text{type } <<a,<e,\tau>>,t>)$$

Existential closure would need to be an alternative evaluating operator along the lines of "mo". This, however, is not entirely trivial. "mo" has the advantage of attaching to a (definite) NP, so the set of alternatives is a set of entities, which allows for "mo" to be a standard quantifier. Existential closure, however, attaches to a type <<a,t>,t>-node, making it a quantifier over sets of assignments.

(144) $[\![\exists\ \alpha]\!] = \{\lambda g.\exists p[p \in [\![\alpha]\!]\ \&\ p(g)]\}$

With these elements in place, such an approach would correctly predict that alternative evaluating operators cause intervention effects, restricting the scope of indefinites.

Benchmark

Island-free scope is unproblematic. Since no movement is involved, no islands are expected. The scope position is not a landing site, but the site where alternatives are evaluated, which automatically predicts **scope restrictions through strong interveners**. **Intermediate readings across weak interveners** are unproblematic as well, as quantifiers are usually not seen as focus evaluating[4].

The **Binder-roof constraint** is not automatically predicted, but could be implemented: If we use a Rooth-style framework employing ~, the effect would be a presuppositional restriction of the domain of existential closure to the set of alternatives. Each alternative would contain an ι, the presupposition of which would need to be accommodated within the alternative. So if an alternative extends beyond a quantifier binding a pronoun within the presupposition of ι, this presupposition would need to be accommodated below this quantifier. This would only work, if the denotation of the indefinite is the same for all values of the bound pronoun, which is a wide scope reading that actually works. For this wide scope reading, the sentence in (145) would generate single alter-

[4] I will spend a significant part of the next chapter contradicting this notion and claiming quite the opposite.

natives that roughly look like (145-a.). The set of alternatives would then be in (145-b.). Since this set only contains alternatives in which all students like the same movie, we generate the only available wide scope reading.

(145) Every student$_1$ saw a movie she$_1$ liked.

a. $\forall$x [student(x) $\rightarrow$ $\exists$!y [movie(y) & x liked y & x saw y]]

b. {$\forall$x [student(x) $\rightarrow$ $\exists$!y [movie(y) & x liked y & y=z & x saw y]] | y$\in$D$_{<e>}$}

This would be a start, but fails as soon as the quantifier binding into the indefinite is downward entailing. If we had "no student" in this example, the wide scope reading would be true, if there was a movie that not every student liked. The result is essentially the same problem that Schwarz (2001) points out for choice function accounts. We could instead make the argument that the set of alternatives is created at ~, so all accommodations happening within these alternatives would need to happen there. Under these circumstances, ~ would be unable to outscope a quantifier binding into the indefinite. This is very stipulative, but I will count it as "there may be a solution".

There is no option to model **pronoun binding** at this point. To implement this, one would need to assume that existential closure comes with a way of binding, which is not trivial, as it would require binding the pronoun to a specific entity in the existentially provided alternative. This is problematic since the alternatives have expanded and the original source of alternatives - which would be the entity the pronoun needs to be bound to - is not accessible anymore. In addition, the actual binding itself should not use alternatives, else there would be no way of **binding across interveners** as in (146).

(146) [A visitor]$_1$ wants only Peter to call him$_1$.

If we have an option to extract an entity from the alternatives and bind a pronoun to that entity, by non-alternative based means, **donkey binding** is unproblematic. Whether we have an existential reading as in (147-a.) or a universal one as in (147-b.) can then be made dependent on whether we quantify existentially or universally over the entities extracted from the alternatives.

(147) Every guest that saw [a movie]$_1$, liked it$_1$.

a. Existential reading:
"There is some movie x such that every guest that saw x liked x."

b. Universal reading:
"For all movies x, every guest that saw x liked x."

To predict **asymmetric readings**, we would then need to get alternatives from the pronoun as well. If this can be done, we can use both alternatives separately, to create the reading in (148-a.)

(148) Every visitor who has a [credit card]$_1$ pays the hotel bill with it$_1$.
Available:
"Every visitor who has one or more credit cards uses one of them to pay the hotel bill."

a. Asymmetric reading through alternatives:
"Every visitor for whom there is an alternative containing a credit card that he owns is such that there is an alternative containing a credit card that he pays the hotel bill with."

This would be a good basis to predict **intervention in donkey binding** and **intervention in asymmetric readings**. If alternatives created by the pronoun need to be used below "only", we would get the reading in (149-a.)

(149) Every visitor who has [a credit card]$_1$ only pays the hotel bill with it$_1$.
Unavailable:
"Every visitor who has one or more credit cards has one which he only uses to pay the hotel bill."

a. Symmetric reading through alternatives:
"Every visitor for whom there is an alternative containing a credit card that he owns is such that only the hotel bill is an x such that there is an alternative containing a credit card that he pays x with."

There is, however, the problem of predicting that weak interveners disrupt donkey binding, but do not restrict the scope of indefinites.

Bound indefinites are doable, if we assume that the element that quantifies over entitiies extracted from the alternatives has a domain that can be bound. This seems like a natural assumption, since this element would be essentially a quantifier and quantifiers are known to display this beahviour.

The **scope barrier for lower quantifiers** does not fall out from what we already have, but there seems to be a viable angle to implement this: Focus evaluating elements like "only" are barriers for quantifier raising, so if existential closure is similar, we could assume that it creates the same barrier. Sentences like (150) are unproblematically predicted.

(150) Every student who read some book failed no exam.
Unavailable:
"There is no exam, for which there is a book such that every student who read the book failed the exam."

But this would also make the prediction that an indefinite cannot take scope between the spellout position of a higher quantifier and its LF position. This would be the reading in (151-a.).

(151) Mehr als zwei studenten haben den meisten Dozenten das erste
more than two students have the most lecturers the first
Kapitel eines Buchs gezeigt.
chapter of-a book shown
"More than two students showed most lecturers the first chapter of a book."

a. Intended:
”Most lecturers x are such that there is a book y, such that more than two students showed the first chapter of y to x.”

This reading seems unavailable. This needs a more extensive discussion, but for now, I will treat it as doable.

	Sg.	CF	Alternatives
Island-free scope	✓	✓	✓
Scope restriction through strong interveners	↯	↯	✓
Intermediate readings across weak interveners	✓	(✓)	✓
Binder-roof constraint	✓	(✓)	(✓)
Pronoun binding	✓	✓	(✓)
Binding across interveners	✓	✓	(✓)
Donkey binding	↯	(✓)	(✓)
Asymmetric readings	↯	↯	(✓)
Intervention in donkey binding	↯	↯	(✓)
Intervention in asymmetric readings	↯	↯	(✓)
Bound indefinites	✓	✓	(✓)
Scope barrier for lower quantifiers	✓	↯	(✓)

Solutions to the problems of this approach depend on finding a good way to bind using alternatives. This is not a trivial task, but if doable, would make this approach quite attractive.

2.4 Conclusion

There is a quite diverse set of problems that are encountered when trying to deal with long distance indefinites. On the one hand, the empirical picture is quite complex and on the other hand, there are some pitfalls for an approach to that picture which need to be avoided. Starting with the empirical picture, the starting point should be the fact that there are long distance indefinites. Indefinites seem to be able to freely take scope, ignoring islands and pretty much anything else. The only things that seem to be able to restrict their scope are focus sensitive items like "only" and quantifiers binding into the indefinite in question. At the same time, the indefinite can also be a barrier to a quantifier, if the quantifier 'implicitly' binds into the indefinite, as in Chierchia (2001)'s weak crossover examples. So a long distance indefinite cannot take scope below the LF position of a quantifier that has been in the scope of the indefinite at spellout.

The next step are donkey constructions. Indefinites seem to be able to bind pronouns that they do not c-command and they can do so in non-symmetric ways. There are different flavours of the proportion problem, which either require a symmetric or asymetric reading. The indefinite can refer to any member of a group and the pronoun to only one member of that group, as in the meter example in (152-a.) or the pronoun can refer to any member of the group as well, as in (152-b.).

(152) a. Usually, if a man has a quarter in his pocket, he will put it in the meter.
b. No parent with a son still in high school has ever lent him the car on a weeknight.

Additionally, donkey constructions are only available, if there is no critical intervener between the indefinite and the first position c-commanding the pronoun and the indefinite. And apparently, these critical interveners are a superset of the critical interveners that restrict the scope of long distance indefinites.

On the side of implementation, there are several problems that need to be avoided. The first of them is the Donald Duck problem. If whatever provides the existential force for the indefinite is separated from the rest of the indefinite, conditionals can become problematic. If the term in (153-a.) represents some conditional with an indefinite in the antecedent, we run into this problem, if we assume an LF along the lines of (153-b.).

(153) a. $\forall x[A(x)\&\exists y[B(y)] \rightarrow C(x)]$
b. $\exists y[\forall x[A(x)\&B(y) \rightarrow C(x)]]$

The problem here is that (153-b.) becomes true if there is an entity that does not have property B. So an approach that tries to model the scope of an indefinite without movement needs a way to make sure that either the rest of the indefinite is interpreted at the locus of quantification or that the rest of the indefinite restricts the domain of quantification in some other way.

This problem can either be avoided by adding some kind of presupposition to

the indefinite, which would effectively make it part of the restrictor of existential quantification or by quantifying over something else, for example alternatives that each involve one specific entity. In this case, the pitfall comes in the form of Shan's problems: If we bind into the expanding alternatives, we want to make sure that the alternatives do not contain non-uniform functions. To avoid this, predicate abstraction must be formulated in an alternative friendly way and the indefinite must, again, come with some kind of presupposition.

The third problem that needs watching out for is when we try to tackle intervention effects. Since a critical intervener restricts the scope of existential quantification, it seems sensible to assume that the association between the indefinite and existential quantification is sensitive to intervention. But since an indefinite can bind a pronoun across a critical intervener, we need to allow for that, which makes it hard to use the same mechanism for both operations. This is mirrored in the behaviour of donkey constructions, which are only sensitive to intervention, if the critical intervener is between the indefinite and the first node c-commanding the indefinite as well as the pronoun, but not if the intervener is between the pronoun and that point.

Additionally, the intervention effect needs to be modeled in a way that allows for elements like "only" to be critical interveners for the association between existential quantification and the indefinite, but not the other way around.

An approach to long distance indefinites that can handle the observed intervention pattern needs to be able to do several things to actually improve on the proposals that are already available. With regard to intervention effects, it should predict that the association between existential quantification and the indefinite is sensitive to intervention effects. At the same time, however, indefinites should not cause intervention effects in focus association, but should cause them in wh-questions (as pointed out in Mayr 2014, among others) but only if the indefinite is not read as a group entity. This behaviour has been observed in Beck (1996b), among others, and has been convincingly illustrated in Mayr (2014) using the aforementioned example repeated in (154):

(154) a. Wo haben sich drei Maler wann eine Pizza geteilt?
where have self three painters when a pizza shared
"Where did three painters when share a pizza?"

b. *Wo haben sich drei Maler wann eine Arbeitshose
where have self three painters when a dungaree
angezogen?
put.on
"Where did three painters when put on a dungaree?"

While in (154-a.), there is no intervention effect, (154-b.) fails. The reason is that in (154-a.), the painters can be interpreted as one unit, while (154-b.) only works if they fit into the same dungaree together. If the indefinite is interpreted as existential quantification, an intervention effect occurs.

In addition to this, the successful approach should be able to explain, why donkey constructions are sensitive to weak interveners that cause intervention effect in wh-questions, but not in focus association, such as "every" or negation. At the same time, indefinites should still be able to outscope these interveners.

With regard to scope, the approach should ideally not rely on movement, as this would require us to have a separate set of rules for movement of indefinites. At the same time, it should correctly predict certain movement-like effects. An indefinite should be unable to outscope a quantifier binding into it, except if the indefinite denotes the same entity for all values of the bound variable, as illustrated in the example we saw in the discussion of singleton approaches:

(155) If every Italian in this room (could manage to) watch a certain program about his country (that will be aired tonight on PBS), we might have an interesting discussion tomorrow.

Similarly, we want to predict Chierchia's weak crossover effects, which prohibit a quantifier outscoping an indefinite that it did not c-command at spellout, but only if the indefinite is construed non-locally.

(156) a. A student read every paper.

Available:
"For every paper, there is a student who read it."

b. Every professor competent on some problem examined every student.
Unavailable:
"For every student x, there is some problem y, such that x was examined by every professor competent on y."

We will also need to predict some interesting behaviour with regard to binding. Not only regular binding with c-command is available, but also binding from a higher position as in donkey constructions. But we will need separate mechanisms for modeling the scope taking behaviour of indefinites and their way of binding variables. While scope taking is sensitive to intervention, binding a pronoun is not. This is especially visible in donkey constructions, which are sensitive to intervention effects, if there is an intervener between the indefinite and the first position above the indefinite that c-commands the pronoun, but not sensitive to interveners between the pronoun and said position.

(157) a. *Jeder Bauer, der nur Maria [einen Esel]$_1$ zeigt, erlaubt
every farmer who only Mary [a donkey]$_1$ shows allows
Peter ihn$_1$ zu streicheln.
Peter it$_1$ to pet
"Every farmer who shows only Mary [a donkey]$_1$ allows Peter to pet it$_1$."

b. Jeder Bauer, der Maria [einen Esel]$_1$ zeigt, erlaubt nur
every farmer who Mary [a donkey]$_1$ shows allows only
Peter ihn$_1$ zu streicheln.
Peter it$_1$ to pet
"Every farmer who shows Mary [a donkey]$_1$ allows only Peter to pet it$_1$."

Additionally, there should be some wiggling room with regard to the value assigned to the bound pronoun in order to allow for the proportion problem. Ideally, we should be able to predict both, symmetric and asymmetric readings. This picture is quite complex and touches on several other topics, so the successful approach should be able to integrate well with current approaches to intervention, question formation, and quantification in general. Ideally, it

also interacts well with what we know about polarity items.

The approaches discussed above are not all equally well suited as a starting point for this endeavour. The singleton approaches have no mechanism to predict any kind of intervention effects and adding one would run counter to what these approaches try to achieve. The choice function accounts already need to stipulate several constraints without being able to justify them, but also lack a way to make the scope taking behaviour sensitive to intervention effects while not making pronoun binding sensitive to it as well.

The approaches that seem best as a starting point are the ones relying on alternativs semantics. Using alternatives has the advantage that we have a reason to assume intervention effects. Additionally, we can predict that things that are sensitive to intervention effects do not automatically cause them themselves, as we can see in question formation. While focus sensitive elements like "only" cause intervention effects in the association between Q and a wh-item, Q does not cause intervention effects in focus association. One problem that an approach relying on alternatives would face is that the current way of modeling (non-)intervention is not sufficient to predict the empirical picture. If we assume - staying in the framework of Rooth (1992) and Beck (2006) - that an alternative evaluating operator is either selective (does not cause intervention effects) or unselective (causes intervention effects), we cannot predict that indefinites cause intervention effects in questions, but do not disturb focus association. The second Problem is binding, especially in donkey constructions. The operator evaluating the alternatives would need to be able to reach into the expanded alternatives in order to be able to map the pronoun to the entity that the alternative in question uses to replace the source of alternatives. This is somewhere between difficult and impossible, if we assume that the entirety of the indefinite is the source of alternatives. Additionally, the operator evaluating the alternatives should also be able to use a binding mechanism that is not based on alternatives, in order to not make binding sensitive to intervention effects as well.

Chapter 3

Proposal

3.1 Introduction

The goal of this chapter will be to outline an approach that correctly predicts the scope taking behaviour of indefinites and their sensitivity to intervention effects. The approach should ideally predict all of the phenomena discussed in the last chapter without positing any machinery that is specific to these phenomena. I will start by establishing a framework for focus interpretation in section 2, or rather by introducing the framework established in Beck (2006), which I will use.

In section 3, I will establish the basic mechanism by which indefinites take scope by introducing a focus evaluating closure operator and providing the internal makeup of indefinites. This will allow us to predict that critical interveners restrict the scope of indefinites. After that, I will complete the framework by establishing a binding mechanism that allows indefinites to bind pronouns. Since the binding mechanism will rely on a specific notion of contextual domains, I will finish the section by explaining the notion of contextual domains as used in this approach.

In section 4, I will use the elements established in sections 2 and 3 and integrate quantifiers into the framework. The rest of the section will be devoted to showing how this framework predicts the non-donkey related phenomena we encountered in chapter 2.

Section 5 will then go on to show how the framework predicts the behaviour of donkey constructions, including a first stab at proportion problem examples. To capture the entire range of donkey constructions, I will have to introduce an additional closure operator, universal closure, which will not be focus sensitive, and define the conditions that license the use of that operator.

The last section will be used to wrap up the chapter, going over the assumptions made during the chapter and collecting the phenomena the framework predicts.

3.2 Distinguished Variables

Since I am going to analyze intervention effects as focus intervention effects in the style of Beck (2006), I am going to use the framework established therein. This framework builds on Wold (1996)'s implementation of Kratzer (1991)'s version of Rooth (1985, 1992)'s approach to focus interpretation. This framework uses the familiar variable assignment function g and a distinguished variable assignment function h. A logical form α in this framework has an ordinary semantic interpretation $[\![\alpha]\!]^{g}$, as well as a focus semantic interpretation $[\![\alpha]\!]^{g,h}$. Focus features are indexed and act as distinguished variables. A focused constituent has the focus semantic interpretation that the distinguished variable assignment function h assigns to the distinguished variable, while the ordinary semantic value is the interpretation that we would get without the focus feature.

(1) $[\![\text{Peter}_{F1}]\!]^{g,h}$=h(1) if 1$\in$dom(h),
$[\![\text{Peter}_{F1}]\!]^{g,h}$=Peter otherwise

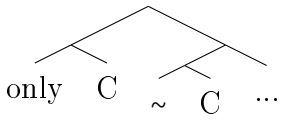
This now requires an updated version of function application:

(2) Function Application:
If $\alpha = [\beta\ \gamma]$ then for any g,h:
$[\![\alpha]\!]^{g}=[\![\beta]\!]^{g}([\![\gamma]\!]^{g})$ and $[\![\alpha]\!]^{g,h}=[\![\beta]\!]^{g,h}([\![\gamma]\!]^{g,h})$

Focus evaluating operators bind distinguished variables. Rooth's ~-operator presuppositionally restricts some constant C to the set of alternatives created by the focus.

(3) $[\![\sim]\!]$
Let D_h be the set of all total distinguished variable assignments and let α be [~ C β] , then for any g,h:
$[\![\alpha]\!]^{g,h}$ only defined if $g(C) \subseteq \{[\![\beta]\!]^{g,h} \mid h \in D_h\}$. Then:
$[\![\alpha]\!]^{g,h} = [\![\beta]\!]^{g}$

Focus sensitive elements like "only" always have such a focus constant in their restrictor and their sister node always has one daughter that is [~ C]:

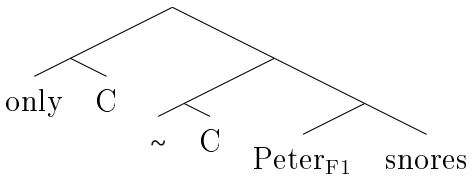


A (first) lexicon entry for "only" could now look like this:

(4) $[\![only]\!]$ (non-final)=
$\lambda C_{<<s,t>,t>}.\lambda P_{<s,t>}.\lambda w.\ \forall P'[P' \in C \ \& \ P'(w) \rightarrow P'=P]$

These tools will be all that we need for now. Let us have a look at a small example:

(5) Only Peter snores.



(6) $[\![$[only C] [[~ C] Peter$_{F1}$ snores]$]\!]^{g}(w)=1$ iff
$[\![only]\!]^{g}$ (g(C))(λw.Peter snores in w)(w)=1 iff
$\forall P[P \in g(C) \ \& \ P(w) \rightarrow P=\lambda w.$Peter snores in w]

Presupposition:
$g(C) \subseteq \{[\![$Peter$_{F1}$ snores$]\!]^{g,h} \mid h \in D_h\}$ =

$$g(C) \subseteq \{\lambda w.h(1) \text{ snores in } w \mid h \in D_h\}$$
$$\forall P[P \in \{\lambda w.h(1) \text{ snores in } w \mid h \in D_h\} \& P(w) \rightarrow P = \lambda w.\text{Peter snores in } w]$$

In this framework, ~ causes intervention effects by deleting the distinguished variable assignment function h after restricting C to the set of alternatives. Any operator above ~ that tries to access the distinguished variable of a focus feature below ~ will do so by manipulating h, which fails, as ~ discards h. This effectively disrupts any kind of focus association across ~, leading to uninterpretability.

3.3 Indefinites

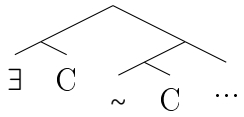
Having established a basic framework for alternative semantics in the form of a distinguished variable approach, we can now start to transfer the concepts of Shimoyama (2001), Kratzer and Shimoyama (2002), and Shimoyama (2006) into this framework. As a starting point, I will assume that the indefinite is a source for alternatives and that the scope taking mechanism employed is a form of existential closure over alternatives. For the purposes of the discussion at hand, I will assume that the alternatives are generated by what is essentially covert focus. This is supposed to mean that what I mark as focused is a source of alternatives. I do not have an opinion on whether this actually is a bona fide focus feature or another mechanism. What I do claim, is that this mechanism is, with regard to the topic at hand, functionally identical to a focus feature and interacts with mechanisms that employ focus. I will follow the existing approaches in assuming that indefinites are at least very close relatives of wh-items.

3.3.1 Taking Scope

The first step for this approach is to establish a scope-taking mechanisms for indefinites. The first approximation to this will be a simple existential closure operator that quantifies over alternatives.

The approach in Kratzer and Shimoyama (2002) does not assign an ordinary semantic value to indefinites, but instead has them denote the set of alterna-

tives, which works well, since they use a Hamblin-style framework. For the framework employed here, this will not suffice[1]. I will assume that the alternative semantic value stays the same - the set of alternative entities that the indefinite can denote - but for the ordinary semantic value, I will assume a specific entity from that set that is made salient in the context. So essentially, I will treat an indefinite like a definite description carrying focus. If we take existential closure (∃) as a focus evaluating operator, we would assume that it has what Rooth (1996) dubbed a "complex subcategorization frame", requiring a ~ operator in its immediate scope. This operator (repeated below) presuppositionally restricts a context variable C, which in turn serves as the domain of quantification.



(7) $[\![\sim]\!]$
Let D_h be the set of all total distinguished variable assignments and let α be [~ C β] , then for any g,h:
$[\![\alpha]\!]^{g,h}$ only defined if $g(C) \subseteq \{[\![\beta]\!]^{g,h} \mid h \in D_h\}$. Then:
$[\![\alpha]\!]^{g,h} = [\![\beta]\!]^{g}$

Having this in place, we can assume a very simple lexicon entry for ∃:

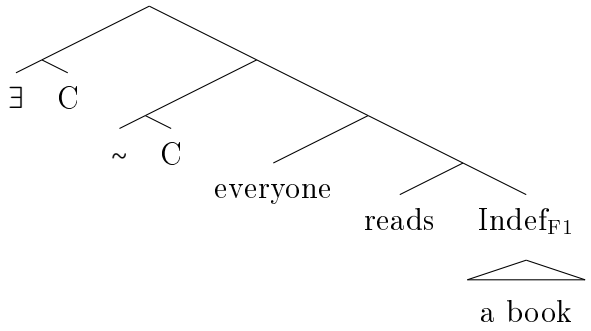
(8) $[\![\exists]\!]$ (non-final version)=
$\lambda p_{<<s,t>,t>}.\lambda q_{<s,t>}.\lambda w_{<s>}.\ \exists p'[p' \in p \ \& p'(w)]$

This has several problems and will be revised further down the line. One of these is that λq currently takes an argument, but then discards it entirely. We could fix this by conjoining "p'=q" to the formula, but since this will be revised anyway, I will ignore the problem for now. With these tools in hand,

[1] For the same reason, I will not use Shimoyama (2001)'s analysis of *-ka* for the ∃-operator. In a Hamblin-style framework, Shimoyama's OP-indexing (Shimoyama 2001[p.42]) existentially closes alternatives, which would correctly predict intervention effects, but in this framework, we will need access to the ordinary semantic value of the indefinite. This cannot easily be done by quantifying over assignment functions. This will be discussed in more detail in section 3.4.2.

we can model a simple example. We are interested in the wide scope reading of (9).

(9) Everyone reads a book.
Reading: There is some book x, such that everyone reads x.



The presupposition created by ~ is then this:

(10) $g(C) \subseteq \{\lambda w.\forall x[x \text{ reads } h(1)] \text{ in } w \mid h \in D_h\}$

If we now apply existential closure to this, we get the expected proposition.

(11) $\lambda w.\ \exists p'[p' \in g(C) \ \&\ p'(w)] =$
$\lambda w.\ \exists p'[p' \in \{\lambda w'.\forall x[x \text{ reads } h(1)] \text{ in } w' \mid h \in D_h\} \ \&\ p'(w)]$

So there is a book for which it is true that everyone read it. This works well, is not sensitive to islands, but crashes when there is an intervening focus sensitive operator. This is, of course, a bit of a naive view and as mentioned above, there are several problems, which I will address in the following sections.

The Internal Structure of an Indefinite

The second step for this approach is to establish what the actual indefinite, the source of alternatives, looks like. In this section, I will propose a first approximation that will be developed through the course of this chapter.

As mentioned above, we currently lack an ordinary semantic value for the indefinite. We followed Shimoyama (2006)[p.150] in assuming that the alternative semantic value of the indefinite is the set of definite descriptions of each alternative. If we want the ordinary semantic value of the indefinite to be

one of these alternatives, we could assume that the indefinite is, as mentioned above, actually just a focused definite description. This is far less of an assumption than one would think at first. First, this is more or less what Romero and Novel (2013) proposed as a solution to Shan (2004)'s second problem. Second, this line of approach builds on the assumption that indefinites are closely related to wh-items, which have also been treated as definite descriptions in several approaches.

Rullmann and Beck (1998a), for example, argued that which-phrases are essentially definite descriptions. Their argument builds on the presuppositional behaviour of which-phrases and has the advantage of avoiding the Donald Duck Problem (Reinhart 1997, 1992), which is relevant for wh-questions as well:

(12) a. Which linguist read every book by which philosopher?

b. For which x,y: x is a linguist who read every z such that y is a philosopher and z is a book by y.

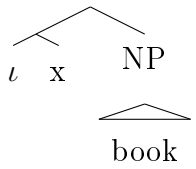
c. $\lambda p.\exists x \exists y[p(w) \ \& \ p=\lambda w'.\ linguist(w')(x) \ \& \ \forall z[philosopher(w')(y) \ \& \ book(w')(z,y) \rightarrow read(w')(x,z)]$
(Rullmann and Beck 1998a, p.221)

If William is a linguist and Donald Duck is not a philosopher, "William read every book by Donald Duck" is in the set of possible answers. The semantics for which-phrases proposed in Rullmann and Beck (1998a) avoids this problem by making the which-phrase a definite description. Their semantics for (12) would look like (13):

(13) $\lambda p.\exists x \exists y[p(w) \ \& \ p=\lambda w'.\forall z[book(w')(z,the(\lambda y'.philosopher(w')(y') \ \& \ y' =y)) \rightarrow read(w')(the(\lambda x'.linguist(w')(x') \ \& \ x'=x),z)]$

So assuming the indefinite as a focused definite description is very similar to the proposal made in Rullmann and Beck (1998a). The observant reader will have noticed that their lexicon entry for wh-items also contains an entity variable that the definite is identical to. This comes in very handy, as it solves several problems that we currently have.

The first problem that is solved by this is that of the ordinary semantic value of the indefinite. It can now be the entity that this variable denotes. Let us for now assume that this entity is supplied by or added to the context. So an indefinite like "a book" would now look like this:



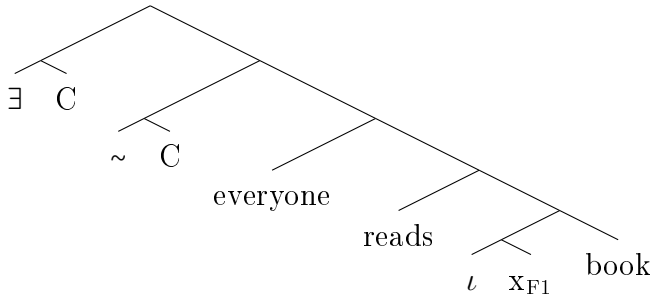
For ι, we can assume the following lexicon entry:

(14) $[\![\iota]\!]$ (non-final version) =
$\lambda x.\lambda f_{<e,t>}$:$\exists!y[f(y)$ & $y{=}x]$. The unique y such that f(y) & x=y

The second problem is that we currently do not know, which compositional componen of the indefinite is the alternative trigger. If we assume focus on this variable, the set of alternatives becomes the set of entities that the indefinite could denote, which is what we wanted and what is assumed in Shimoyama (2006). It should also be noted that this in a way replicates Jäger (2007)'s partial variables. We now have a set of entites with the same presupposition that a partial variable would have, so this set would be the set of possible values that could be assigned to the partial variable. Additionally, this set would also be the contextual domain of the indefinite, which would integrate well with Chierchia (2006, 2013)'s domain alternatives.

A third problem that would be solved by this is that simply assuming that the whole definite description carries focus would create problematic presuppositions. If we assume that "a book" is a focused version of "the book", we would still presuppose that there is exactly one book (the focus alternatives being for example "the magazine", "the table", etc.). If we assume this variable and put focus on that, we only presuppose that there is exactly one book that is identical to that variable, which is unproblematic, but still enough to avoid the Donald Duck problem as well as Shan's problem. If we now apply this to the example above, we get the following:

(15) Everyone reads a book.



ι creates the following presupposition:

(16) $\exists!y[book(y) \& y=[\![x_{F1}]\!]^{g,h}]$

The presupposition created by ~ is then this:

(17) $g(C) \subseteq \{\lambda w.\forall z[z \text{ reads the unique } y{:}book(y) \& h(1)=y] \text{ in } w \mid h \in D_h\}$

If we now apply existential closure to this, we again get the expected proposition.

(18) $\lambda w.\exists p'[p' \in g(C) \& p'(w)] =$
$\lambda w.\exists p'[p' \in \{\lambda w'.\forall z[z \text{ reads the unique } y{:}book(y) \& h(1)=y] \text{ in } w' \mid h \in D_h\} \& p'(w)]$

Predicting Intervention Effects

Having established rough versions of the central pieces we need, we can now predict the first batch of intervention effects.

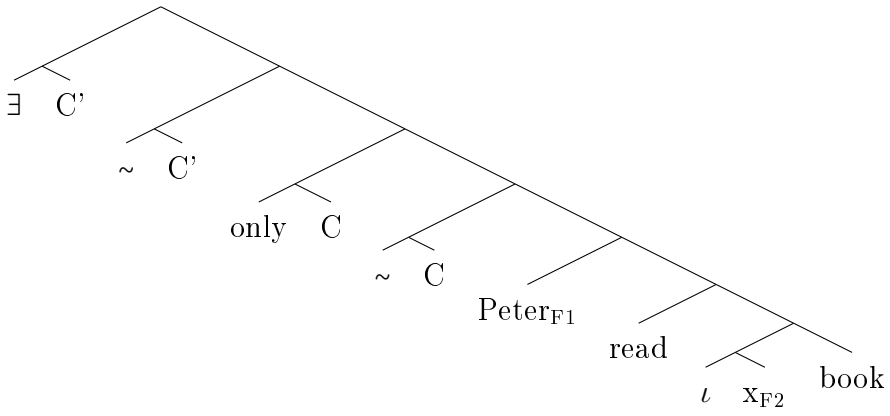
Up to this point, the approach presented here does not differ from what is assumed in Shimoyama (2006). It allows for island-free scope and gives us an angle to correctly predict that focus sensitive operators like "only" restrict the scope of indefinites.

(19) Only Peter read a book.

a. Unavailable: $\exists y[book(y) \& \forall x[x \text{ read } y \rightarrow x=Peter]]$

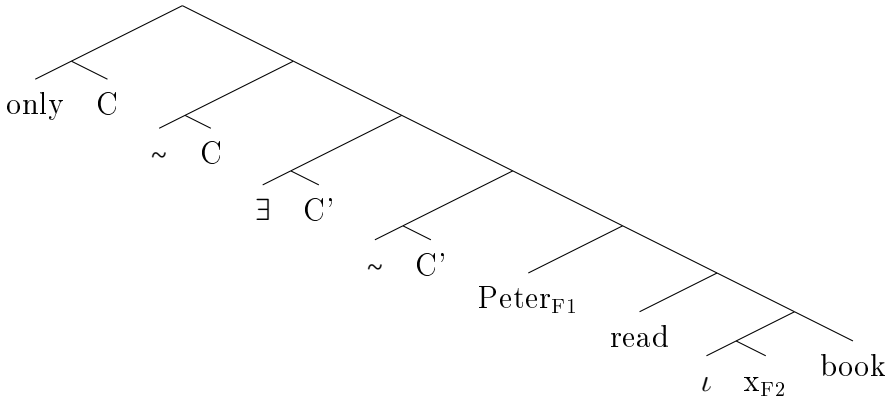
b. Available: $\forall x[\exists y[book(y) \& x \text{ read } y] \rightarrow x=Peter]$

LF a.

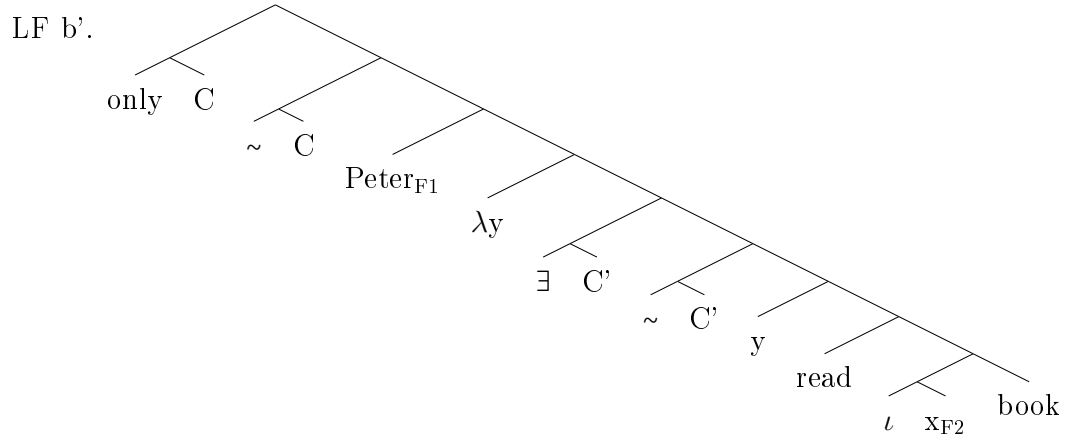


The LF above, which generates the reading for (19-a.), fails. The ~ attached to "only" unselectively evaluates all foci in its scope and then resets the distinguished variable assignment function, making it impossible for the ~ attached to ∃ to access the alternatives generated within the indefinite. There is a problem, though. If we attach ∃ below "only", we get the following LF:

LF b.



This is essentially the same intervention structure, only this time, [∃ ~ C] is the intervener and makes it impossible for the ~ attached to "only" to access the alternatives. This problem will disappear in the next chapter, but as a temporary fix, let us assume that "Peter" moves and joins "only".



The presupposition created by the lower ~, attached to ∃, is as follows:

(20) g(C')⊆{λw.y reads the unique x such that book(x) in w & h(2)=x in w | h∈D_h}

This makes (21-a.) the denotation of the sister node of [~ C], attached to "only", and (21-b.) the presupposition introduced by ~:

(21) a. λw'.∃p[p∈{λw. Peter reads the unique x such that book(x) in w & h(2)=x in w | h∈D_h} & p(w')]

b. g(C)⊆{λw'.∃p[p∈{λw. h'(1) reads the unique x such that book(x) in w & h(2)=x in w | h∈D_h} & p(w')] | h'∈D_h}

Applying "only" to this would then yield the result in (22):

(22) λw".∀p'[p'(w") & p'∈{λw'.∃p[p∈{λw. h'(1) reads the unique x such that book(x) in w & h(2)=x in w| h∈D_h} & p(w')]| h'∈D_h} → p'=λw'. ∃p[p∈{λw. Peter reads the unique x such that book(x) in w & h(2)=x in w| h∈D_h} & p(w')]

Or to put it in prose: "The only true scenarios in which there is a book that someone read are the ones in which Peter read the book."

So we can now produce the available reading and correctly predict that the unavailable reading cannot be produced. Our movement fix is problematic, as it cannot handle examples in which the focused item targeted by "only" is embedded in another clause or otherwise unable to move above ∃.

Entity or Intervener

The approach now correctly predicts the first batch of intervention effects, but there are several reasons to assume that existential closure is not the only option available. In this section, we will discuss some of these reasons and establish one other mechanism that seems to be available, namely treating the indefinite as a specific entity.

An indefinite can be used to refer to a specific entity that is known to the speaker, but not the hearer or whose specific identity is irrelevant for the conversation. This cases behave for all intents and purposes like proper names: They always take widest scope and they neither cause intervention effects nor are they affected by them. These readings are nigh indistinguishable from wide scope readings of a quantificational indefinite, but can be made visible as illustrated by an example from Heim (1991):

(23) Ein Student von mir hat promoviert. Das hätte ich nie für
a student of mine has graduated. that have I never for
möglich gehalten.
possible assumed
"A student of mine got his PhD. I would never have expected that."
(Heim 1991[p.517])

a. "There is a student of mine that got his PhD. I would never have expected that there is a student of mine that would get his PhD."

b. "Franz got his PhD. I would never have expected that Franz would get his PhD."

Reading (23-a.) is the quantificational reading of the indefinite. But since the context given in Heim (1991) is that these sentences are uttered by some "Barbara", it seems save to assume that (23-a.) is not the prominent reading. The reading in (23-b.) is one, where the indefinite denotes a specific entity known to the speaker. Now consider (24):

(24) Nur Maria denkt, dass ein Student von mir promovieren wird.
only Mary thinks that a student of mine graduate will.
Das hätte ich nie für möglich gehalten.
that have I never for possible assumed

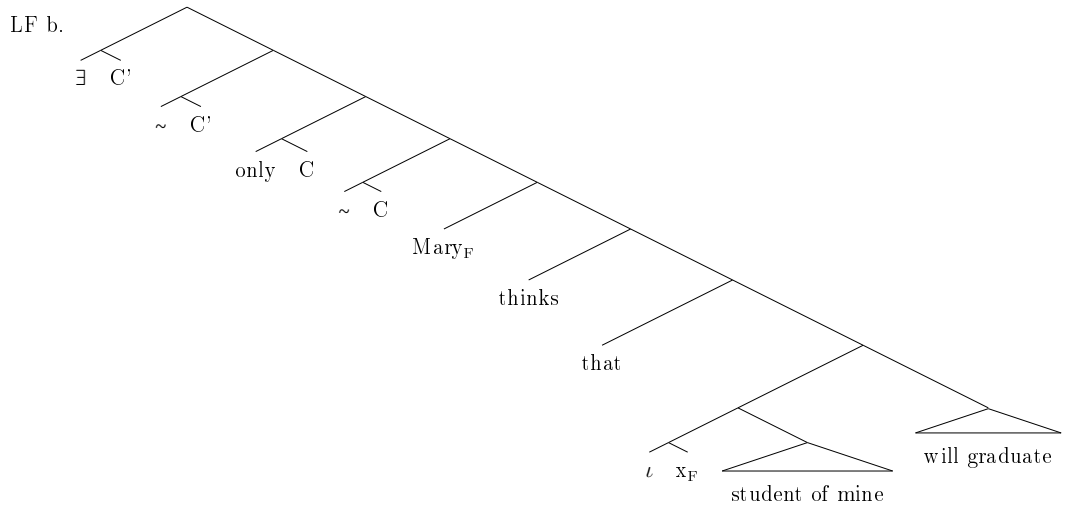
"Only Mary thinks that a student of mine will get his PhD. I would never have expected that."

a. "Only Mary thinks that there is a student of mine that will get his PhD. I would never have expected that only Mary thinks that there is a student of mine that will get his PhD."

b. *"There is a student of mine of whom only Mary thinks that he will get his PhD. I would never have expected that there is a student of mine of whom only Mary thinks that he will get his PhD."

c. "Only Mary thinks that Franz will get his PhD. I would never have expected that only Mary thinks that Franz will get his PhD."

With the critical intervener "only" in place, there are now two scope options for a quantificational/non-specific indefinite: Below "only", as in (24-a.), and above, as in (24-b.). Reading (24-b.) is not available, while the specific reading (24-c.) still is. (24-b.) would have the LF below, which is an intervention structure.



(24-c.) is the specific or entity reading, as I will call it. These readings are not the focus of discussion in this work. I will assume that they are always available[2], but a different phenomenon. In these cases, there are several pos-

[2]Except under certain circumstances, for example with relational nouns or verbs of creation, as pointed out to me by Sigrid Beck(p.c.):

(i) a. Only Peter has a brother.

sible reasons why an indefinite instead of a proper name is used: The name could be irrelevant for the conversation, it could be someone the hearer does not know, or it could simply be to protect Franz. The result is that these readings have an existential flavour, as the hearer is left with only the information that there is someone that fits the bill. As the entity reading is not affected by intervention effects and always takes widest scope, or rather: is scopeless, I will assume that in these cases, the indefinite does not carry focus. This aligns with their behaviour with regard to causing intervention effects for other elements.

As noted in Beck (1996a) and Mayr (2014), among others, indefinites are critical interveners in wh-questions, but only if they are interpreted as quantificational. If they are instead interpreted as referring to a specific entity, the effect vanishes. In (25), there is a pair list reading available, as long as I am talking about a specific colleague. If this is not the case, the reading vanishes and the lower wh-item has to be interpreted as an indefinite.

(25) Ich will wissen, was ein Kollege wem schenkt.
I want know what a colleague who gifts.
"I want to know which gift a (specific) colleague gives to whom."

That indefinites act as critical interveners for wh-questions is something that we already correctly predict. To be more precise, we predict that existential closure acts as a critical intervener. Consider (26):

(26) Context: We are playing a game, where each player gets a card with another players name on it, which they need to find.

Jeder will wissen, wo ein Spieler wann ist.
everyone wants know where a player when is.
"Everyone wants to know where a player when is."

a. ∀x[∃y[x wants to know where y is at which time]]

b. ∃y[∀x[x wants to know where y is at which time]]

≠ Günther is only brother to Peter.

b. Only Peter paints a painting.
≠ "Child on Stairs" is only painted by Peter.

c. *∀x[x wants to know place a and time b such that ∃y[y is in a at b]]

As expected, (26-a.) and (26-b.) work fine (for (26-b.), we can assume a context in which all players drew the same card), since existential closure is not in a position to cause an intervention effect. In (26-c.), however, it is and we get an intervention effect. It is, however, hard to differentiate between widest scope existential closure and the entity interpretation. The difference becomes visible in the presence of a strong intervener, as indefinites seem to be able to outscope strong interveners, only if they are interpreted as specific entities. Consider (27):

(27) Jeder denkt, dass nur Peter ein Buch gelesen hat.
everyone thinks that only Peter a book read has
"Everyone thinks that only Peter read a book."

a. ∀x[x thinks that Peter is the only y such that ∃z[book(z) & y read z]]
b. ∃z[book(z) & ∀x[x thinks that Peter is the only y such that y read z]]
c. *∀x[∃z[book(z) & x thinks that Peter is the only y such that y read z]]

In this sentence, the preferred reading is the one in (27-a.), but (27-b.) is also available. The intermediate reading in (27-c.), however, is not available. This is what we would expect if the indefinite is either dealt with via existential closure, which is sensitive to intervention effects and creates intervention effects as well, or treated as an entity, which would make it entirely scopeless. If we embed the example in (26) under such a strong intervener, we can get an intermediate reading below "only", but above "every":

(28) Context: We are playing a different game and Peter misunderstood the rules.

Nur Peter denkt, dass jeder wissen will, wo ein Spieler
only peter thinks that everyone know wants where a player
wann ist.
when is.

"Only Peter thinks that everyone wants to know where a player when is."

a. Peter is the only z such that z thinks that ∀x[∃y[x wants to know where y is at which time]]
b. Peter is the only z such that z thinks that ∃y[∀x[x wants to know where y is at which time]]
c. *Peter is the only z such that z thinks that ∀x[x wants to know place a and time b such that ∃y[y is in a at b]]
d. ∃y[Peter is the only z such that z thinks that ∀x[x wants to know where y is at which time]]

Since intermediate readings without the intervention effect are available, we cannot chalk this up to an entity reading. But the entity reading in (28-d.) is available as well. So essentially, we need the option to use existential closure, as well as the option to interpret the indefinite as a specific entity.

Our approach is currently well equipped to handle this. An indefinite contains a free variable that is covertly focused, creating alternatives that are evaluated by existential closure. The variable itself is then taken as a new entity in the context that can be referred to. If we interpret the indefinite as an entity available in the context instead of a focused variable, the indefinite refers to a specific entity and no closure is required. So we have two options: Either the variable refers to a specific entity, or it carries focus. One of the two is always the case, but never both.

3.3.2 Binding Mechanism

At this point, the approach allows for scope without movement, predicts intervention effects and accounts for entity readings. This section will deal with the binding mechanism employed by indefinites. I will start by outlining, which properties this mechanism will need to have.

As mentioned in the preceding chapter, the utility of this approach depends heavily on how binding is implemented. Indefinites, like regular quantifiers, can bind pronouns within their scope as in (29-a.), but also in donkey con-

structions, as in (29-b.).

(29) a. [A friend]$_1$ showed me her$_1$ car.
b. A friend, who showed me [a car]$_1$, likes it$_1$.

We could, as a default, assume, that the indefinite comes with a λ-binder, as we would with regular quantifiers. But since the indefinite does not move and is not a quantifier, we have no easy reason to assume this binder. Additionally, this will not work for donkey constructions, as the donkey pronoun is not in the scope of the indefinite.

Alternatively, we could assume that, since the indefinite is of type <e>, the pronoun simply refers to the salient entity created by the indefinite. This has two problems. First, this would not predict that donkey constructions are sensitive to intervention effects. For entity and pronoun to corefer, it does not really matter, where in the structure the entity is "created". The second problem is the proportion problem: If the indefinite and the pronoun refer to the same entity in each alternative, we cannot generate asymmetric redings. So in (30), every single coin owned by a man would need to end up in the meter.

(30) If a man has [a quarter]$_1$, he puts it$_1$ in the meter.

Another way would be to assume that pronoun and indefinite both carry the same focus, so in each alternative, pronoun and indefinite are the same entity. Apart from running into the proportion problem for the exact same reasons as above, this also has the disadvantage of incorrectly predicting that a critical intervener above the pronoun would interrupt donkey constructions, which would make (31-a.) ungrammatical. It would also predict that binding a pronoun across a critical intervener, as in (31-b.), would not work.

(31) a. A friend, who owns [a car]$_1$, told only me that she likes it$_1$.
b. [A friend]$_1$ told only me that she$_1$ bought a car.

The binding mechanism that we want should not rely on alternatives, but still be able to bind a pronoun to an entity that is part of an alternative. To be

more precise, it should be able to bind a pronoun to an entity that is in the same set as an entity that is part of an alternative, if we want to allow for asymmetric readings. To be able to do this, we will need to bind at a point in the structure that has access to the set of alternatives as well as the pronoun. That point should be close to existential closure in order to allow us to correctly predict that critical interveners interrupt donkey constructions.

We can do these things by assuming that existential closure comes with a λ-binder. Conceptually, this is less problematic than attaching the binder to the indefinite, as it is not entirely unexpected that a quantificational element has a binder. It is, however, conceptually unattractive to assume that existential closure is somehow aware of whether there is a pronoun that needs to be bound and create a binder only if needed. It is similarly unattractive to assume that the binder is always there, but binds nothing, if there is no pronoun, i.e. empty binding.

If we look at other quantifiers, the binder is usually used to bind the trace of the quantified phrase, binding other variables that might be there as well. Analogously, we would want the binder that we attach to existential closure to bind something in the indefinite as well. To be able to deal with the proportion problem, that thing should not be the entity denoted by the indefinite. If we do that, indefinite and pronoun need to refer to the same entity in each case, making asymmetric readings impossible.

What Gets Bound is the Domain

To implement a binding mechanism, the first thing we need is the thing that gets bound. In this section, I will propose a more refined version of what an indefinite looks like, which includes a bindable element.

Currently, indefinites are - apart from the focus on the entity variable - identical to definite descriptions. Definite descriptions can have interpretations, that are what we would expect from bound variables. They can be bound by quantifiers c-commanding them (as noted in Wilson 1984, 1991; Heim 1991; Neale 2004; Elbourne 2001; Elbourne 2005 (via Elbourne 2013)) as in (32-a.)

and can take the place of the pronoun in a donkey construction as well (as noted in Strawson 1961; Heim 1982, 1991; Elbourne 2001; Elbourne 2005 (via Elbourne 2013)) as in (32-b.).

(32) a. Every student was accompanied by someone who knows the student.
b. Every student who read a book liked the book.

Another thing that quantifiers can bind are the domains of other quantifiers, as noted for example in Heim (1991) and von Fintel (1994). Assume a group of three students, all of which are going to a different course. If each of them did all the assignments that they got in their respective course, we can truthfully say the sentence in (33).

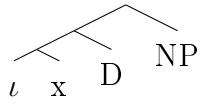
(33) Every student did every assignment.

This, too, can be done in a donkey construction. Assume the same scenario as above. The sentence in (34) has a preferred reading, in which the domain of "every assignment" covaries with the students, essentially making the domain of the universal quantifier the donkey pronoun.

(34) If a student got an excellent grade every assignment was good.

That there are bindable elements in the domain restrictions of determiners, be they quantifiers or definite articles, has been argued for in von Fintel (1994), Stanley and Szabó (2000), and Martí (2003, 2006) among others. And that pronouns generally have the semantics of definite descriptions has been argued for in Elbourne (2005) (following Postal 1966) among others. Since we are treating indefinites as definite descriptions, this would result in indefinites, definite descriptions and pronouns having the same internal makeup, the only difference being that the NP is elided in the case of pronouns.[3] This gives us a bindable domain in the indefinite.

[3]There is a discussion to be had about what happens to the entity variable in a pronoun. For the time being, I will simply assume that it gets a salient value from the context. For a more indepth discussion, I would refer the interested reader to Elbourne (2005)[Ch.3].



Since we now have a domain in there as well, we will need to change the lexical entry for ι:

(35) $[\![\iota]\!]$ (final version)=
$\lambda x.\lambda D_{<e,t>}.\lambda f_{<e,t>}$:$\exists!y[f(y)\&D(y)\&y=x]$.The unique y:f(y)&D(y)&x=y

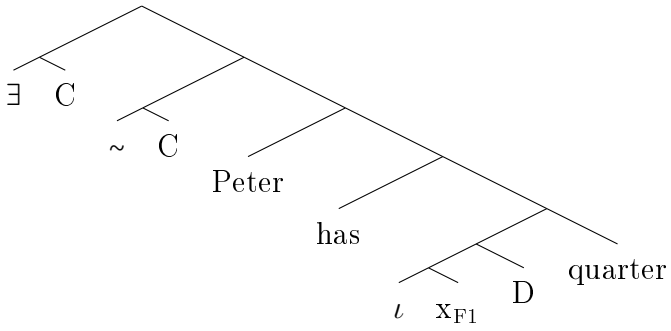
This leads to indefinites, definites and pronouns, all of which can be used in donkey constructions, having the same bindable element, namely a domain variable. Assuming that domains are what gets bound would also help us tremendously with another problem: Let us take another look at the proportion problem example from above:

(36) If a man has [a quarter]$_1$, he puts it$_1$ in the meter.

What we want this to mean is that if there is a man that has at least one quarter, then there is a quarter (in the group of quarters that he has) that he puts in the meter. So basically, we would like to existentially quantify over the domain of quarters that are owned by a single man and map the pronoun to a value from this domain.

This domain is not too far from what our system currently produces. Consider the sentence in (37). We would assume the following LF for that.

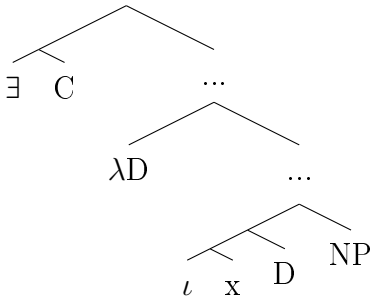
(37) Peter has a quarter.



The set of alternatives generated here, of which C has to be a subset, is this:

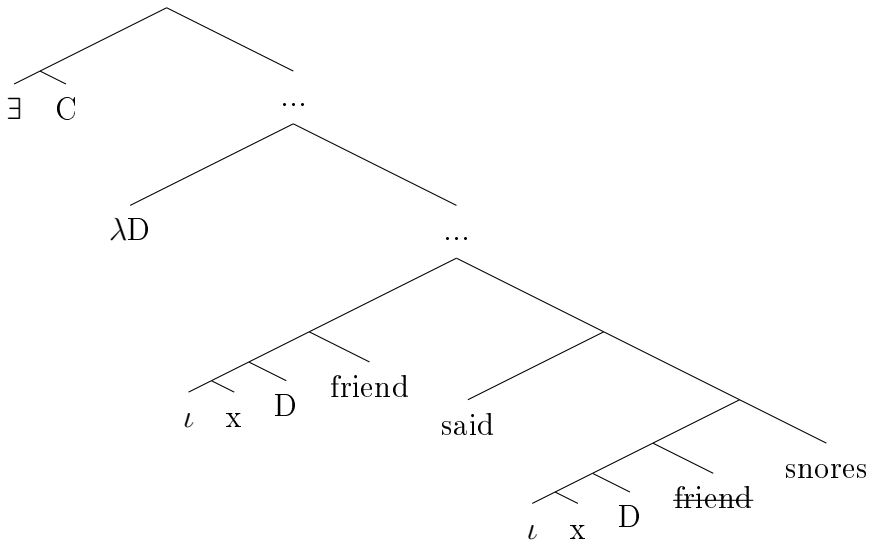
(38) $\{\lambda$w.Peter has ιx[D(x) & quarter(x) & h(1)=x] in w $\mid$ h$\in D_h\}$

This is close to what we want, but not quite there. Conceptually, we would like the set of alternatives to provide us with a set of domains. Let us for the moment assume that we actually knew how to do that. Existential closure binds the domain variable of the indefinite and states that there is an alternative domain in the restrictor that makes the scope true.



With this, we can bind pronouns that are c-commanded by existential closure to the indefinite that gets closed. Let us have a look at an example:

(39) [A friend]$_1$ said that she$_1$ snores.



I am ignoring the focus mechanism for this example and, as I said, will assume that we have a way of getting domains from C. Both, indefinite and pronoun, will get the same interpretation:

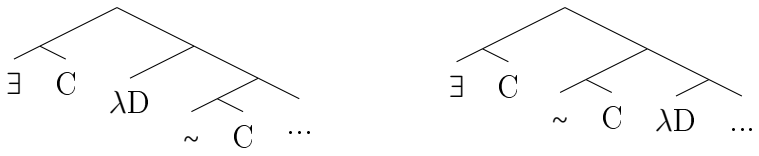
(40) The unique y: D(y) & friend(y) & y=x

The free variable x in the indefinite is made salient in the context, introducing a new discourse referent. This is then picked up by the pronoun as the most salient entity for the free variable. Existential closure now states that there is a domain that contains a fitting entity.

How to Get Domains from Alternatives

The second part of the binding mechanism is the binder. In this section, I will first discuss where this binder might be located and then refine the lexical entry of existential closure so that it can employ the set of alternatives in a way that allows us to bind domain variables.

Before we can figure out how we can get the set of domains from the set of alternatives, we will first need to figure out, what the set of alternatives actually looks like. The first question here would be whether binding happens before, or after the alternatives are evaluated. Both options below are available, the second one is the one we will decide to use.



The first option has the advantage that ~ still operates on propositions and produces a set of alternative propositions. This would be nice from a conceptual point of view, as this is what we have come to expect from ~. The disadvantage is that if C is a set of propositions, we would have to somehow extract the domain alternatives from these propositions in order to be able to existentially quantify over domains.

I will instead use the second option, which would also have an advantage from a conceptual point of view, as it allows us to keep Rooth's complex subcategorization frame. A lexical entry for existential closure that uses this option could look like this:

(41) $[\![\exists]\!]$ (nearly final version)=
$\lambda C_{<<s,t>,t>}.\lambda P_{<<e,t>,<s,t>>}.\lambda w.\ \exists D[\exists P'[P' \in C \ \&\ P'(D)(w)\ \&\ P'=P]]$

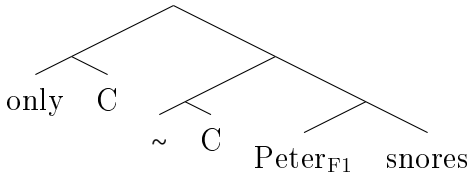
One might argue that this version has the problem that the contribution of focus here does not seem very informative. Existential closure would only say "There is a domain that makes the statement one of the true alternatives.". I would, however, argue that the contribution is sufficient for another reason: $\exists$ looks remarkably similar to the lexical entry we would assume for "only":

(42) $[\![only]\!]$ (non-final version)=
$\lambda C_{<<s,t>,t>}.\lambda P_{<s,t>}.\lambda w.\ \forall P'[P' \in C \ \&\ P'(w) \rightarrow P'=P]$

Apart from the whole domain business, the only difference is the quantificational force. Now if we take a look at the set of alternatives that "only" uses, we can see another striking similarity. In (43), assume that the alternatives to Peter are the men in the context.

(43) Only Peter snores.

a.

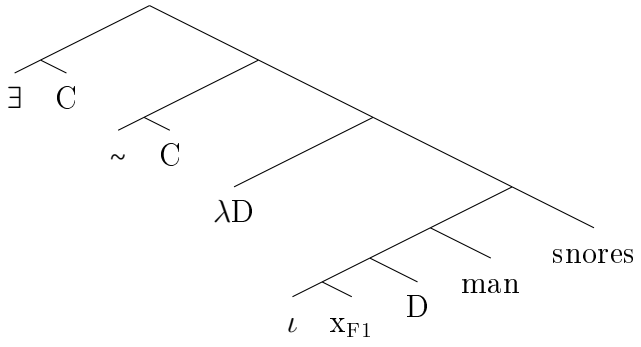


b. $g(C) \subseteq \{\lambda w.h(1)$ snores in $w \mid h \in D_h\}$

If we compare this to (44), we can see that (again, ignoring the whole domain business) the alternatives are identical.

(44) A man snores.

a.



b. $g(C) \subseteq \{\lambda D.\lambda w.\iota x[D(x) \ \& \ man(x) \ \& \ h(1)=x]$ snores in $w \mid h \in D_h\}$

Any alternative in this set that takes as an argument a (sub-)domain of the same domain we assumed for "only" - the men in the context - will yield one of the alternatives that we got in the "only" example. In addition to these similarities, we also know that there is a covert version of "only", namely EXH (see for example Spector 2003, 2007 among many others), and we also know that "only" can bind domains, as noted, for example, in Heim (1991), von Fintel (1994), and Fintel (1995) using the following example:

(45) Only one class was so bad that no student passed the exam.

In the preferred reading, both, "no student", as well as "the exam" are restricted to the context of that class. Martí (2003) convincingly argues that, since this process is subject to weak crossover effects, the context restrictor is or contains a pronominal item, which is bound in examples like the one above. So we would need some form of domain binding for "only" as well. A lexical entry that would achieve that would be (46):

(46) $[\![\text{only}]\!]$ (nearly final version)=
$\lambda C_{<<<e,t>,<s,t>>,t>}.\lambda P_{<<e,t>,<s,t>>}.\lambda w. \ \forall D[\exists P'[P' \in C \ \& \ P'(D)(w)] \rightarrow P'=P]]$

I take the presence of another operator that only differs with regard to its quantificational force from the one I propose as evidence that my proposal is not too outlandish.

What is a Domain

That domain/context restrictors of determiners can be bound is not exactly new: von Fintel (1994) and many others (cf. Stanley 2000, 2002; Stanley and Szabó 2000; Chierchia 1992b; Engdahl 1986; Jacobson 2000; Heim 1990a; Elbourne 2002 (via Martí 2003)) assume that the context restrictor of a quantifier - the thing I call domain - consists of a functional and an argumental variable. In these approaches, the function for the functional variable "will usually be recoverable from the context" (von Fintel 1994[p.156]). We can assume the

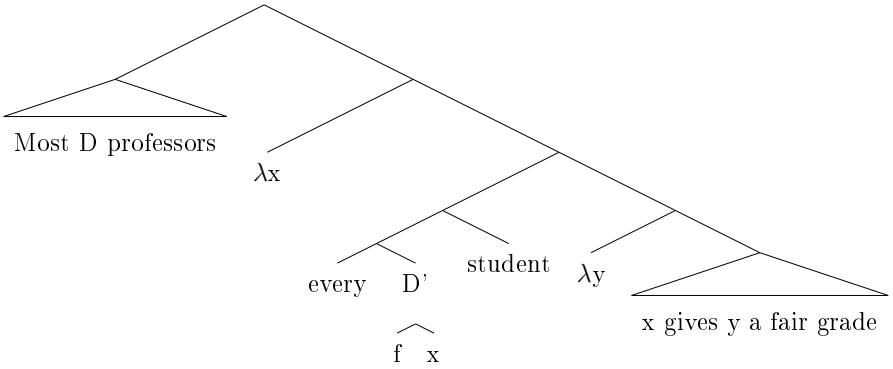
following dummy-function for now:

(47) Functional variable (Dummy):
λx.λy. y is contextually relevant for x

"[T]he argumental variable [...] is a covert pronominal item" (Martí 2003[p.241]), i.e. a variable that can be bound by other elements in the structure. So a domain D consisting of such a functional variable and a bound variable x_1 denotes the set {y: y is contextually relevant for g(1)}.

(48) Die meisten Professorinnen geben jedem Studenten eine faire Note.
the most professors give every student a fair grade
"Most professors give every student a fair grade."

a.



b. For most professors x: x gives every student *that is relevant for x* a fair grade.

I will simplify here and assume that, instead, a quantifier quantifies over and binds domains that contain one "central" entity that has the property denoted by the restrictor of the quantifier and all entities that are contextually relevant when talking about the central entity. So what I call domain is essentially the functional variable applied to the argumental variable.

If a quantifier Q that has in its restrictor the domain D and a property p binds some domain D' of another determiner in its scope, the following needs to hold for D': D' has a central element x, such that D(x) and p(x). The whole of D' then consists of x and all elements that are contextually relevant when talking about x. To describe this relation, I use $D' \leqslant_p D$. In cases where D' is bound by an element that does not have an additional property in its restrictor (which we will need later on for $\exists$), I assume that D and D' share at least one

element, which is the central element of D'. To describe this, I use D'$\preccurlyeq$D.

(49) $\preccurlyeq$:

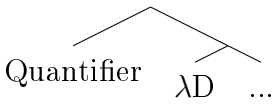
a. $\forall$ D, D': D'$\preccurlyeq$D iff
$\exists$x[D(x) & D'= λy. y is contextually relevant for x]

b. $\forall$ f, D, D': D'$\preccurlyeq_f$D iff
$\exists$x[f(x) & D(x) & D'= λy. y is contextually relevant for x]

This is analogous to the use of situation pronouns (e.g. Elbourne 2013), which are very similar to my notion of domains. In frameworks like Elbourne (2013)'s, situation pronouns are those situation variables that are used with every determiner, but nowhere else. A quantifier with such a domain-situation S^D and an NP denoting the property f quantifies over situations $S^{D'}$ that share a subsituation S^f with S^D: $S^f \leq$(part of) S^D and $S^f \leq S^{D'}$. S^f is a minimal situation, that contains an entity x, such that f(x) holds in S^f.

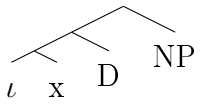
At this point, it is not entirely clear to me, whether these three approaches actually make different predictions, but they are at the very least close conceptual relatives. I use quantification over entire domains for two reasons: The first one is that it allows me to remain non-committal with regard to whether the functional variable can be bound as well. The second one is simplicity: All binding can be domain binding now, as a domain can contain times, worlds, situations, entities, etc..

Since, in my approach, quantifiers now quantify over domains, I will assume that they, just as existential closure does, have a binder for domains.



This, however, leads to the same problem that we discussed for existential closure: What does the domain binder bind, if there is no viable domain variable in the scope to bind? I will use the same solution that we used for existential closure: We already gave indefinites, definite descriptions and pronouns the same structure, so I am going to assume that traces have that same structure

as well:



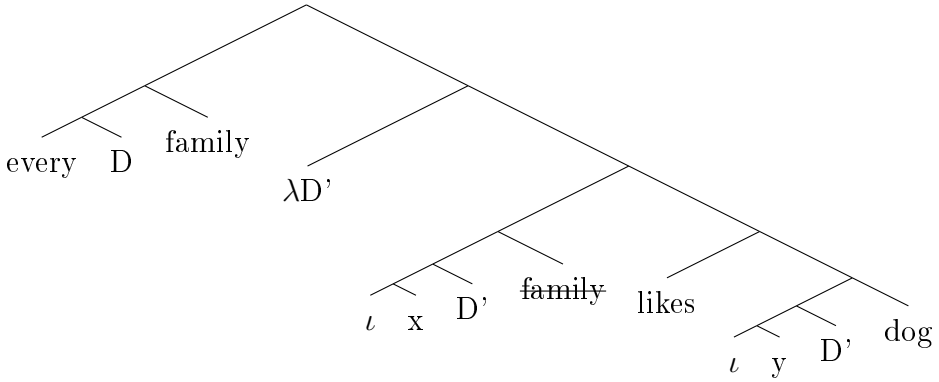
If we do this, we know what the domain binder binds and we do not have to bind entities anymore. This also integrates well with other current approaches to a point where one could argue that what we just did is just adapting the results of these approaches to our current framework. Treating traces as definite descriptions containing a bound variable is essentially, what Fox (2002, 1999)'s trace conversion does. And binding the domain of said trace is pretty much what Fox and Johnson (2016) propose. They do not assume traces as such, but instead, following a copy-approach to movement, assume that the lower copy is a definite description that contains the NP and a bound variable that the definite description has to denote. And similar to Jäger (2007)'s partial variables, or the presupposition of ι in our approach, the variable can only get a value that has the property denoted by the NP.

Since we know that quantifiers have (bindable) domains themselves, the lexicon entry for "every" would look roughly like this:

(50) $[\![\text{every}]\!]$ (non-final version)=
$\lambda D_{<e,t>}.\lambda f_{<e,t>}.\lambda p_{<<e,t>,t>}.\ \forall D'[D' \leqslant_f D \rightarrow p(D')]$

Let us see how this works with an example: Assume some contextual domain D containing at least one family that has a dog.

(51) Every family likes the dog.



The structure above will now produce the following result:

(52) $\forall$D'[D'$\leqslant_{\text{family}}$D $\rightarrow$ ιx[D'(x) & family(x)] likes ιy[D'(y) & dog(y)]]
"Every family y in this context likes the dog x in the context of that family."

Using this mechanism allows us to bind traces, pronouns and domains in a unified way and comes with the bonus that existential closure now looks like any overt quantifier apart from focus evaluation. The next section will erase that difference as well.

3.4 Weak Interveners

We saw that not only focus evaluating operators like "only" cause intervention effects for indefinites, but that there are also what I called "weak interveners", which include basically all quantifiers. In this section, I will attempt to show why they are interveners and why this is mostly not visible in non-donkey environments.

The main part of this section will be spent on intermediate readings in which an indefinite is construed as taking scope over a quantifier. The basic idea is this: Quantifiers can evaluate focus. If they evaluate the focus in an indefinite, the result is that the indefinite denotes the same entity, independent of the quantifier. This entity is then accommodated into the context. The point where this happens is subject to a constraint on presupposition accommodation, as I assume that the presupposition of the ι-operator is what facilitates the introduction of this context referent.

3.4.1 Quantifiers are Focus Evaluating

The first step in understanding the interaction between quantifiers and indefinites is to establish that and how quantifiers evaluate focus and what they do with it. This is what this section will do.

Quantifiers can make use of focus to interpret non-focused material in their scope as part of their restrictor, as discussed in Rooth (1985), von Fintel (1994), and Krifka (1990), among others. Essentially, the idea is that the non-focused material is interpreted as part of the restrictor, while the focused material stays in the scope of the quantifier.

(53) Everyone calls Mary_{F} on her mobile.
”Everyone who calls someone on their mobile, calls Mary.”

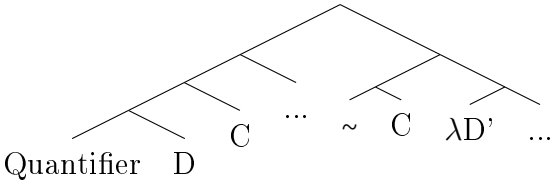
This association is sensitive to intervention by ~.

(54) a. Jeder sagt, dass Maria Grippe_{F} hat.
everyone says that Mary flu has
"Everyone says that Mary has the flu_{F}."
Available:
”Everyone who says that Mary has something, says that she has the flu.”

b. Jeder sagt, dass nur Maria Grippe_{F} hat.
everyone says that only Mary flu has
"Everyone says that only Mary has the flu_{F}."
Unavailable:
”Everyone who says that only Mary has something, says that only she has the flu.”

To allow for quantifiers to associate with focus, I will assume that quantifiers use a device for focus evaluation, ~. The lexical entry of a quantifier will then take the alternatives and use them in the restrictor. The way this is done here is by requiring a true or at least relevant alternative, which restricts the domains bound by the quantifier to ones that make one of the alternatives true. In the example in (53), the alternatives are of the form "calls x on their mobile". So "every" now quantifies over person-domains that are such that

there is an alternative which is true for the person in the domain: The person-domains that contain a person that calls someone.



(55) ⟦every⟧ (final version)=
$\lambda D_{<e,t>}.\lambda C_{<<<e,t>,t>,t>}.\lambda f_{<e,t>}.\lambda p_{<<e,t>,t>}.$
$\forall D'[D' \leqslant_f D \ \& \ \exists p'[p' \in C \ \& \ p'(D')] \rightarrow p(D')]$

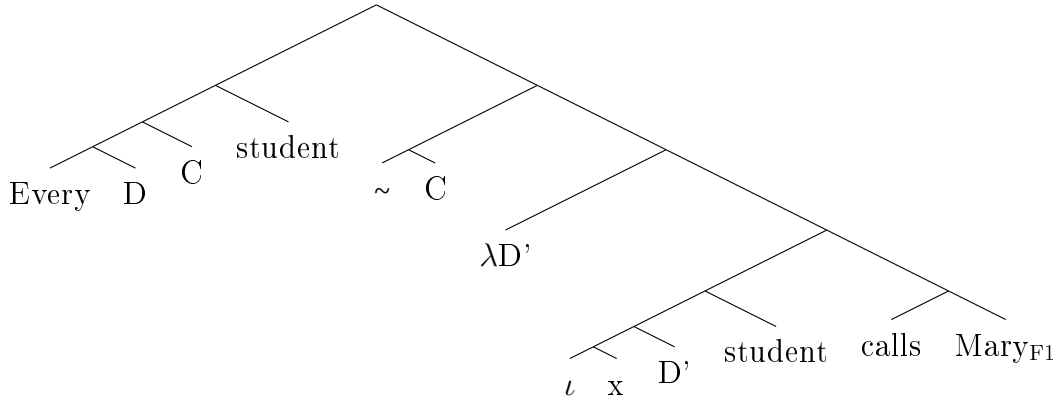
This is a bit of a simplification. A closer approximation would be to say that the domain has to be such that there is an alternative that is *relevant* to the domain. Consider (56):

(56) Everyone in my class read the textbook$_F$

Using the lexical entry above, this would be true if only one person in class read the textbook, provided that noone else read anything. If we instead use a relevance condition, we would say that everyone who was supposed to read something, did so, or any similar contextually relevant condition. As the exact spellout of this condition is not crucial for the discussion at hand, I will continue to use this simplification.

We can now derive the truth conditions we expect:

(57) Every student calls Mary$_{F1}$.
"Every student who calls someone, calls Mary."



The denotation of the sisternode of [~ C] is then this:

(58) λD'. ιx[D'(x) & student(x)] calls Mary

~ then creates the following presupposition for C:

(59) g(C)={λD'.ιx[D'(x) & student(x)] calls h(1) | h$\in D_h$}

If we now apply "every student" to this, we get the following truth conditions:

(60) $\forall$D'[D'$\leqslant_{student}$D&$\exists$p'[p'$\in$g(C)&p'(D')] $\rightarrow$ ιx[D'(x)&student(x)] calls Mary]

"For all domain centered around a student from the current domain: If the student calls an alternative to Mary, the student calls Mary."

This approach to the interaction of quantifiers with focus is very close to what is done in Eckardt (1999) among others. In this approach, quantifiers describe the relation between the cardinality of the focus semantic value of their sister node and the ordinary value of that node. To put it in prose, for the example in (60), "every" says that the amount of students for which there is a true alternative, i.e. students that call someone, is the same as the amount of students, for which the ordinary value holds, i.e. students that call Mary. This approach is, at least conceptually, identical to mine.

Quantifiers and Intervention Effects

In this section, I will show that the intervention behaviour of quantifiers matches what we would predict under the assumptions made in the last section. I will then go on and show that having only a focus sensitive version of a quantifier available will not suffice.

The assumptions in the last section lead to some interesting predictions: We already saw that quantifiers are sensitive to intervention effects with regard to associating with focus, but we would also (correctly) predict that quantifiers cause intervention effects in wh-questions.

(61) Wem hat jeder was gegeben?
whom has everyone what given?
"To which person did everyone give what?"

a. *Which x and y are such that everyone gave x y?

b. For every z: Which x and y are such that z gave x y

For (61), the pair list reading in (61-a.) is absent. The available reading in (61-b.) is generated when the universal quantifier is interpreted as taking scope over the question operator (see Krifka 2001). Additionally, we would expect quantifiers to cause intervention effects in focus association with "only". This seems to happen when there is an overt focus that we want the quantifier to associate with.

(62) Ich habe nur gesagt, dass jeder Maria_{F} aufs Handy_{F} anruft.
I have only said that everyone Mary on mobile calls.
"I only said that everyone calls Mary_{F} on her mobile_{F}."

a. *Mary is the only x of which I claimed that for all y, if y calls x, y calls x on x's mobile.

b. *Mobiles are the only devices x of which I claimed that for all y, if y calls someone on their x, y calls Mary on her x.

If there is only one focus, the quantifier cannot associate with it, since this would leave "only" without a set of alternatives, which would stop it from working. We also cannot get a reading where the quantifier and "only" asso-

ciate with the same focus, as in (63-b.).

(63) Ich habe nur gesagt, dass jeder Maria$_F$ anruft.
I have only said that everyone Mary calls.
"I only said that everyone calls Mary$_F$."

a. Mary is the only x of which I claimed that for all y, y calls x

b. *Mary is the only x of which I claimed that for all y, if y calls someone, y calls x.

We would also expect quantifiers to intervene with each other with regard to focus association. In (64), reading (64-a.) is available, but reading (64-b.) is not. In (64-b.), "noone" associates with focus across the universal quantifier, which does not result in an available reading, since quantifiers presuppose that their restrictor is not the empty set. So the presupposition created here would be that there is at least one person who calls everyone.

(64) Niemand ruft jeden aufs Handy$_F$ an.
Noone calls everyone on mobile up
"Noone calls everyone on their mobile$_F$."

a. $\neg\exists y[\forall x[y \text{ calls } x \rightarrow y \text{ calls } x \text{ on their mobile}]]$

b. $*\neg\exists y[\forall x[x \text{ calls } y] \ \& \ \forall x[x \text{ calls } y \text{ on their mobile}]]$
PSP: There is someone who calls everyone.

Similarly, since existential closure employs ~, we would predict indefinites to cause intervention effects in quantifier focus association:

(65) a. Jeder gibt seine Hausaufgabe bei Peter$_F$ ab.
everyone hands his assignment at Peter in
"Everyone gives his assignment to Peter$_F$."
Available:
"Everyone who gives his assignment to someone, gives it to Peter."

b. Jeder gibt eine Hausaufgabe bei Peter$_F$ ab.
everyone hands an assignment at Peter in
"Everyone gives an assignment to Peter$_F$."
Unavailable:
"Everyone who is such that there is an assignment that he gives to someone, is such that there is an assignment that he gives to

Peter."
Available:
"There is a specific assignment x. Everyone who gives x to someone, gives x to Peter."

In (65-a.), the quantifier can associate with focus on "Peter", but in (65-b.), this does not work, unless we interpret the indefinite as a specific entity. This is what we would currently expect: If we put existential closure in the scope of the universal quantifier, there is no focus left for the quantifier to associate with. If we put existential closure above the universal quantifier, existential closure cannot associate with focus anymore. The available reading in (65-b.) is the one where we interpret the indefinite as a specific entity, which allows us to forgo the use of existential closure.

Since quantifiers cause intervention effects independently of whether they associate with focus themselves, but can also be used when no source of alternatives is in their scope, I will assume the lexicon entry from above (repeated in (66-a.)), as well as the one in (66-b.). (66-a.) is used when there is a source of alternatives in the scope of the quantifier. (66-b.) is used when there is no source of alternatives present.

(66) a. $[\![\text{every}_F]\!] =$
$\lambda D_{<e,t>}.\lambda C_{<<<e,t>,t>,t>}.\lambda f_{<e,t>}.\lambda p_{<<e,t>,t>}.$
$\forall D'[D' \leqslant_f D \ \& \ \exists p'[p' \in C \ \& \ p'(D')] \rightarrow p(D')]$

b. $[\![\text{every}_O]\!] =$
$\lambda D_{<e,t>}.\lambda f_{<e,t>}.\lambda p_{<<e,t>,t>}.$
$\forall D'[D' \leqslant_f D \rightarrow p(D')]$

In order to account for the fact that a quantifier that does not associate with focus itself is no barrier for focus association with "only", as illustreated by (67), I will assume that focus sensitive quantifiers are only licensed when they are not in the scope of an overt focus sensitive item that requires association with overt focus and has not done so yet. This will be extensively discussed in the next chapter.

(67) I only said that everyone likes Peter_{F}.

This makes some interesting prediction that will be discussed later in this chapter, after we had a look at how focus evaluating quantifiers influence intermediate scope readings of indefinites.

3.4.2 Intermediate Readings

Currently, we would predict that intermediate readings, in which an indefinite takes scope between two quantifiers, are not available. Crossing a quantifier should only work, if the indefinite is interpreted as an entity, which would allow for a widest scope reading, but not for an intermediate reading. Schwarzschild (2002)'s approach, as well as the approaches relying on skolemized choice functions, argue that a higher quantifier binds something or other in the indefinite, thereby causing the impression of intermediate scope without actually producing it. I will argue that it is the quantifiers, that enable intermediate scope readings, but that this has nothing to do with binding, but with focus association. Independent of the scope of the indefinite, we will need a process for quantifiers to bind the domain of existential closure anyway. I will start with this and then go on to show why this will not be sufficient to explain intermediate readings and how this approach handles them instead.

Schlenker's Problem

To understand how quantifiers cause intervention effects, but still allow for intermediate scope readings of indefinites embedded below them, we will need one more element, the domain of existential closure. This section will implement this and arrive at the final version of existential closure.

We would like quantifiers to be able to bind something in the indefinite, since we still have to deal with Schlenker (1998)'s problem. In (68), reading c. is unavailable or at least dispreferred. Existential quantification seems to happen below "every", but the set that is quantified over varies from student to student.

(68) Context: Every student in my syntax class has one weak point: John

doesn't understand Case Theory, Mary has problems with Binding Theory, etc. Before the final, I say:

a. "If each student makes progress in a (certain) area, nobody will flunk the exam. "

b. Available:
"There is a certain distribution of fields per student such that if each student makes progress in the field assigned to him/her, nobody will flunk the exam."

c. Unavailable:
"If each student makes progress in at least one area, nobody will flunk the exam."

To show that this is not a reading involving specific entities relative to each student, we extended the example:

(69) Context: Every student in my syntax class has two weak points: John doesn't understand Case Theory and Islands, Mary has problems with Binding Theory and adjuncts, etc. I structured the exam in a way that allows people to still pass, if they have only one weak point. Before the final, I say:

a. "If each student makes progress in a (certain) area, nobody will flunk the exam."

b. Available:
"There is a certain distribution of fields per student such that if each student makes progress in one of the fields assigned to him/her, nobody will flunk the exam."

c. Unavailable:
"If each student makes progress in at least one area, nobody will flunk the exam."

What we would like to happen here is for the domain of existential closure to contain a student and the weak points of the respective student. The first thing we would need for this is a lexical entry for existential closure that actually contains a domain.

(70) $[\![\exists]\!]$ (final version)=
$\lambda D_{<e,t>}.\lambda C_{<<<e,t>,t>,t>}.\lambda P_{<<e,t>,t>}.$
$\exists D'[D' \preccurlyeq D \ \& \ \exists P'[P' \in C \ \& \ P'(D')] \ \& \ P(D')]$

When we defined $\preccurlyeq$, we did so as repeated in (71) and said that if a quantifier Q that has in its restrictor the domain D and an NP denoting some property f binds some domain D', D' has a central element x, such that D(x) and f(x). The whole of D' then consists of x and all elements that are contextually relevant when talking about x. This relation is $D' \preccurlyeq_f D$.

(71) $\preccurlyeq_f$:
$\forall$ f, D, D': $D' \preccurlyeq_f D$ iff
$\exists x[f(x) \ \& \ D(x) \ \& \ D' = \lambda y.$ y is contextually relevant for x]

This made sure that $\preccurlyeq$ chooses a domain that is centered around some entity that has the property f, which was the restrictor of the quantifier. Existential closure does not come with its own NP, but instead uses the set of alternatives as its restrictor. Each alternative in that set contains an ι-operator that presupposes that there is an entity that has the salient property denoted by the NP in the indefinite. The lexical entry for existential closure in (70) can therefore only quantify over domains that contain an entity that has this property. This replicates the effect of Jäger (2007)'s partial variables and Onea (2013, 2015)'s constraints on assignment functions. It allows us to get the relevant domains without having direct access to the relevant property[4].

But since $\exists$ does not come with an NP, $\preccurlyeq_f$ cannot be used. So to allow for this, in cases where D' is bound by an element that does not have an additional property in its restrictor, the assumption is that D and D' share at least one element, which is the central element of D'. $D' \preccurlyeq D$.

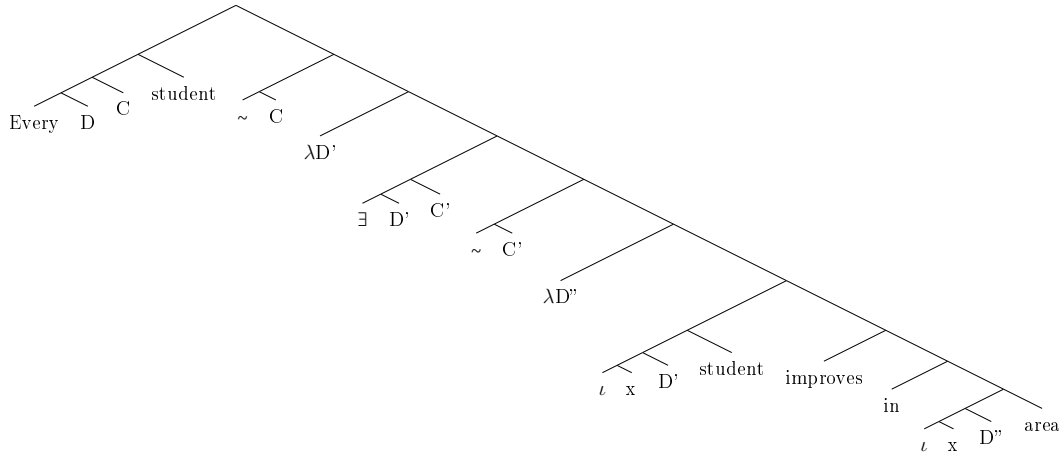
(72) $\preccurlyeq$:
$\forall$ D, D': $D' \preccurlyeq D$ iff

[4]There is currently no mechanism to make sure that these domains are actually centered around the entity that has the property denoted by the NP in the indefinite. The only condition is that they contain at least one of these. I am currently not aware of any circumstances under which this would be problematic, but cannot exclude the possibility either.

$\exists$x[D(x) & D'= λy. y is contextually relevant for x]

If we now look at Schlenker's example, we can do the following:

(73) If every student improves in an area...



If "every student" binds the domain of existential closure, we could assume that the domain variables that "every" quantifies over are domains that contain one student and whatever is contextually affiliated with said student. For example the areas in which they need to improve. One of these domains D' would be {Mary, Binding Theory} or, in the extended example, {Mary, Binding Theory, Adjuncts}. Existential closure now says that there is a domain D" which contains at least one thing from D' and at least one thing that is an area. The student in D' improves in the area in D".

Deriving Intermediate Readings

Having established the final version of existential closure, this section will explore how quantifiers facilitate intermediate readings. I will argue that the quantifier below the intended scope site is what allows for intermediate readings.

Chierchia (2001)[p.84] states that "Existential closure of a function f is restricted to the (top and the) immediate scope of the quantifier that binds the argument of f." Schwarz (2011)[p.889] argues that this prohibits indefinites scoping below negation without a higher quantifier being present. This would

predict that there is no reading for (74) in which there is no problem such that every professor competent on it examined John, a reading that Schwarz (2011) argues is available.

(74) John wasn't examined by every professor competent on some problem.

Our approach currently has no problem with Schwarz's example, since the indefinite is not in the scope of the universal quantifier, but in the restrictor. Since ~ is in the scope of the quantifier, existential closure can unproblematically take scope below negation. But what if we change the example a bit:

(75) Ich weiß nicht von jedem Studierenden, ob er einen Fehler
I know not of every student whether he a mistake
gemacht hat.
made has
"I do not know of every student whether they made a mistake."

a. There is a mistake x and it is not the case that I know for all students y whether y made x.
b. It is not the case that there is a mistake x and I know for all students y whether y made x.
c. It is not the case that for all students y, there is a mistake x and I know whether y made x.
d. It is not the case that for all students y, I know whether there is a mistake x and y made x.

The intermediate reading in (75-b.) is still available. This is problematic for the account at hand, since we would assume that existential closure is now trapped below "every". Chierchia (2001)'s and Schwarzschild (2002)'s solution would be to assume that a higher quantifier binds into the indefinite. As mentioned above, this is not a viable solution here, as there is no quantifier above the intended scope site.

So this is not an available solution. But what we do have is a (covertly) focused element and an operator that can evaluate focus. So what happens, when the intervening quantifier is what evaluates the focus in the indefinite

instead of existential closure? In (76-a.), the set of alternatives that the quantifier can evaluate is the set of propositions that state that x read some specific book. The alternatives vary with regard to the book. (76-b.) is what we get when the quantifier evaluates this focus.

(76) a. Everyone read a book.

b. $\forall x[\exists y[book(y) \ \& \ x \text{ read } y] \rightarrow x \text{ read } z]$

So (76-b.) essentially says that everyone who read a book read some specific book z, which is either already a context referent or is now introduced as one. The entity denoted by the indefinite is now the same, independent of the quantifier. This creates the impression of the indefinite outscoping the quantifier. For this to work, however, we need the ordinary semantic value of the entity variable, which is not entirely unproblematic. This wil be discussed in the next section. For the situation at hand, the specific value is irrelevant, as long as it is the same independent of the quantifier, so let us for now assume that we have some way to get this value. This process works for DE quantifiers as well:

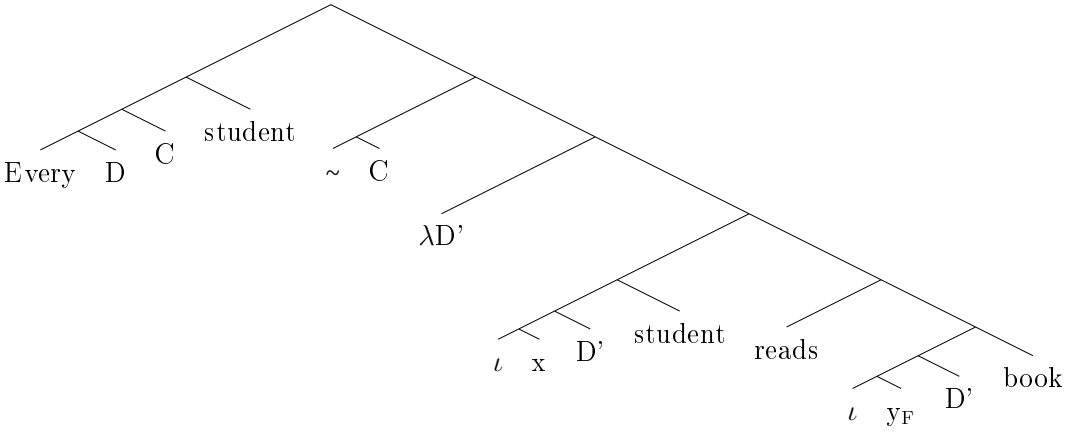
(77) a. Noone read a book.
$\neg\exists x[\exists y[book(y) \ \& \ x \text{ read } y] \ \& \ x \text{ read } z]$
b. Less than three students read a book.
$\neg\exists 3x[\exists y[book(y) \ \& \ x \text{ read } y] \ \& \ x \text{ read } z]$

This allows an indefinite to outscope a quantifier without relying on existential closure taking scope over the quantifier. In fact, this does not rely on existential closure at all, since the quantifier evaluates the focus and binds the domain variable in the indefinite, thereby replacing existential closure entirely.

Our problem is now that we have some specific book z, which is either already a context referent or is now introduced as one. This would create the entity reading, as we now have a specific entity in the context, making the indefinite effectively scopeless. To generate intermediate scope readings, we still need this entity to be relative to the higher quantifier.

Right now, an indefinit can "skip" one weak intervener this way. Having the quantifier evaluate the focus on the entity variable makes sure that the domains the quantifier quantifies over all contain the same entity. The domain variable in the indefinite is accordingly bound by the quantifier.Consider (78):

(78) Every student reads a book.



In this example, "every" quantifies over domains D' accessible from D. If these domains cannot sensibly be assumed to all contain the the same entity that could be denoted by the indefinite, it cannot outscope the quantifier. This is what happens when the indefinite contains a bound pronoun, which is what creates the binder-roof constraint. We can reproduce this without using a bound pronoun as well:

(79) Every decent university has a semantics professor.

In (79), it is unlikely that all subdomains that contain a university also contain the same professor. A higher quantifier that binds the domain of a lower quantifier can create an easier pathway to a higher domain. Compare (80-a.) and (80-b.).

(80) a. Jeder Dozent will, dass in jedem Kurs jeder Student ein
every lecturer wants that in every course every student a
Buch liest.
book reads
"Every lecturer wants it to be the case that in every course, every

student reads a book."

b. Jeder Dozent will, dass in jedem Kurs, der an irgendeiner
every lecturer wants that in every course that at any
Uni unterrichtet wird, jeder Student ein Buch liest.
university taught is, every student a book reads
"Every lecturer wants it to be the case that in every course, taught at any university, every student reads a book."

While in (80-a.), a reading where there is a different book for each lecturer is easily available, it becomes much harder to get in (80-b.). As long as the courses are restricted to the courses of the lecturer in question or even the university the lecturer teaches at, the books can be relative to the lecturer. But if we widen the domain inbetween, as in (80-b.), the reading is much harder to get. This works in the other direction as well:

(81) a. Jeder Dozent will, dass in jedem Studiengang jeder Student
every lecturer wants that in every program every student
ein Buch liest.
a book reads
"Every lecturer wants it to be the case that in every program, every student reads a book."

b. Jeder Dozent will, dass in jedem Studiengang, in dem er
every lecturer wants that in every program in which he
Kurse gibt, jeder Student ein Buch liest.
courses teaches every student a book reads
"Every lecturer wants it to be the case that in every program he teaches a course in, every student reads a book."

Here, (81-a.) makes it difficult to get an intermediate reading, as the subdomains that contain programs do not seem to be restricted to contain the same lecturer each. But if we overtly restrict the programs to exactly that, as in (81-b.), the intermediate reading becomes easily available again.

What seems to happen here is that the entity variable does not seem to be strictly restricted to the exact same entity, but to the same entity for a given domain. Within that domain, this entity is then introduced as a local context referent, creating the impression of existential quantification.

One argument for this way of enabling intermediate readings was already hinted at above. We said that focus sensitive quantifiers are only licensed when they are not in the scope of an overt focus sensitive item that requires association with overt focus and has not done so yet. Consider (82):

(82) a. Ich habe nur gesagt, dass Peter_{F} jedem ein Buch empfohlen hat.
I have only said that Peter everyone a book recommended has
"I only said that Peter_{F} recommended a book to everyone."
Available:
"Peter is the only x of which I claimed that there is a book that x recommended to everyone."

b. Ich habe nur gesagt, dass jedem Peter_{F} ein Buch empfohlen hat.
I have only said that everyone Peter a book recommended has
"I only said that Peter_{F} recommended a book to everyone."
Unavailable:
"Peter is the only x of which I claimed that there is a book that x recommended to everyone."

(82-a.) has "every" in the scope of an overt focus sensitive item that requires association with overt focus and already did so. (82-b.) only differs from (82-a.) in so far that the quantifier has been scrambled in front of the item carrying overt focus. In (82-a.), we can get a reading, where the indefinite seems to take scope over the quantifier, while (82-b.) does not allow for this reading. This is what we currently predict. If we assume that the quantifier is not focus sensitive, existential closure could associate with the indefinite across the quantifier, but would cause an intervention effect for "only". The alternative would be to have the quantifier associate with the indefinite, which is not available since the use of a focus evaluating quantifier is not licensed in that environment.

Introducing Context Referents

This section will take a closer look at the ordinary semantic value of the entity variable and context referents introduced by indefinites, specifically at how this context referent can be introduced at different points in the structure, creating the impression of different intermediate readings. I will show that this process

is restricted by DE operators and explain how this happens.

Let me start by adressing the elephant in the room: The ordinary semantic value of the entity variable that enables this framework to predict intermediate readings is not available. This value is used by quantifiers that evaluate the focus in the indefinite and is introduced as a context referent. This context referent, in turn, is not necessarily a specific entity in the context of the conversation, but may just be a specific entity within the scope of some quantifier.

To get this value in a strictly compositional way proves difficult: If we want the entity variable to get its value from the assignment function g, we would need to assume that the index of the entity variable is either a) already in g through some contextual means or b) added to it via predicate abstraction.

a) would always result in global scope of the indefinite, while b) does not work if the element that does the binding is not ∃. A quantifier evaluating the focus in the indefinite, for example, would need to bind the entity variable to a value that is independent of that exact quantifier. Approaches like Onea (2013, 2015) attempt to this by having the indefinite pose a constraint on the assignment function, restricting it to one that binds the indefinite. These constraints are then filtered out by higher elements quantifying over assignment functions. This could be made to work for the examples above, but will not suffice to predict the behaviour of DE quantifiers that will be discussed in this section.

For the purposes of this approach, I will assume that the entity variable stays free and has a value assigned to it from the local context. This value is introduced as a context referent. To be more precise, I assume that the existence of a valid entity in the domain of whatever element evaluates the focus on the entity variable is an inference that leads to the recipient assuming a salient entity in that domain.

In an indefinite [ι x D" NP], the presupposition of ι is ∃!y[D"(y) & NP(y) & y=x]. For this presupposition to hold, there needs to be some entity I,

which x refers to, such that D"(I) and NP(I). This is easy enough to accommodate. If some operator, be it a quantifier or ∃, whose domain is D' binds D", the resulting inference is (83):

(83) ∃I[∃D"[D"⩽D' & D"(I) & NP(I)]]

So for a given value of D', there is the inference that we can get a D" from it, which contains a salient entity that has the property on the NP. This entity is then used as the ordinary semantic value of the entity variable and introduced as a local context referent that is available where that value of D' is available.

It can even be available in a larger area, for example in the scope of yet another element with a domain D which binds D'. In that case, we might be able to extend this inference. As long as I is the same in all D'⩽D, for a given value of D, the context referent is available where that value of D is available and so on. If this inference about a context referent I is drawn with regard to a quantifier Q, it is perceived as the indefinite taking scope over Q. I will call this I is stable relative to Q, or I is stable to Q.

This is not an optimal solution, but it will do for now. It works for the data discussed in the preceding section and it allows us to explain the behaviour of indefinites with regard to DE quantifiers. Consider (84):

(84) a. Jeder Dozent lässt in jedem Kurs jeden Studenten ein Buch
every lecturer makes in every course every student a book
lesen.
read
"Every lecturer makes every student in every course read a book."

b. Jeder Dozent lässt in keinem Kurs jeden Studenten ein
every lecturer makes in no course every student a
Buch lesen.
book read
"Every lecturer has no course in which he makes every student read a book."

In (84-a.), the reading where books are relative to lecturers is available. In (84-b.), however, this is not the case. In (84-a.), the context referent needs

to be stable relative to "every student"(Q1) and "every course"(Q2), but not relative to "every lecturer"(Q3), i.e. For each lecturer-domain, there is a salient entity I of which we only know that it is a book, available from all student-domains and from all course-domains.

(85) a. Q3(Q2(∃I[Q1(p(I))]))
b. Q3(∃I[Q2(Q1(p(I)))])

In (85-b.), this cannot easily be done, as in this case, Q2 is DE. For a DE quantifier Q_{DE}, the following holds:

(86) $Q_{DE}(\ \exists I[p(I)]) \rightarrow \forall I[\ Q_{DE}(p(I))]$

And since I needs to be stable to Q1 and Q2 is DE, the result is this:

(87) Q3(∀I[Q2(Q1(p(I)))])

Technically speaking, the condition Q3(∃I[Q2(Q1(p(I)))]) is fulfilled by this, but there can be no *salient* entity for I above Q2 anymore.

But downward entailing quantifiers can still associate with the focus on the entity variable, so if the DE quantifier is the lowest one above the indefinite, it does not restrict the availability of intermediate readings above it, as in (88-a.), but if it is not the first one, as in (88-b.), it creates a barrier, above which no intermediate reading is possible anymore.

(88) a. Jeder Dozent lässt in jedem Kurs keinen Studenten ein
every lecturer makes in every course no student a
Buch lesen.
book read
"Every lecturer is such that in every course, he makes no student read a book."

b. Jeder Dozent lässt in keinem Kurs jeden Studenten ein
every lecturer makes in no course every student a
Buch lesen.
book read
"Every lecturer has no course in which he makes every student read a book."

This does not restrict the availability of intermediate readings below the downward entailing quantifier. In (89-a.), books can be relative to universities, lecturers or courses. Intermediate readings are freely available throughout. In (89-b.), there is no reading available, where each university has a different book, that no lecturer makes everyone read. But below the downward entailing quantifier, intermediate readings are available. Books can, for example, still be relative to courses.

(89) a. An jeder Universität lässt jeder Dozent in jedem Kurs
at every university makes every lecturer in every course
jeden Studenten ein Buch lesen.
every student a book read
"At every university, every lecturer is such that in every course, he makes every student read a book."

b. An jeder Universität lässt kein Dozent in jedem Kurs jeden
at every university makes no lecturer in every course every
Studenten ein Buch lesen.
student a book read
"At every university, no lecturer is such that in every course, he makes every student read a book."

Introducing context referents as an inference about the domain of a quantifier and using this context referent as the ordinary semantic value of the entity variable is not an optimal solution, but for now, it makes the right predictions.

Which Quantifiers are Critical Interveners?

In this section, I will specify which quantifiers can be focus evaluating. We will see that only upward entailing quantifiers and (sometimes) "exactly n"-type quantifiers are not. To do this, I will introduce the notion of focus informativity.

Mayr (2014) argues that the common property that is shared by all critical interveners is that they are not additive and do not scopally commute with existentials.

(90) a. Non-additive
$Qx(p \vee q) \neq Qx(p) \vee Qx(q)$

b. Does not scopally commute with existentials
Qx.∃y.p≠∃y.Qx.p

The resulting set of critical interveners is all quantifiers except upward entailing quantifiers and "exactly n"-type quantifiers. We can derive the same set of critical interveners, but from a different point of view. Generally speaking, we would like focus association to be informative in some way. If we assume, that natural language quantifiers presuppose that their restrictor is not the empty set, the non-additive quantifiers are the ones, where using alternatives created in the scope of the quantifier as part of the restrictor is actually informative. That the presupposition also needs to hold for a restrictor that has been modified via focus can be seen in the example in (91). While (91-a.) works fine, (91-b.) is odd.

(91) a. Niemand striegelt ein Einhorn$_F$ mit einem Kamm.
noone grooms a unicorn with a comb
"Noone grooms a unicorn$_F$ with a comb."

b. *Niemand striegelt ein Einhorn mit einem Kamm$_F$.
noone grooms a unicorn with a comb
"Noone grooms a unicorn with a comb$_F$."

In (91-a.), the presupposition is that there is at least one person that grooms something with a comb. This can safely be assumed, so the presupposition is met. In (91-b.), however, the presupposition is that there is at least one person that grooms a unicorn with something. This presupposition is a bit more problematic, leading to infelicity.

Taking this presupposition into consideration, we can say that for any quantifier Q, associating with focus is informative if the regular assertion plus presupposition of the quantifier is not equivalent to the assertion of the focused version plus the presupposition.

(92) Let c be an element that can be focused.
A quantifier Q is focus informative (FI) iff
∃p,q,c:

$\exists x[p(x)]$ & $Qy(p(y))(q(c)(y))$
PSP Assertion
≠
$\exists x[p(x)\&\exists z[p(x)\&q(z)(x)]]$ & $Qy(p(y)\&\exists z[p(y)\&q(z)(y)])(q(c)(y))$
PSP including focus Assertion including focus

This is the case for "every":

(93) Everyone likes Mary_{F}.
$\exists x[person(x)] \& \forall y[person(y) \rightarrow likes(Mary)(y)] \neq$
$\exists x,a[person(x) \& likes(a)(x)] \& \forall y[(person(y) \& \exists z.likes(z)(y)) \rightarrow likes(Mary)(y)]$

And for DE quantifiers as well:

(94) Noone likes Mary_{F}.
$\exists x[person(x)] \& \neg\exists y[person(y) \& likes(Mary)(y)] \neq$
$\exists x,a[person(x) \& likes(a)(x)] \& \neg\exists y[(person(y) \& \exists z.likes(z)(y)) \& likes(Mary)(y)]$

This holds for any quantifier that is not upward entailing in its restrictor. All quantifiers[5] that are upward entailing in their restrictor are also upward entailing in their scope, so I will refer to them as UE quantifiers. Mayr (2014)'s use of non-additivity identifies the exact same group of elements as critical interveners that the notion of focus informativity does with one exception: Quantifiers of the type "exactly n" are not focus informative and not UE. But as Mayr (2014) correctly notes, these do cause intervention effects:

(95) *Wen haben genau drei Studenten wann eingeladen?
who have exactly three students when invited
"Who did exactly three students invite when?"
(Mayr 2014[p.523])

It should, however, be noted that "exactly n" elements do behave like indefinites. They can take irregular scope, as one can see in (96), where all scope readings are available.

[5] At least all English and German quantifiers that I am aware of.

(96) An jeder Universität lässt jeder Dozent in jedem Kurs jeden
at every university makes every lecturer in every course every
Studenten genau zwei Bücher lesen.
student exacly two books read
"At every university, every lecturer is such that in every course, he makes every student read exactly two books."

a. ∀x[university(x) → ∀y[lecturer(y) → ∀z[course(z) → ∀a[student(a) → ∃2b[book(b) & at x, in z, y makes a read b]]]]]
b. ∀x[university(x) → ∀y[lecturer(y) → ∀z[course(z) → ∃2b[book(b) & ∀a[student(a) → at x, in z, y makes a read b]]]]]
c. ∀x[university(x) → ∀y[lecturer(y) → ∀z[course(z) → ∃2b[book(b) & ∀a[student(a) → at x, in z, y makes a read b]]]]]
d. ∀x[university(x) → ∀y[lecturer(y) → ∃2b[book(b) & ∀z[course(z) → ∀a[student(a) → at x, in z, y makes a read b]]]]]
e. ∀x[university(x) → ∃2b[book(b) & ∀y[lecturer(y) → ∀z[course(z) → ∀a[student(a) → at x, in z, y makes a read b]]]]]

They can also be used in donkey constructions:

(97) Wenn eine Bäuerin genau zwei Esel hat, streichelt sie sie.
if a farmer exactly two donkeys owns pets she them
"If a farmer owns exactly two donkeys, she pets them."

But what is more interesting is that they do not cause intervention effects in donkey constructions:

(98) Wenn eine Bäuerin genau zwei Besuchern einen Esel zeigt, mag
if a farmer exactly two visitors a donkey shows likes
sie ihn.
she it
"If a farmer shows exactly two visitors a donkey, she likes it."

And they do not cause intervention effects in questions if they are interpreted as taking scope over the question operator:

(99) Context: We play a game, where cards are exchanged. Each player wants to know which cards the players seated next to them have traded.

Jeder will wissen wem genau zwei Spieler was gegeben
everyone wants know who exactly two players what given
haben.
have
"Everyone wants to know who exactly two players gave what to."

So under the approach presented here, the intervention effect caused by "exactly n" type elements are due to existential closure. With regard to UE quantifiers, our predictions would be that they do not cause intervention effects in question formation or donkey constructions. This is borne out:

(100) a. Wo haben sich mehr als drei Studenten wann getroffen?
where have self more than three students when met
"Where did exactly three students meet when?"

b. Wenn eine Bäckerin mit genau zwei Besuchern einen
if a baker with exactly two visitors a
Kuchen teilt, mag sie ihn.
cake shares likes she it
"If a baker shares with exactly two visitors a cake, she likes it."

The examples in (100) use collective predicates, since, as Mayr (2014) notes, a distributive reading would employ a distributivity operator that would cause an intervention effect. There is another interesting prediction that we make: We noted that DE quantifiers still allow for indefinites to get intermediate scope readings above them, as long as they are the lowest quantifier above the indefinite. Since UE quantifiers are not focus informative, we would predict that there can be UE quantifiers below the DE quantifier without creating a barrier for the scope of the indefinite. This seems to be the case, since the two relevant readings for (101) are still available.

(101) An jeder Universität erlaubt jeder Dozent in keinem Kurs mehr
at every university allows every lecturer in no course more
als zwei Studenten ein Buch zusammen zu präsentieren.
than two students a book together to present
"At every university, every lecturer is such that in no course, he allows more than two students to present a book together."

a. ∀x[university(x) → ∀y[lecturer(y) → ∃b[book(b) & ¬∃z[course(z) & ∃>2a[student(a) & at x, in z, y allows a to present b together]]]]]

b. ∀x[university(x) → ∃b[book(b) & ∀y[lecturer(y) → ¬∃z[course(z) & ∃>2a[student(a) & at x, in z, y allows a to present b together]]]]]

Additionally, we would predict that a quantifier can associate with focus across an intervening non-FI quantifier. This is the case as well.

(102) a. Jeder fotografiert mehr als drei Leute (zusammen) im
everyone photographs more than three people (together) in
Querformat$_F$.
landscape
"Everyone photographs more than three people (together) in landscape format."

b. Reading: Everyone who photographs more than three people (together), does so in landscape format.

In contrast to Mayr (2014), this approach predicts that an element has to be focus informative to be a critical intervener, but, since focus informativity is a required condition for an element to associate with focus, but not a sufficient one, not that every focus informative element is actually a critical intervener. This is an advantage, as it allows us to deal with the fact that, as noted in Kim (2002), Beck (2006), and Mayr (2014), intervention effects caused by quantifiers are crosslinguistically not as stable as ones caused by focus operators.

So overall, this approach predicts that the only quantifiers that are not in and of themselves critical interveners are UE quantifiers and "exactly n" type quantifiers. UE quantifiers are critical interveners, if they are read distributively and "exactly n" type elements are critical interveners, if they are interpreted using existential closure. All other quantifiers are critical interveners.

3.4.3 Do Local Indefinites Behave Differently?

In this section, I will discuss the difference between locally construed and non-locally construed indefinites. I will argue that there is none. I will start by

having another look at Chierchia's WCO effects, which seem to pose a problem for our account, and propose a solution for this. This solution also explains the perceived difference between locally and non-locally construed indefinites.

As noted in Chierchia (2001), indefinites that are construed non-locally seem to be barriers for QR in so far, that a quantifier that does not c-command them at spellout cannot take scope above the perceived scope position of the indefinite. Chierchia (2001) illustrates this using the example in (103):

(103) Every professor competent on some problem examined every student.

The unavailable reading is the one, where for each student there is a different problem and the student was examined by every professor competent on that problem. Our approach correctly predicts that, since focus evaluating operators (such as "only" or quantifiers associating with focus) are barriers for QR. Since existential closure is a focus evaluating operator, the effect above does not come as a surprise. What does come as a surprise, is that this is only the case for non-local readings of an indefinite. An indefinite that is construed locally can be outscoped by a lower quantifier, which is a problem, as we would assume that a local reading of an indefinite is derived by applying existential closure locally. Consider the following sentence:

(104) A technician inspected every plane.
(Chierchia 2001)

In this sentence, a reading that has different technicians inspecting different planes is easily available. We could circumvent this problem by assuming (as do several other approaches) that indefinites can choose to either behave like regular quantifiers or in the way discussed here. This is not a good solution, since we would overgenerate local construals of indefinites. Consider (105) (repeated from above) again:

(105) a. An jeder Universität lässt jeder Dozent in jedem Kurs
at every university makes every lecturer in every course
jeden Studenten ein Buch lesen.
every student a book read
"At every university, every lecturer is such that in every course,

he makes every student read a book."

b. An jeder Universität lässt kein Dozent in jedem Kurs
at every university makes no lecturer in every course
jeden Studenten ein Buch lesen.
every student a book read
"At every university, no lecturer is such that in every course, he makes every student read a book."

We noted that in (105-a.), all scope positions are available, while in (105-b.), only those below the DE quantifier are available. This is problematic for a solution that allows indefinites to behave like regular quantifiers as long as they are construed locally, as all scope positions in (105) are local ones. Instead, I would like to propose that this is a focus effect as well. In (106), a reading is available, in which "every teacher" takes scope above "a drawing" ((106-a.)), while (107) does not have that reading:

(106) Sally hat ein Bild jedem Lehrer gezeigt.
Sally has a drawing every teacher shown
"Sally showed a drawing to every teacher."

a. ”For all teachers x: there is a drawing y and Sally showed y to x.”

b. ”There is a drawing y and for all teachers x: Sally showed y to x.”

(107) Nur Sally hat ein Bild jedem Lehrer gezeigt.
only Sally has a drawing every teacher shown
"Only Sally showed a drawing to every teacher."

a. *”Only Sally is z, such that for all teachers x: there is a drawing y and z showed y to x.”

b. ”Only Sally is z, such that there is a drawing y and for all teachers x: Sally showed y to x.”

The focus evaluating operator "only" should not interfere with QR within its scope and we get the relevant reading if we replace the indefinite:

(108) Nur Sally hat mehr als zwei Bilder jedem Lehrer gezeigt.
only Sally has more than two drawings every teacher shown
"Only Sally showed more than two drawings to every teacher."

a. ”Only Sally is z, such that for all teachers x: there are more than two drawings y and z showed y to x.”
b. ”Only Sally is z, such that there are more than two drawings y and for all teachers x: Sally showed y to x.”

(108-a.), the reading "Sally is the only one who is such that every teacher x is such that she showed more than 2 drawings to x." is available. This data would be expected, if we assumed that there is something that replaces existential closure, thereby allowing the quantifier to QR above the indefinite. This something would need to be above "only", which would place "only" in an intervening position. This is quite informative, since there is not a lot above that position that could be responsible for this effect. The thing that does come to mind, however, is the speech act operator. Tomioka (2010) argues that this is where contrastive topic focus is evaluated. I will not discuss the mechanisms that have been proposed for that, since they are not that relevant for the discussion at hand. What is important for us, is that "A focus on a CT is not closed off until the Speech Act level." (Tomioka 2010[p.10]).

We already expect a focus within the indefinite. What happens here, is that the focus is on the entire indefinite and interpreted as a contrastive topic focus. This moves the evaluation of the focus to a position above the QR landing site of the quantifier and thereby allows the quantifier to outscope the indefinite. This may seem a bit far fetched, but it seems to make the right predictions: One prediction is that a quantifier that does not c-command an indefinite at spellout can only outscope it, if there are actually alternatives to the focused indefinite available. Consider (109):

(109) a. Jeder Erbe erhält ein Auto.
every inheritor gets a car
"Every inheritor gets a car."
b. Ein Auto erhält jeder Erbe.
a car gets every inheritor
"Every inheritor gets a car"

Both sentences mean exactly the same and (109-b.) sound a lot more natural when we put focus on "car". There are alternatives to cars when we talk about

what can be inherited. Now consider (110):

(110) a. Jeder Erbe erhält einen Erbanteil.
every inheritor gets a share of inheritance
"Every inheritor gets a share of inheritance."

b. *Einen Erbanteil erhält jeder Erbe.
a share of inheritance gets every inheritor
"Every inheritor gets a share of inheritance."

While (110-a.) works perfectly fine and could, for example, be used to define the term "inheritor", (110-b.) does not. In German, "Erbanteil" is any portion of an inheritance, including the entire thing, if there is only one inheritor. So there is no alternative to "Erbanteil", which makes contrastive topic focus on the indefinite impossible. The only available reading would be that there is one specific share of inheritance that every inheritor inherits. This is what we would predict.

So if a quantifier is below an indefinite at spellout, the indefinite either carries focus on its entity variable, which would either be evaluated by existential closure or a higher quantifier, both of which create barriers for QR[6], or the indefinite carries contrastive topic focus, which would be evaluated above the QR landing site, thereby allowing the lower quantifier to outscope the indefinite. Together, this predicts what Chierchia (2001) analyses as a weak crossover effect and seems to make a distinction between locally and non-locally construed indefinites unnecessary.

3.4.4 The Scope of Indefinites

Overall, this approach predicts the following behaviour for quantifiers: First, FI quantifiers can associate with focus and as such require focus evaluation in their scope. This leads to intervention effects in questions and restricts the scope of indefinites.

Second, since these quantifiers can associate with focus, they can associate

[6]This explanation creates other problems. For more details see Appendix III - Interaction with quantifiers.

with the focus in an indefinite in their scope, which means that, for the domain of that quantifier, the indefinite always denotes the same entity. This creates the impression of the indefinite outscoping the quantifier.

Third, quantifiers can bind the domain of other quantifiers in their scope, thus the effect that the indefinite is a specific entity for a given domain can be inherited upwards. As this entity can be introduced as a context referent for a given domain at any position, intermediate readings within a chain of quantifiers are available.

Fourth, DE quantifiers cannot inherit this entity upwards and therefore interrupt the chain, allowing for intermediate scope readings below, but not above them. They can, however, associate with focus themselves and therefore do not interrupt the chain, if they are at the start.

Fifth, non-FI quantifiers do not cause intervention effects. If they are read distributively, a distributivity operator is used, which in turn creates intervention effects.

If we revisit our list from chapter 2, we now correctly predict the effects that are not related to donkey constructions. Indefinites are predicted to be able to take scope ignoring islands, since no movement is involved, but this scope is restricted by any focus evaluating element. They are able to bind pronouns by having existential closure bind their domain, as well as the one of the pronoun, which can happen across a critical intervener, since no focus is involved. The binder-roof constraint is predicted, since outscoping a quantifier requires that the indefinite refers to the same entity throughout the domain of the quantifier, which is not the case, if said quantifier binds a pronoun within the indefinite. Chierchia's weak crossover effects are predicted, as focus evaluating operators like existential closure generally create barriers for QR, which means that a lower quantifier can only QR above an indefinite if the focus on that indefinite is evaluated at the speech act level. We can also deal with Schlenker's problem, since existential closure carries a domain variable that can be bound by a higher quantifier. So the only part left are donkey constructions.

3.5 Donkey Constructions

In this section, I will show that donkey constructions and their peculiarities fall out from what we already have. Ideally, we want to be able to correctly predict the following things:

First, donkey constructions should be possible. There needs to be a way for an embedded indefinite to bind a pronoun that it does not c-command. Our expectation would be that this is either done via existential closure or via the indefinite referring to a specific entity, which in turn would allow the pronoun to corefer.

Second, we would like this process to be sensitive to intervention by weak, as well as strong interveners, but only if they are between the indefinite and the closest position that c-commands the indefinite as well as the pronoun.

Third, we want to be able to predict asymmetric readings in proportion problem sentences. The pronoun needs to be able to either refer to the same entity as the indefinite or an entity from the same salient group of entities.

Most of this automatically falls out from what we need for indefinites outside of donkey constructions anyway. We will, however, need one additional element, namely universal closure.

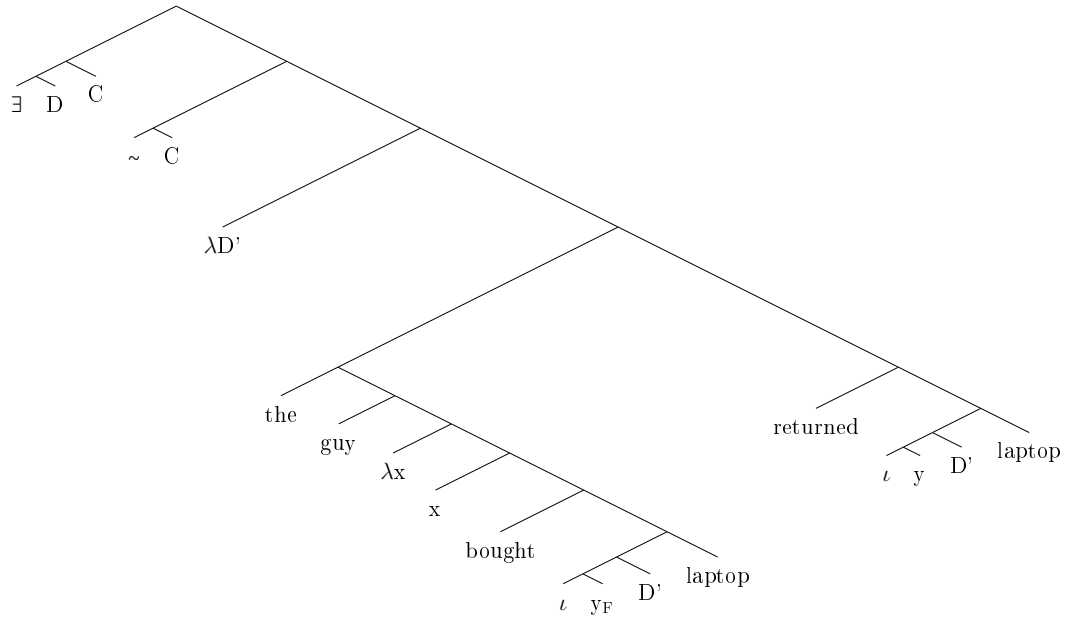
3.5.1 Donkey Mechanics

Let us start with a basic donkey construction with an existential reading that does not contain any interveners or quantifiers:

(111) Der Typ, der gestern einen Laptop gekauft hat, hat ihn heute
the guy who yesterday a laptop bought has has it today
zurück gegeben.
back given
"The guy who bought a laptop yesterday returned it today."

In a case like this, we can just proceed as usual. The entity variable in the indefinite carries focus and existential closure evaluates this focus, binding the

domain variable in the indefinite, as well as the pronoun.

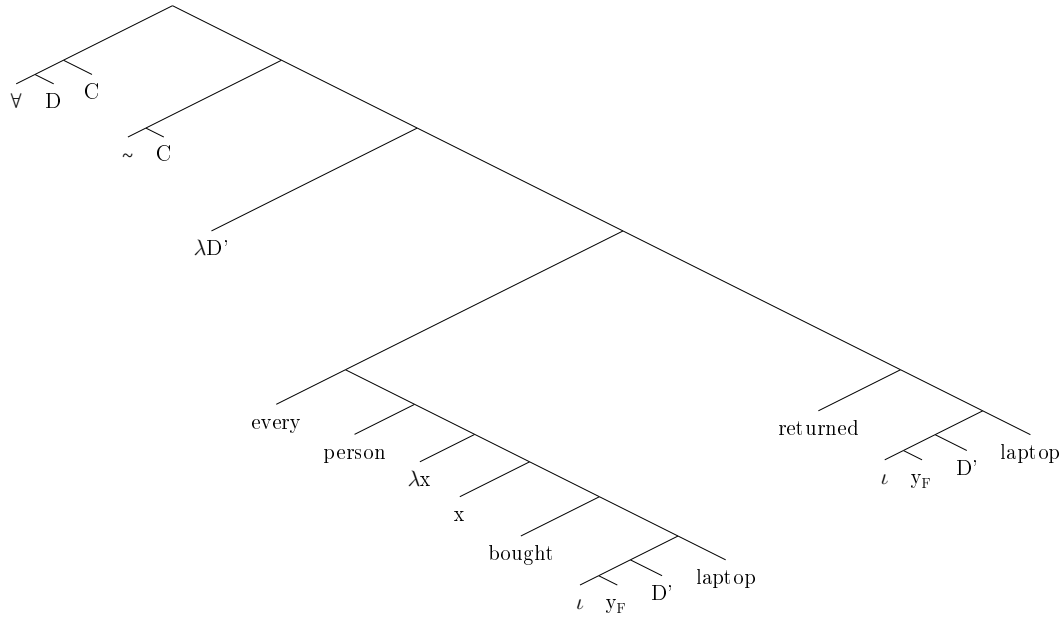


We get a reading in which there is a subdomain of the context that contains at least one laptop and the guy that bought said laptop yesterday returned it today. We already predict that this is sensitive to weak, as well as strong interveners that are inbetween existential closure and the focused variable in the indefinite. But this will not suffice for indefinites that are embedded in a DE environment:

(112) Jeder, der gestern einen Laptop gekauft hat, hat ihn heute
Everyone who yesterday a laptop bought has has it today
zurück gegeben.
back given
"Everyone who bought a laptop yesterday returned it today."

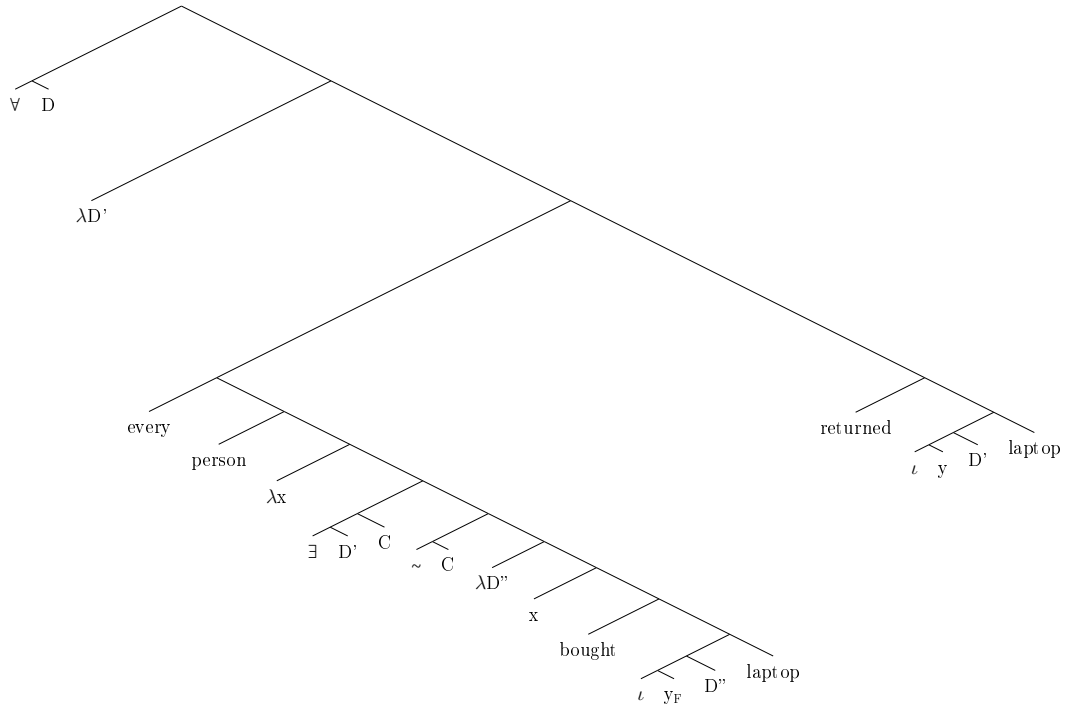
If we use the same process here, we will get a reading where we have a specific laptop in the context that is such that everyone who bought it returned it. This is not what we want. There are two ways to solve this: Option one is to put existential closure in the restrictor, as well as the scope of "every", which would have the problem that we somehow have to make sure that both closure operators always pick the same entity. Option two would be to have closure using universal quantification on top of "every". This would allow us to bind the domains of the indefinite, as well as the pronoun, without requiring a spe-

cific entity in the context. Let us see what happens if we simply replace ∃ with ∀, assuming that they only differ with regard to their quantificational force.



This does not work. The set of alternatives to which C is restricted by ~ contains alternatives to the entire structure. This effectively means that we produce truth conditions that are trivially true. Universal closure would state that all domains that contain a laptop which is such that everyone who bought it returned it, are such that everyone who bought the laptop in this domain, returned it. This will happen whenever we evaluate the focus in the indefinite above the quantifier that embeds it.

What would work better is if we had universal closure binding the domain of existential closure instead. This would not be new. De Swart (2001) also proposes a universal closure operator for use with elements in DE environments.



Since the pronoun is not in the scope of ∃, we now have a problem: The entity variable in the pronoun does not need to refer to the same context referent as the one in the indefinite. To fix this, I will assume that pronouns - and probably most other ι-constructions apart from indefinites - come with an additional restriction, which I will place in the presupposition of ι: The entity variable needs to be the central element in the domain of ι.

(113) $[\![\iota_{\mathrm{PRN}}]\!]$ =
$\lambda x.\lambda D_{<e,t>}.\lambda f_{<e,t>}$:$\exists!y$[f(y) & y is the central element of D & y=x].
The unique y, such that f(y) & x=y & y is the central element of D

This presupposition of the ι operator in the scope of "every" restricts the domains that universal closure quantifies over to ones that have a laptop as their central element. This would result in truth conditions that say "For all laptop-domains D' in the context: everyone who is such that there is a laptop in D' that he bought, returned the laptop in D'." The lexical entry for universal closure would then look like (114):

(114) $[\![\forall]\!]$: $\lambda D_{<e,t>}.\lambda P_{<<e,t>,t>}.\ \forall D'[D' \leqslant D \rightarrow P(D')]$

Assuming universal closure allows us to generate the reading we are after. As

we will see later, this also provides us with the tools we need to deal with the proportion problem. But for now, we saw above that we can deal with donkey constructions, in which the indefinite is embedded in a definite description. Using universal closure, we can also deal with donkey constructions, in which the indefinite is embedded in the restrictor of a DE quantifiers.

This approach can now handle donkey constructions with existential, as well as universal readings. The process is sensitive to intervention by weak as well as strong interveners.

3.5.2 Proportion Problems

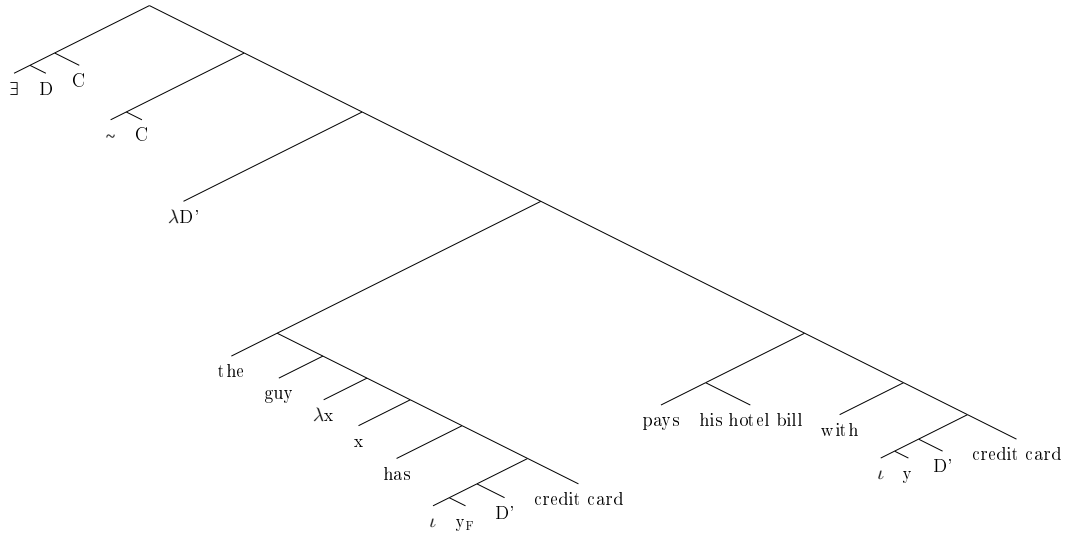
What we still need to deal with, are asymmetric readings in proportion problem sentences. In this section, I will propose a first analysis. This is just a first analysis, however, as the phenomenon has many aspects and doing it justice here would require a discussion that exceeds the scope of this work.

(115) a. Everyone who has a credit card pays the hotel bill with it.
b. Everyone who has a daughter with a drivers license lends her the car.

In (115-a.), the prominent reading is an asymmetric one: The sentence is true, if everyone who owns one or more credit cards uses one of them to pay his hotel bill. But (115-b.) has a prominent reading that requires that everyone who has one or more daughters with a license lends each of them the car. This is an interesting task, since these examples do not differ significantly with regard to their structure. Instead, which reading is prominent seems to depend on world knowledge and context. So ideally, we would want a mechanism to produce asymmetric readings that is generally available, but optional. Let us first have a look at how the system currently handles these examples. If the indefinite is embedded within a definite description, we are already predicting the correct result:

(116) Der Typ der eine Kreditkarte hat, zahlt seine Hotelrechnung mit
the guy who a credit card has pays his hotel bill with

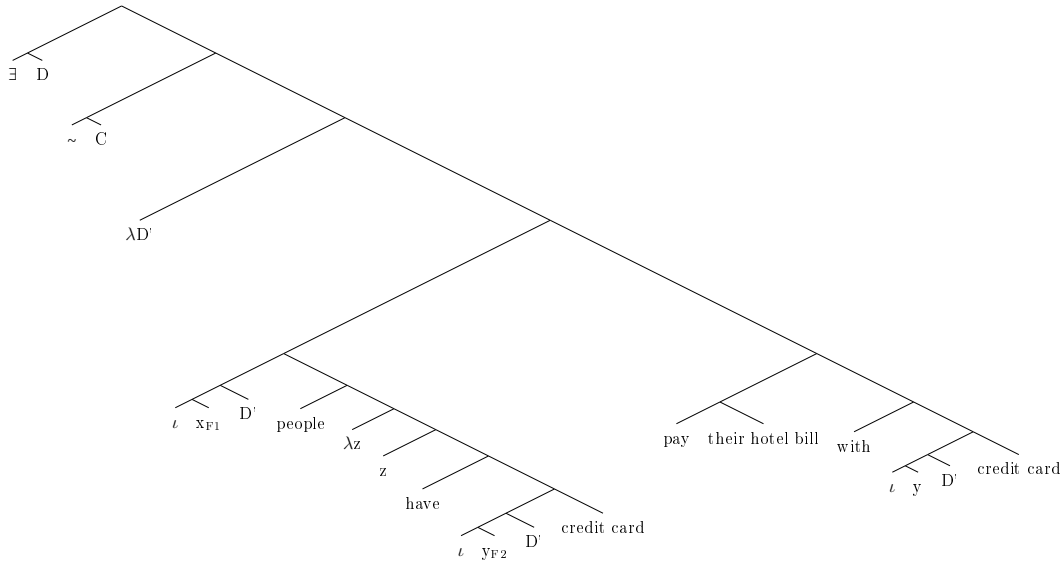
ihr.
it
"The guy who has a credit card, pays his hotel bill with it."



The reading we produce here, is a symmetric reading. This is correct, as this sentence seems to lack an asymmetric reading. This sentence is about a specific person with a specific credit card. If he has more than one, we would expect something along the lines of "only the guy, who...". So far, so good. What do we have, if the indefinite is embedded within another indefinite[7]?

(117) Genau drei Leute, die eine Kreditkarte haben, zahlen ihre
exactly three people who a credit card have pay their
Hotelrechnung mit ihr.
hotel bill with it
"Exactly three people who have a credit card, pay their hotel bill with it."

[7] As a proper discussion of "exactly n"-type indefinite would exceed the scope of this work, let us for the purposes of this example assume that ∃ for "exactly three" is identical with regular ∃, but instead of saying "there is at least one D", it says "there are at least three D". This is, of course, a massive oversimplification.

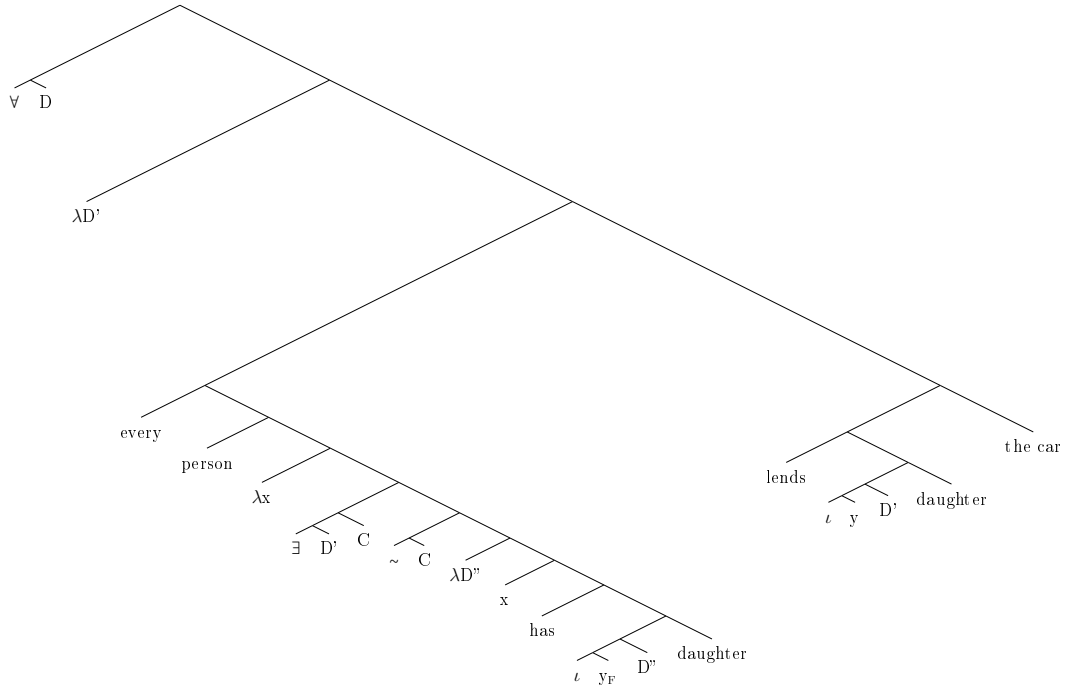


The result we get here, is "There are exactly three person/credit card pairs, such that the person pays their hotel bill with the credit card." This will always produce an asymmetric reading. Looking at a sentence that would usually have a prominent symmetric reading, this seems to be correct:

(118) Genau drei Leute, die eine Tochter mit Führerschein haben, leihen ihr das Auto.
exactly three people who a daughter with drivers license have lend her the car
"Exactly three people who have a daughter with a drivers license lend her the car."

The sentence in (118) would still be considered true, if one of these three people has two daughters, but only lend one of them the car. Donkey constructions that allow for both readings seem to be ones, where the indefinite is embedded in a DE environment. The symmetric reading is what we already produce anyway:

(119) Jeder, der eine Tochter mit Führerschein hat, leiht ihr das Auto.
everyone who a daughter with drivers license has lends her the car
"Everyone who has a daughter with a drivers license lends her the car."

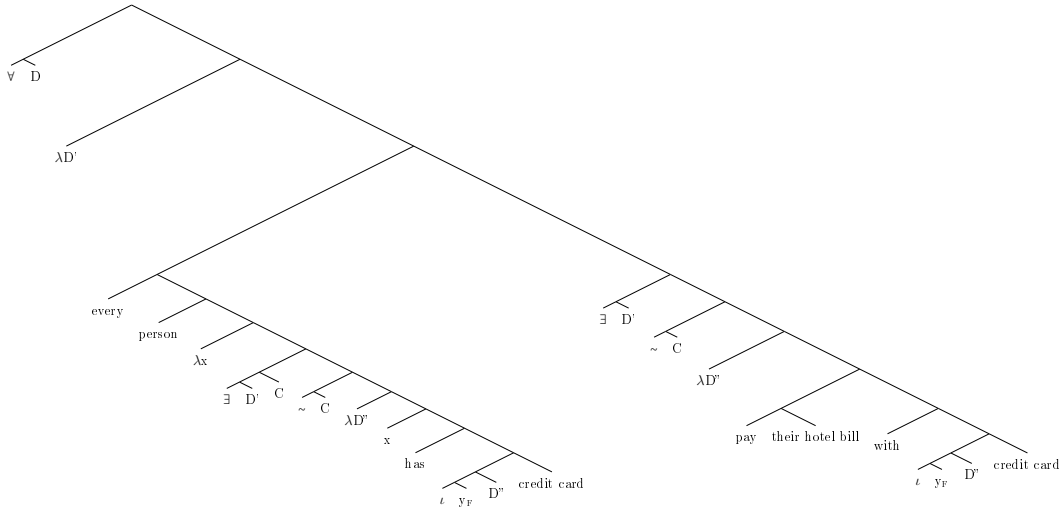


The asymmetric reading is a bit more tricky. Earlier, we had this example:

(120) If a man has [a quarter]$_1$, he puts it$_1$ in the meter.

We said that we want this to mean that if there is a man that has at least one quarter, then there is a quarter (in the group of quarters that he has) that he puts in the meter. So for the credit card examples, we would like to say that everyone who owns one or more credit cards is such that there is a credit card in the group of cards he owns that he pays the hotel bill with. This is actually quite easy to accomplish:

(121) Jeder, der eine Kreditkarte hat, zahlt seine Hotelrechnung mit ihr.
everyone who a credit card has pays their hotel bill with it
"Everyone who has a credit card, pays their hotel bill with it."



The reading we produce here is "Everyone who is such that there is a credit card they have, is such that there is a credit card they pay their hotel bill with." This is exactly the reading we had in mind. This solution, however, requires us to accept two assumptions: The first one is that a domain of credit cards is such that it contains credit cards belonging to the same person. The second one is that we can have existential closure for pronouns. With regard to the first, this is not automatically given, but in contexts where we have another prominent way of grouping credit cards, the prominent reading tends to be one in which we do not get an asymmetric reading:

(122) Context: A bank made a mistake with regard to their credit cards, so they did a recall.

a. "Everyone who has a credit card sends it in."

In (122), an asymmetric reading seems unavailable. This can be made even clearer with a minimal pair, where only the context is changed:

(123) "Everyone who has a credit card uses it at least once per month."

a. Context: We looked at how often people use credit cards.

b. Context: We looked at how often credit cards are used.

In context (123-a.), the prominent way to group credit cards would be by owner. In (123-b.), the prominent grouping is to handle each credit card seperately. And, as expected, in context (123-a.), the prominent reading is

asymmetric, while in (123-b.), it is symmetric.

The second assumption we would need to accept for the solution presented here, would be that we can have existential closure for pronouns. This is a bit more problematic. If that were the case, we would predict that we cannot have an asymmetric reading, if there is a critical intervener above the pronoun.

(124) a. Jeder, der eine Kreditkarte hat, erlaubt Peter, sie zu verwenden.
everyone who a credit card has allows Peter it to use
"Everyone who has a credit card, allows Peter to use it."

b. Jeder, der eine Kreditkarte hat, erlaubt nur Peter, sie zu verwenden.
everyone who a credit card has allows only Peter it to use
"Everyone who has a credit card, allows only Peter to use it."

While sentence (124-a.) has an asymmetric reading, which would still be true, if an owner of three credit cards allows Peter to use one of them, (124-b.) does not have the corresponding reading. (124-b.) is falsified by an owner of three credit cards that allows Mary to use two of them, but only lends the third one to Peter. We can observe the same effect if a DE operator is in the way:

(125) Jeder, der eine Kreditkarte hat, bezahlt seine Hotelrechnung
everyone who a credit card has pays their hotel bill
nicht mit ihr.
not with it
"Everyone who has a credit card, does not pay their hotel bill with it."

Again, the sentence would be falsified by someone who has two credit cards and always pays her hotel bills with the first one, but never the second one. These effects are predicted by the process we use to generate asymmetric readings.

In order to not predict that pronouns can generally be used like indefinites, we will need some restrictions. We do not want the entity variable in a pronoun to carry focus, if the element that it refers to is something other than an in-

definite. This is doable: Following Elbourne (2005)'s approach, pronouns are the phonological realization of a definite article with an elided noun phrase. A constraint that restricts the presence of focus in elided constituents to constituents whose antecedent also has focus, seems natural and in line with the identity condition on ellipsis.

The second restriction is that we do not want that focus to be evaluated by a quantifier or rather by anything that is not $\exists$. This falls out from what we already did: In the preceding section, we argued that the ι-operator in a pronoun comes with an additional restriction: The entity variable needs to be the central element in the domain of ι. This makes it impossible for a quantifier to evaluate the focus, as evaluation by a quantifier requires a stable context referent which is independent of the domain bound by the quantifier. In the case of a pronoun, this context referent would need to be the central element of said domain. In addition, a quantifier that evaluates the focus of something, also binds the domain of that thing. The central element of that domain now has to have the property denoted by the restrictor of that quantifier. The result would then be that the quantifier binds the pronoun. We cannot fulfill both requirements at once, so this restriction is actually already there.

The third restriction we need is one that allows us to restrict the presence of focus in a pronoun to cases, where the salient way of grouping for the domain is not one where each entity in the domain is a sensible group. We only want an asymmetric reading to be available, when there is no discernible salient entity in the domain. If we are talking about kids that might wreck the car, each one is a discernible salient entity, but if we are talking about a handfull of quarters, this is not the case. We can get this through Heim's novelty condition:

(126) Novelty Condition:
An indefinite NP must not have the same referential index as any NP to its left.
(Heim 1982[p.100])

In this framework, this would translate to (127)[8]:

(127) Novelty Condition:
The entity variable of an ι-construction can only carry focus if it does not refer to a context referent that was already introduced.

This implementation of the novelty condition, which we would need anyway, gives us the third restriction. As a neat side-effect, this also stops a pronoun that is c-commanded by the indefinite it refers to to carry focus, as there necessarily would be a context referent available that the entity variable in the pronoun would refer to.

As said in the beginning of this section: This is just a first analysis. Extending this needs to be left to future research.

3.6 Conclusion

The approach presented here now correctly predicts all parts of our table. The scope taking behaviour of indefinites and their sensitivity to strong interveners is predicted, as well as their behaviour in the presence of weak interveners. We also correctly predict the peculiarities of donkey constructions, as well as their specific flavour of sensitivity to critical interveners.

The tools we used are mostly things that are used for other phenomena as well. Those that are not, are instead close relatives to ones that are. We assumed that indefinites are not bona fide quantifiers and that their quantificational force is separate from their lexical content. The actual indefinite is, similar to what Kratzer and Shimoyama (2002) assume, a source of alternatives and essentially structurally identical to a wh-item. For this structure, we assumed what Rullmann and Beck (1998b) proposed for wh-items and what Romero and Novel (2013) use to avoid Shan (2004)'s problems: The indefinite

[8] A more precise version would probably be "The entity variable of an ι-construction can only carry focus if it does not refer to a context referent that was already introduced *in this domain or another domain derived from the same domain that this domain was derived from.*" But this is a discussion for another time.

is a definite description that contains an entity variable, which is the actual source of alternatives. These alternatives are evaluated by a covert closure operator that provides the existential force of the indefinite. This closure operator binds the domain variable of the indefinite and, as we would expect from an element that is essentially a quantifier, has a bindable domain of its own.

To facilitate binding of pronouns, we assumed, similar to Elbourne (2013), that a pronoun is also a definite description. What gets bound in the pronoun is also the domain. This whole process of domain binding is very similar to what is done in situation semantics, where a situation variable in the pronoun would be what gets bound. The similarity to situation semantics extends to the domains themselves, which contain entities that are used to create new domains, a process that is similar to the creation of minimal situations that are themselves part of larger situations. It is also very similar or identical to what is done in von Fintel (1994) and Martí (2003) among others.

Since the scope of indefinites is restricted by focus sensitive interveners as well as non-UE quantifiers, we assumed, similar to to the approach in Eckardt (1999), that quantifiers can make use of focus. To explain why this is not the case for UE quantifiers, we introduced the notion of focus informativity, which is a property of all non-UE quantifiers. We also showed that FI quantifiers can evaluate the alternatives produced by indefinites and thereby create intermediate scope readings by creating a context referent in their domain, which can be inherited upwards to the domain of a higher quantifier binding the domain of the one that originally evaluated the alternatives, a process that can be repeated, allowing the indefinite to take seemingly arbitrary scope. We saw that this process gets interrupted by DE quantifiers, as they cannot inherit this context referent upwards.

We also assumed that the alternatives created by the indefinite can be evaluated by other operators, for example as contrastive topic focus. All of this can be circumvented by having the entity variable in the indefinite refer to a specific entity. This allows for widest scope readings, which are always available.

For donkey constructions that have the indefinite embedded in a DE environment, we introduced another closure operator, universal closure, which is not a focus evaluating operator, but binds the domain of the existential closure operator. This operator is not exactly new either, as it has been - though not in this specific form - proposed by De Swart (2001). With this operator, we were also able to create the asymmetric readings encountered in proportion problem sentences and were able to correctly predict that these readings are - in contrast to symmetric readings - sensitive to the presence of critical interveners above the pronoun.

As a side effect, this approach correctly predicts that indefinites and non-UE quantifiers cause intervention effects in wh-questions and allows us to extend Beck (2006)'s analysis of intervention effects to quantifiers and indefinites. Additionally, our system allows us to bind the domains of quantifiers without the need to split said domain into a bindable entity and a relation, as is done for example in von Fintel (1994), while still capturing the crossover effects observed in Martí (2003).

Chapter 4

Interactions of Focus Machinery

4.1 Introduction

The goal of this chapter is twofold: I will attempt to show how this approach interacts with other areas of investigation and how it can be used to gain further insight into these areas. The second goal is to examine the interactions between different alternative evaluating operators and to develop a tool that allows the user to establish a starting point for further investigation into related topics. This will be done via these interactions and should allow the user to see overlap with related areas and generate some default predictions from the get go.

I will start by showing what our approach can do for another area of investigation, namely polarity items. To do this, I will give an overview over one strand of approaches which, to me, seems quite compatible with what we did in the last chapter. I will then go on to illustrate what our approach automatically predicts about negative polarity items, positive polarity items and free choice items. Adding some minor assumptions, I will attempt to show that this approach can correctly predict most of the behaviour of these elements.

The last section will, as promised above, investigate interactions between different critical interveners. These interactions can be categorized into a kind of hierarchy of critical interveners. This hierarchy provides a frame with which to categorize critical interveners, thereby allowing us to group different inter-

veners into categories that can serve as a starting point in investigating their similarities and differences. The hierarchy is defined by two elements: The properties of the intervener (is focus evaluation obligatory and what kind of focus is evaluated) and three general rules of focus evaluation that govern the interaction between focus evaluating operators depending on their properties.

4.2 Polarity Items

There is a substantial amount of literature that discusses polarity items and free choice items, the variety of which rivals the one found in the literature dedicated to indefinites. One thing that most approaches agree on, however, is that polarity/free choice items and indefinites are closely related. In this section, the goal is not to provide a full fledged analysis of these phenomena, but to show that the approach presented here is very compatible with several current approaches. To do this, I will start by discussing one line of approach that seems to be particularly compatible with the assumptions we made about indefinites in the last chapter. I will then go on to show how our approach could handle polarity and free choice items. We will find that the conditions we have to place on polarity items to make them negative polarity items (NPI), positive polarity items (PPI) or free choice items (FCI) are quite similar to assumptions made in other approaches.

4.2.1 Current Approaches

Lahiri (1998)

Lahiri (1998) provides an analysis of Hindi NPIs on the basis of the way they are constructed. Hindi NPIs consist of an indefinite and the additive particle "bhii", which, if used on its own, corresponds to English "even" or "also".

(1)

ek bhii:	'any, even one'	ek:	'one'
koii bhii:	'anyone, any (count)'	koii:	'someone'
kuch bhii:	'anything, any (mass)'	kuch:	'something, a little'
zaraa bhii:	'even a little'	zaraa:	'a little'
kabhii bhii:	'anytime, ever'	kabhii:	'sometime'
kahiiN bhii:	'anywhere'	kahiiN:	'somewhere'

The meaning contribution of "bhii" is, following Lahiri (1998), an additive implicature:

(2) raam bhii aayaa
Ram BHII came
Assertion: Ram came
Implicature: $\exists x[x \neq \text{Ram} \ \& \ x \text{ came}]$

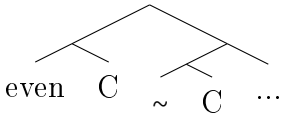
If we add focus on "raam", the contribution changes slightly, as an additional implicature arises, namely that Ram was the least likely to come.

(3) raam_{F} bhii aayaa
Ram BHII came
Assertion: Ram came
Implicature 1: $\exists x[x \neq \text{Ram} \ \& \ x \text{ came}]$
Implicature 2: $\forall x[x \text{ came} \rightarrow \text{likelihood}(x \text{ came}) > \text{likelihood}(\text{Ram came})]$

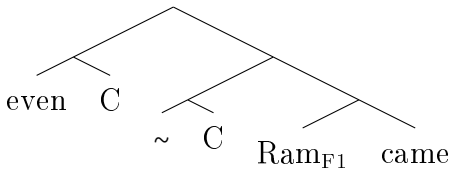
So if there is no focus, "bhii" is similar to English "also" and if there is focus, "bhii" is similar to English "even". For "even", we would assume a lexical entry like (4), which would cover the contribution of "bhii" as described above:

(4) $[\![\text{even}]\!] =$
$\lambda C_{<<s,t>,t>}.\lambda P_{<s,t>}.\lambda w.$
$\exists P'[P' \in C \ \& \ P' \neq P \ \& \ P'(w)] \ \&$
$\forall P''[P'' \in C \ \& \ P''(w) \rightarrow \text{likelihood}(P''(w)) > \text{likelihood}(P(w))]$

The structural environment of "even" would be identical to what we would assume for "only":



For the example above, we would get the following structure:



Our set of alternatives would now look like (5-a.), resulting in the proposition in (5-b.):

(5) a. $g(C) \subseteq \{\lambda w.\ came(h(1))(w) \mid h \in D_{<h>}\}$
(e.g. $\{[\lambda w.came(Ram)(w)],[\lambda w.came(Sita)(w)],[\lambda w.came(Mohan)(w)]\}$
b. $\lambda w.\exists P'[P' \in C \ \&\ P' \neq [\lambda w'.came(Ram)(w')] \ \&\ P'(w)] \ \&$
$\forall P''[P'' \in C \ \&\ P''(w) \rightarrow likelihood(P''(w)) > likelihood(came(Ram)(w))]$

So what we are saying is "Ram came, someone else came and of those who came, Ram was the least likely." This works fine. But if we replace Ram with an existential, we produce a contradiction:

(6) *koii bhii aayaa
someone BHII came
"Even someone came."

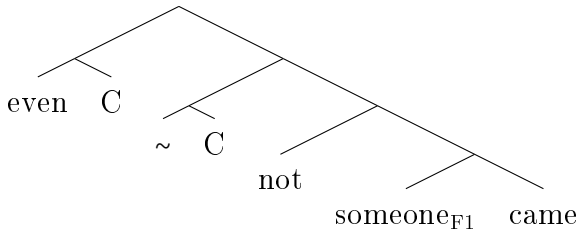
The alternatives to "someone" are its scalar alternatives, for example "exactly three". This would mean that the set of alternatives would now look like (7-a.), resulting in the proposition in (7-b.):

(7) a. $g(C) \subseteq \{[\lambda w.\exists x[came(x)(w)]],[\lambda w.\exists !3x[came(x)(w)]]\}$
b. $\lambda w.\exists P'[P' \in C \ \&\ P' \neq [\lambda w'.\exists x[came(x)(w')]] \ \&\ P'(w)] \ \&$
$\forall P''[P'' \in C \ \&\ P''(w) \rightarrow likelihood(P''(w)) > likelihood(\exists x[came(x)(w)])]$

This is a problem, since all scalar alternatives to "someone came" entail "someone came". There can be nothing in C that is more likely, but one element in C has to be true and the true alternatives in C have to be more likely. The structure above produces a contradiction. This is not the case, if the existential

is embedded under a DE operator:

(8) koii bhii nahiiN aayaa
someone BHII didn't come
"Noone came."



The set of alternatives is (9-a.), resulting in (9-b.):

(9) a. g(C)⊆{[λw.¬∃x[came(x)(w)]],[λw.¬∃!3x[came(x)(w)]]}
b. λw.∃P'[P'∈C & P'≠[λw'.¬∃x[came(x)(w')]] & P'(w)] &
∀P"[P"∈C & P"(w) → likelihood(P"(w)) > likelihood(¬∃x[came(x)(w)])]

This works. ¬∃!3x[came(x)(w)] entails ¬∃x[came(x)(w)], but not the other way around, so we can quite convincingly argue that it is more likely that ¬∃!3x[came(x)] than ¬∃x[came(x)]. So now we do have a true alternative that is more likely and no contradiction arises. Thus, Lahiri (1998) correctly predicts the distribution of Hindi NPIs, restricting them to downward entailing environments. It should be noted that in Lahiri (1998)'s implementation, what is focused is not the existential quantifer, but a very weak predicate, namely the cardinality predicate "one", which is true of everything that exists.

Some very interesting elements employed in this approach that we should keep in mind: The approach relies on a combination of existential and universal quantification. The combination is only licensed if the existential part is embedded in a DE environment and the universal part is above this environment. In addition, we have a focus evaluating component associating with a focused indefinite. This sounds quite familiar.

Chierchia (2006)

Chierchia (2006) proposes an approach that is similar to Lahiri (1998)'s. The basic assumption is that there are two ways to strengthen a statement: A covert

version of "only" (O) and one of "even" (E). If alternatives of some kind are available (for example through focus on some element), these operations can be used to essentially evaluate these alternatives, using them to strengthen the statement. "$p \sqsubseteq_c q$" is used to say that p is stronger/less likely than q relative to a common ground c

(10) a. $E_C(p) = p \;\&\; \forall q \in C[p \sqsubseteq_c q]$, where C = ALT
b. $O_C(p) = p \;\&\; \forall q \in C[q \rightarrow p \sqsubseteq_c q]$, where C = ALT

The answer in (11) can either have the reading in (11-a.) or the one in (11-b.), depending on which of these operations we use:

(11) Q: Who came?
A: Peter_F came.
a. A lot of people came. Even Peter.
b. Noone came. Only Peter.

In (11-a.), a lot of people came, the most unexpected of which was Peter, so stating that (E_C) Peter came implies that everyone who was more likely to come did so as well. In (11-b.), it was not unlikely that Peter would come, so stating that (O_C) Peter came implies that noone else did.

The idea is now that the difference between NPI indefinites and regular indefinites is that NPIs have incorporate domain widening. Their domain is required to be the largest one available. This domain is focused. The result of focus on a wide domain is that all alternatives to that domains are subsets of it. These alternatives can only be used by E_C, since O_C would not actually strengthen anything, as the result of using any of the alternative domains is entailed by using the original domain. The result is very similar to what Lahiri (1998)'s approach does. Assume a domain consisting of two people, Aaron (a) and Bertha (b).

(12) *Anyone came.

This sentence would have the (unstrengthened) assertion in (13-a.) and the alternatives in (13-b.).

(13) a. $\exists x[x \in \{a,b\} \,\&\, x \text{ came}]$
b. $\exists x[x \in \{a\} \,\&\, x \text{ came}]$
$\exists x[x \in \{b\} \,\&\, x \text{ came}]$

The result would be that E_C would produce the following implicature:

(14) $\exists x[x \in \{a,b\} \,\&\, x \text{ came}] \subseteq_c \exists x[x \in \{a\} \,\&\, x \text{ came}]$
$\exists x[x \in \{a,b\} \,\&\, x \text{ came}] \subseteq_c \exists x[x \in \{b\} \,\&\, x \text{ came}]$

This creates the same problem encountered in Lahiri (1998)'s approach: $\exists x[x \in \{a,b\} \,\&\, x \text{ came}]$ is asymmetrically entailed by $\exists x[x \in \{a\} \,\&\, x \text{ came}]$ as well as $\exists x[x \in \{b\} \,\&\, x \text{ came}]$, so the implicature that $\exists x[x \in \{a,b\} \,\&\, x \text{ came}]$ is a stronger statement can never be the case in a non-DE environment.

Some interesting elements of this approach that we might want to keep in mind are again the combined use of existential and universal quantification which only works if the existential is within a DE environment and the universal above. In addition to that, quantification over alternatives is used in a way that is quite similar to what we did: In Chierchia (2006)'s approach, the alternatives that get quantified over differ with regard to what the domains contain, while in our approach, the alternatives differ with regard to what the domains that are quantified over contain.

Chierchia (2013)

The approach proposed in Chierchia (2013) can be seen as a successor of the one presented in Chierchia (2006). The crucial difference, however, is that in this approach, the effect is due to the O operator, which, in a Roothian framework, would look like this[1]:

(15) $[\![O]\!] =$
$\lambda C_{<<s,t>,t>}.\lambda p_{<s,t>}.\lambda w.\ p(w) \,\&\, \forall q[q \in C \,\&\, q(w) \rightarrow p \vDash q]$

This allows for a sleeker system. The assumption is still that the domain of

[1] This is a bit of a simplification, as Chierchia (2013) differentiates between different kinds of alternatives, such as scalar alternatives and domain alternatives. This is not relevant for the discussion at hand.

the NPI is obligatorily focused and that this focus has to be evaluated, but we do not require the domain to be widened. The only important thing is that the set of alternatives to a given domain includes all subsets of that domain. The effect is then quite similar. Let us return to the example above:

(16) *Anyone came.

Again, we get the assertion in (17-a.) and the alternatives in (17-b.). There might be other alternatives as well, but as long as those given below are present, the effect persists.

(17) a. $\exists x[x \in \{a,b\} \,\&\, x \text{ came}]$
b. $\exists x[x \in \{a\} \,\&\, x \text{ came}]$
$\exists x[x \in \{b\} \,\&\, x \text{ came}]$

Since (17-a.) does not entail any of the alternatives in (17-b.), both of them must be excluded by O. Applying O to the sentence above yields the following result:

(18) $g(C) \subseteq \{\exists x[x \in \{a\} \& x \text{ came}], \exists x[x \in \{b\} \& x \text{ came}]\}$

a. $\exists x[x \in \{a,b\} \,\&\, x \text{ came}] \,\&$
$\forall q[q \in g(C) \,\&\, q \rightarrow \exists x[x \in \{a,b\} \& x \text{ came}] \models q]$
It follows that

b. $\exists x[x \in \{a,b\} \& x \text{ came}] \models \exists x[x \in \{a\} \& x \text{ came}] \vee \neg\exists x[x \in \{a\} \& x \text{ came}]$
$\exists x[x \in \{a,b\} \& x \text{ came}] \models \exists x[x \in \{b\} \& x \text{ came}] \vee \neg\exists x[x \in \{b\} \& x \text{ came}]$
And since

c. $\exists x[x \in \{a,b\} \& x \text{ came}] \not\models \exists x[x \in \{a\} \,\&\, x \text{ came}]$
$\exists x[x \in \{a,b\} \& x \text{ came}] \not\models \exists x[x \in \{b\} \,\&\, x \text{ came}]$
It follows that

d. $\neg\exists x[x \in \{a\} \,\&\, x \text{ came}]$
$\neg\exists x[x \in \{b\} \,\&\, x \text{ came}]$
If we combine this with a., we get

e. $\exists x[x \in \{a,b\} \,\&\, x \text{ came}] \,\&$
$\neg\exists x[x \in \{a\} \,\&\, x \text{ came}] \,\&$
$\neg\exists x[x \in \{b\} \,\&\, x \text{ came}]$

f. $= \bot$

We get a contradiction: Either Aaron or Bertha or both came, but Aaron did not come and Bertha did not come. If we put the NPI in a downward entailing environment instead, everything works out fine:

(19) It is not the case that anybody came.

(20) g(C)⊆{¬∃x[x∈{a}&x came], ¬∃x[x∈{b}&x came]}

a. ¬∃x[x∈{a,b} & x came] &
∀q[q∈g(C) & q → ¬∃x[x∈{a,b}&x came]⊨q]
And since

b. ¬∃x[x∈{a,b}&x came]⊨¬∃x[x∈{a} & x came]
¬∃x[x∈{a,b}&x came]⊨¬∃x[x∈{b} & x came]
The statement is consistent.

This works fine, no contradiction is created. The similarities to our approach persist: We have covert focus and the alternatives differ with regard to the domains. We also still have existential quantification in the DE environment, but universal quantification does not seem to happen anymore. This is due to the DE environment. In the example above, our approach would universally quantify over domains that contain either Aaron or Bertha or both. Within the DE environment, we would then existentially quantify over domains that contain either Aaron or Bertha. Chierchia (2013)'s approach restricts NPIs to environments, in which existentially quantifying over domains that contain either Aaron or Bertha or both only works, if the result of existential quantification over the domain containing Aaron and Bertha entails the result of existentially quantifying over domains that contain either Aaron or Bertha. And since the NPI quantifies over the domain containing Aaron and Bertha, both approaches produce identical results.

4.2.2 Polarity Items as Indefinites

Negative Polarity Items

If we treat NPIs as regular indefinites, we get the correct truth conditions in DE environments, as long as we use existential closure and universal closure, but cannot correctly predict their distribution. Chierchia (2013)'s approach

assumes that an NPI has an obligatorily focused domain, which must be evaluated by O. This restricts the NPI to DE environments. Analogously, we could assume that NPIs require that the domain variable of existential closure gets bound by universal closure. This would also restrict NPIs to DE environments, as those are the only environments, which allow for universal closure. In addition, this would capture the intuition of domain widening. If we use universal closure, we cannot restrict the domain of existential closure through other means, essentially forcing the statement to be true for the largest domain.

In addition to that, we would need to make sure that the entity variable contained in the NPI does not receive a value through other means. We do not want the focus to be evaluated by a quantifier and we do not want the entity reading. Both of them have in common that the entity variable receives a value from the (local) context. In case of the entity reading, the variable denotes some specific entity in the context, while focus evaluation through a quantifier would describe a relation between the alternatives and the ordinary semantic value of the variable, which would in turn be an entity that is available in the (local) context. We can get rid of both of these readings by assuming the following:

(21) 'any' does not refer to a context referent that is available above the operator that evaluates the alternatives produced by 'any'.

This forces existential closure, as all other options are now barred. But this has another effect as well: If $\exists$ evaluates the alternatives generated by 'any', it produces a context referent that is stable relative to $\exists$. This is a problem, except if $\exists$ is closed by universal closure. In that case, universally quantifying over the domain variable of $\exists$ immediately makes the context referent unavailable again.

To formally implement the (quite vague) rule above, I would propose that, similar to pronouns, ι for 'any' comes with an added restriction: The entity variable in an NPI does not have an ordinary semantic value. Since this would lead to an automatic presupposition failure for the ι-operator, I would also propose that the argument slot for the entity variable is only "active", if the variable is defined.

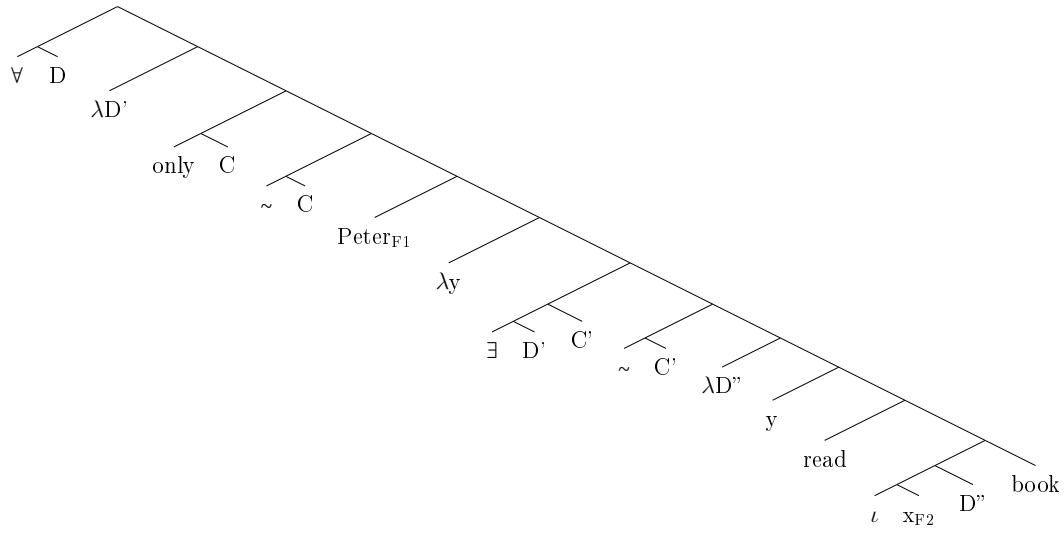
(22) a. $[\![[\iota\ x]D]\!]$ (x is defined)=
$\lambda D_{<e,t>}.\lambda f_{<e,t>}$:$\exists!y[f(y)\&D(y)\&y=x]$.The unique y:f(y)&D(y)&x=y

b. $[\![[\iota\ x]D]\!]$ (x is undefined)=
$\lambda D_{<e,t>}.\lambda f_{<e,t>}$:$\exists!y[f(y)\&D(y)]$.The unique y:f(y)&D(y)

This assumption is analogous to Chierchia (2013)'s assumption that NPIs have an obligatorily focused domain: If the variable cannot have an ordinary semantic value, it can only have an effect, if it is focused. This focus cannot be evaluated by a quantifier, as this would require an ordinary semantic value for the variable. It cannot receive a value from the context, as this would be the ordinary semantic value. And it cannot receive existential closure outside of a DE environment, as this would require a salient entity in the context that satisfies the presupposition of the ι-operator and which would fulfill all criteria for the entity variable. In these cases, the variable would de facto have an ordinary semantic value. Effectively, we could argue that "any" is the phonological realization of the "weaker" ι-operator in (22-b.). If there is an entity available that is a de facto ordinary semantic value of the variable, "any" would not be the expected realization. This restricts NPIs to DE environments. But it will not suffice to explain (23):

(23) Only Peter read any book.

(23) is problematic for this account, as we would currently expect the following structure:



This will not work, as it produces the right truth conditions, but an unwanted presupposition. Right now, this produces the truth conditions in (24-a.). The problem is that "only" presupposes the truth of the proposition denoted by the ordinary semantic value. This would result in the presupposition in (24-b.):

(24) a. λw.∀D'[D'⩽D → ∀p[p∈C & p(w) → p= λw'.∃D"[D"⩽D' & ∃p'[p'∈C' & p'(D")(w)] & Peter read ιx[book(x)&D"(x)] in w']]]
"All domains are such that if someone read the book in that domain, it was Peter who did so."
g(C)⊆
{λw'.∃D"[D"⩽D' & ∃p'[p'∈C' & p'(D")(w)] & h(1) read ιx[book(x) & D"(x)] in w'] | h∈$D_{<h>}$}
g(C')⊆
{λD.λw. y read ιx[book(x) & D(x) & x=h(2)] in w | h∈$D_{<h>}$}

b. PSP of "only":
∃D"[D"⩽D' & ∃p'[p'∈C' & p'(D")(w)] & Peter read ιx[book(x)&D"(x)] in @]

The presupposition in (24-b.) restricts D' to domains from which we can derive a domain D" that contains a book that Peter read. This weakens the truth conditions drastically. Universal closure is now restricted to these domains, which makes the truth conditions "All books that Peter read are such that only Peter read them." To fix this, let us go back to the preceding chapter: It has been noted that in (25), the domain of "no student" is restricted to the

class that "only one class" refers to.

(25) Only one class was so bad that no student passed the exam.

We had a version of "only" that would take care of that:

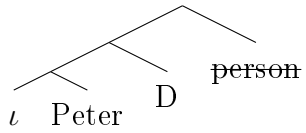
(26) ⟦only⟧ (nearly final version)=
$\lambda C_{<<<e,t>,<s,t>>,t>}.\lambda P_{<<e,t>,<s,t>>}.\lambda w.\ \ \forall D[\exists P'[P' \in C\ \&\ P'(D)(w) \rightarrow P'=P]]]$

Let us make a slight change to this entry to bring it in line with the other quantificational elements and add the presupposition:

(27) ⟦only⟧ (final version)=
$\lambda D_{<e,t>}.\lambda C_{<<<e,t>,<s,t>>,t>}.\lambda P_{<<e,t>,<s,t>>}.\lambda w{:}\ \exists D'[D' \leqslant D\ \&\ P(D')(w)].$
$\forall D'[D' \leqslant D\ \&\ \exists P'[P' \in C\ \&\ P'(D')(w) \rightarrow P'=P]]]$

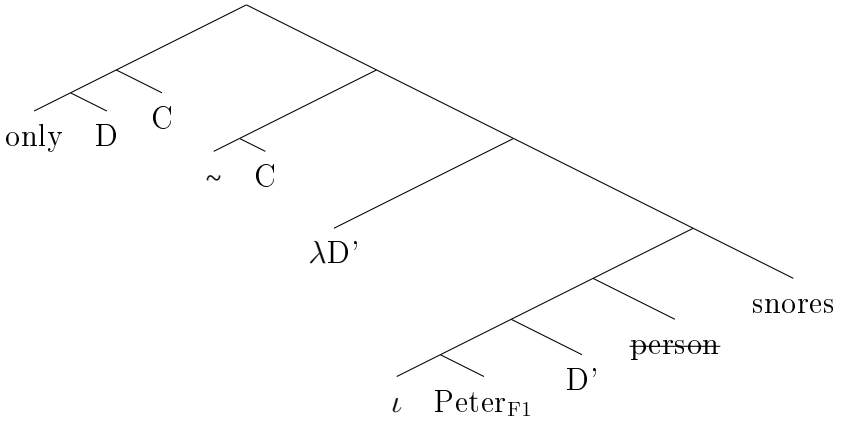
To further unify, I will assume that names are internally complex as well, but in an entirely unsurprising way:

Peter =



A sentence like (28) then receives the following structure and truth conditions:

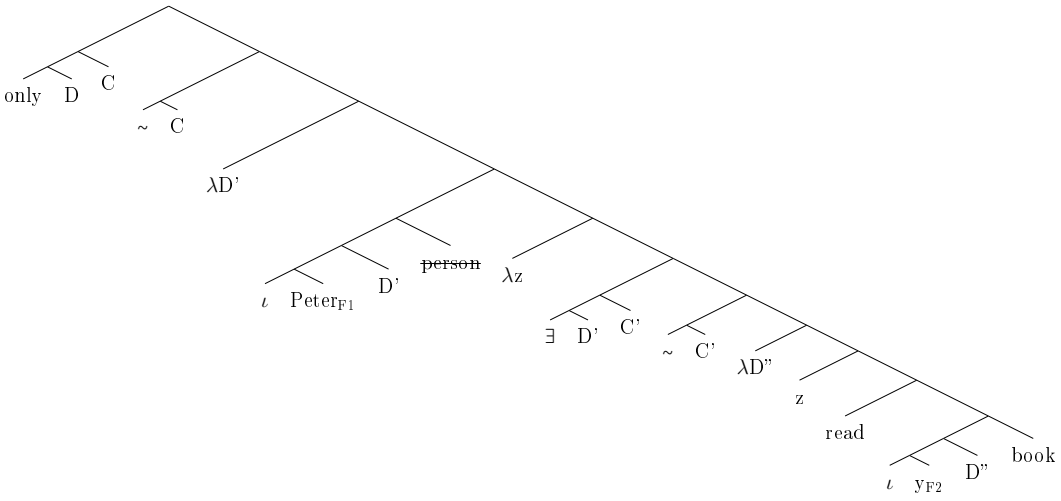
(28) Only Peter_{F1} snores.



(29) λw.∀D'[D'⩽D&∃P'[P'∈C&P'(D')(w)]→P'=λD".λw'.ιx[D"(x) & x=Peter] snores in w']
g(C) ⊆
{λD.λw. ιx[D(x) & x=h(1)] snores in w | h∈D$_{<h>}$}
PSP: ∃D'[D'⩽D & ιx[D(x) & x=Peter] snores in w]

This works quite well. This lexical entry of "only" also has the nice side effect of universally quantifying over domains, which means it could replace universal closure if we have an NPI. The example from above would then get this structure instead:

(30) Only Peter read any book.



We would now get the following truth conditions:

(31) λw.$\forall$D'[D'$\preccurlyeq$D & $\exists$P'[P'$\in$C & P'(D')(w)] $\rightarrow$ P'=
λD".λw'.$\exists$D"'[D"'$\preccurlyeq$D" & $\exists$p'[p'$\in$C' & p'(D"')(w')] & ιx[D"(x) & x=Peter]
read ιy[book(y) & D"'(y)] in w']]
g(C)$\subseteq$
{λD.λw.$\exists$D'[D'$\preccurlyeq$D & $\exists$p'[p'$\in$C' & p'(D')(w)] & ιx[D(x) & x=h(1)] read
ιy[book(y) & D'(y)] in w] | h$\in D_{<h>}$}
g(C')$\subseteq$
{λD.λw. z read ιy[book(y) & D(y) & y=h(2)] in w | h$\in D_{<h>}$}
PSP of "only":
$\exists$D'[D'$\preccurlyeq$D & $\exists$D"[D"$\preccurlyeq$D' & $\exists$p'[p'$\in$C' & p'(D")(w')] & ιx[D'(x) & x=Peter]
read ιy[book(y) & D"(y)] in @]]

So now, the truth conditions are "If there is a domain containing x from which we can derive a domain containing a book that x read, that x is Peter" and the presupposition is "There is a domain containing Peter from which we can derive a domain containing a book that Peter read." This is what we want. "only" replaces universal closure by binding the domain of existential closure via universal quantification.

This is not unproblematic, however. If a universal quantifier can replace universal closure, we would expect items like "every" and "must" to license NPIs. Instead, they interrupt licensing. Let us have a look at an example and see what happens:

(32) *Everyone reads any book.

In this scenario, the ungrammaticality is expected: There is a focused element in the scope of "every", so it attempts to associate with this focus. The effect is that we get truth conditions that roughly look like this:

(33) Every domain that contains a person and a book that the person reads is such that the person reads the book.

The "weak" ι-operator in the NPI restricts the domains to ones that contain exactly one book. This makes the sentence trivially true. But the configuration we see with "only" is that it associates with another focused element and just

binds the domain of existential closure. So a better example would be (34):

(34) *Everyone saw Peter_{F} read any book.

This would result in truth conditions along these lines:

(35) Every person-domain D which we can derive a domain D' that contains a book such that the person in D saw someone read the book in D' is such that we can derive a book-domain D" such that the person in D saw Peter read the unique book in D".

The problem here is that "every" quantifies over domains that contain a person that saw someone read a book. We then assert that this person saw Peter read a book. This means that part of what defines the person-domain D is that there is a book-domain D' available from there. So existential closure quantifies over domains in which there has to be a viable book that the index of the entity variable in the indefinite can be mapped to. This prohibit the use of "any", as discussed above. From the notion of the entity variable not having an ordinary semantic value, we can already predict a lot:

(36)
a. "any" is an indefinite that contains an obligatorily focused entity variable which cannot have an ordinary semantic value.
b. This focus needs to be evaluated by existential closure, as all other methods will fail.
c. Existential closure needs to have the same effect for all values that its domain could receive. If this is not the case, there is an entity that is the ordinary semantic value of the entity variable.
d. The domain of existential closure needs to be bound by a universal quantifier. Anything else would violate c.

In a DE environment, we have access to universal closure, which works fine. If the next available universal quantifier is "only", things also work out. If, however, there is another universal quantifier, it either tries to associate with the focus in the NPI (which fails) or has associated with a focused element above the NPI, which in turn makes the NPI part of the alternatives, requiring the presence of at least one entity that the entity variable in the NPI could be

mapped to. Even if we have existential closure below said universal quantifier and the universal quantifier binding the domain of existential closure, we create local context referents. For each value that the universal quantifier maps to the bound domain, there is a context referent. So universal quantifiers like "every" are predicted to interrupt NPI licensing.

Positive Polarity Items

Positive polarity items like "some" are quite analogous to negative polarity items. Where the condition on the use of "any" was that there is no entity available that the variable could be mapped to, we can simply turn this around for "some": The condition for using "some" is that it does create a context referent.

(37) 'some' refers to a context referent that is available above the operator that evaluates the alternatives produced by 'some'.

The assumption would be that "some" is a phonetic realization of an ι-operator whose entity variable needs to be stable relative to the evaluating operator. If it takes scope via existential closure, the lowest point in the structure where the context referent can be introduced is right below the operator that binds the domain of existential closure. This essentially makes it a regular indefinite with one exception: It cannot be construed as taking scope in the immediate scope of negation.

(38) Peter did not read some book.

a. Available:
"There is a book that Peter did not read."
b. Unavailable:
"It is not the case that there is a book that Peter read."

Negation, just as other downward entailing operators, is a barrier for the scope of indefinites. Negation can be focus sensitive, in so far that it can negate a specific alternative, thereby creating the inference that there is at least one true alternative. In (39-a.) and (39-b.), the assertion is the same, but (39-b.)

implies that I saw someone else.

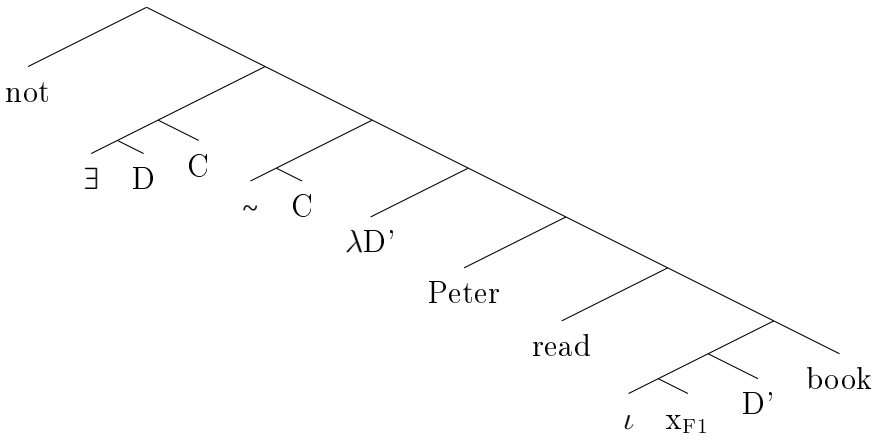
(39) a. I did not see Peter.
b. I did not see Peter_{F}.

To account for this, we can assume the following lexical entries for negation:

(40) a. $[\![\text{not}_{\text{O}}]\!]=$
$\lambda p_{<s,t>}.\lambda w.\neg p(w)$
b. $[\![\text{not}_{\text{F}}]\!]=$
$\lambda C_{<<s,t>,t>}.\lambda p_{<s,t>}.\lambda w.\forall p'[p'\in C \ \& \ p'(w) \rightarrow p'\neq p]$

Since (40-b.) quantifies over alternative propositions p' such that $p'\in C$ & p'(w), we assume that the set of these propositions is not the empty set, which means that there is at least one true alternative. Since negation is focus evaluating, it comes with ~, which means that we cannot have existential closure above negation associating with the focus in an indefinite below. We have two options: Existential closure below negation or negation itself evaluating the alternatives created by the indefinite. Let us have a look at the first case:

(41) Peter did not read some book.



This would generate the following truth conditions:

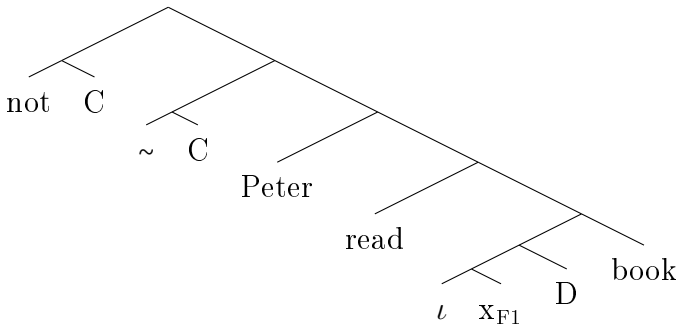
(42) $g(C)\subseteq\{\lambda D'.\lambda w.$ Peter read $\iota y[D'(y)$ & book(y) & $y=h(1)]$ in w $\mid$ $h\in D_{<h>}\}$
$\lambda w.\neg\exists D'[D'\lesssim D \ \& \ \exists p'[p'\in C \ \& \ p'(D')(w)] \ \&$ Peter read $\iota y[D'(y)$ & book(y)

& y=x] in w]
"There is no D' that contains a book, which is equivalent to x, that Peter read."

The context referent that x refers to now needs to be introduced at some point in the structure. It cannot be below existential closure, but it cannot be between negation and existential closure either: Negation does not bind the domain of existential closure, so we have no reason to assume that the context referent is not stable relative to negation. The context referent is thus available above negation, which results in a wide scope reading. This would not be the case if, instead of negation, we had a DE quantifier. This quantifier could bind the domain of existential closure and allow for the inference that the context referent is stable relative to existential closure but not the quantifier. This would allow for a narrow scope reading.

The alternative method mentioned above is for negation to evaluate the focus in the indefinite, replacing existential closure.

(43) Peter did not read some book.



In this case, the element that associates with the focus does not bind the domain variable of the indefinite, so D is simply some currently salient contextual domain. This results in the following truth conditions:

(44) $g(C) \subseteq \{\lambda w.$ Peter read $\iota y[D(y)$ & book(y) & $y=h(1)]$ in $w \mid h \in D_{<h>}\}$
$\lambda w.\forall p'[p' \in C$ & $p'(w) \rightarrow p' \neq \lambda w'.$ Peter read $\iota y[D(y)$ & book(y) & $y=x]$ in $w']$

As mentioned above, this creates the inference that there is a true alternative.

So Peter did not read the book x, but he did read some other book. Again, the effect is that "some" is perceived as taking scope above negation.

Free Choice Items

Another aspect of "any" is, that, apart from NPI use, it can also be used as a free choice item (FCI).

(45) a. Peter can solve any problem.
b. Pick any card!

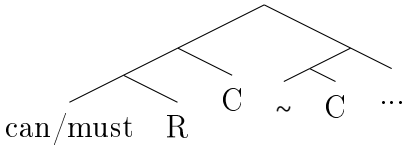
In these uses, "any" has a distinct universal flavour, but is not actually a universal.

(46) a. Peter can solve any problem, but not all of them.
b. Pick any card, but not all of them!

The relation between NPIs and FCIs is crosslinguistically robust and, as shown in Haspelmath (1997), a large group of languages use the same morphemes for free choice and negative polarity items. One analysis of these effects that is particularly well suited to our approach is the one presented in Aloni (2007b,a). This account assumes that modals are focus evaluating operators that act on propositional alternatives. Transposed into our framework, we would have lexical entires along these lines:

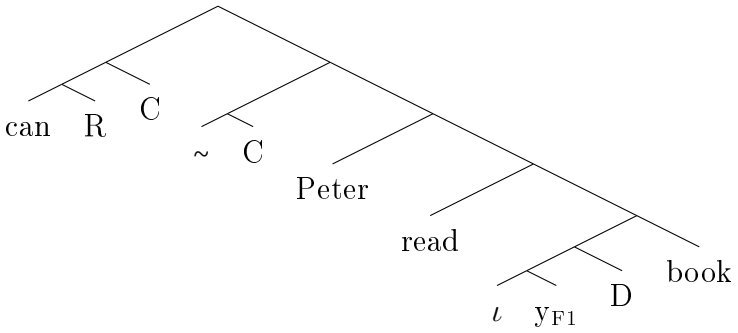
(47) a. $[\![\text{can}]\!] =$
$\lambda R_{<s,<s,t>>}.\lambda C_{<<s,t>,t>}.\lambda p_{<s,t>}.\lambda w.$
$\forall p'[p' \in C \rightarrow \exists w'[R(w)(w') \ \& \ p'(w')]]$
b. $[\![\text{must}]\!] =$
$\lambda R_{<s,<s,t>>}.\lambda C_{<<s,t>,t>}.\lambda p_{<s,t>}.\lambda w.$
$\exists p'[p' \in C \ \& \ \forall w'[R(w)(w') \rightarrow p'(w')]]$

The corresponding structural environment we would expect in our framework for these elements would then be this:



The relation R is used to describe the flavour of modality the modal in question has. It is an accessability relation between two worlds in terms of deontic compatibility, epistemic compatibility and so on. If no source of alternatives is present in the scope of the modal, C is a singleton, which reduces the modal to a quantifier over worlds. If there is a source of alternatives, like an indefinite or disjunction (which creates scalar alternatives), the modal becomes a quantifier over propositional alternatives. An approach to modals along these lines enables us to explain a lot of FCI behaviour with the tools we already have. Consider (48). We would get the following structure and truth conditions:

(48) Peter can read any book.



We would now get the following truth conditions:

(49) $g(C) \subseteq \{\lambda w.\text{Peter read } \iota x[D(x) \,\&\, x=h(1)] \text{ in } w \mid h \in D_{<h>}\}$
$\lambda w.\forall p'[p' \in C \rightarrow \exists w'[R(w)(w') \,\&\, p'(w')]]$
"For all propositions in which Peter reads some book, there is a compatible world in which that proposition holds."

The use of "any" is licensed, since there is no specific value that the index on the entity variable gets mapped to. This changes, if we replace the modal:

(50) *Peter must read any book.

(51) $g(C) \subseteq \{\lambda w.\text{Peter read } \iota x[D(x) \,\&\, x=h(1)] \text{ in } w \mid h \in D_{<h>}\}$
$\lambda w.\exists p'[p' \in C \,\&\, \forall w'[R(w)(w') \rightarrow p'(w')]]$

> "There is a propositions in which Peter reads some book and all compatible worlds are such that this proposition holds."

In this case, there is some specific book that peter reads in all compatible worlds. So now, there is a specific value that the entity variable gets mapped to. The use of "any" is therefore not licensed anymore. This also makes sure that "must" interrupts NPI licensing.

4.2.3 Conclusion

Using the approach proposed here, we seem to have some leverage on the problem of polarity items. As mentioned above, this is just a first analysis: I ignored large parts of the phenomenon, such as subtrigging (discussed for example in Menéndez-Benito 2010) or the different varieties of FCIs. But using our approach to indefinites, we can already predict quite a substantial part and reproduce intuitions and observations made in other approaches without having to stipulate a lot of additional machinery. This seems to be a promising angle, but still needs a lot of work to see where this approach makes predictions that differ from other approaches.

4.3 A Hierarchy of Intervention Effects

There seem to be priorities with regard to intervention effects. While all elements we assumed to be focus evaluating cause intervention effects of some kind for each other, some seem to take priority. When we encounter an intervention configuration, there are several methods to try and read the sentence in a way that is not an intervention configuration. These methods, however, are not all available in all circumstances. A quantifier like "every" does not cause an intervention effect for "only", but does so for indefinites and questions. Similar prioritizing can be observed across the board. I will start this section by giving an overview of the observed pattern. After this, I will attempt to establish a set of rules that predicts this pattern and categorize critical interveners accordingly. For a more concise collection of the data discussed in this section, see Appendix IV - Hierarchy of Intervention.

4.3.1 The Observed Pattern of Intervention

Intervention in Focus Association by "only"

The critical intervener that usually results in the most crisp judgments is "only". It also seems to be the most resilient way of focus association which seems to be pretty much immune to other critical interveners apart from itself. Another instance of "only", however, reliably does cause intervention effects:

(52) *Ich habe nur gesagt, dass nur Peter_{F} Maria_{F} gesehen hat.
I have only said that only Peter Mary seen has
"I only said that only Peter_{F} saw Mary_{F}."

The example in (52) is ungrammatical to the point where informants ask what the sentence is even supposed to mean. This is what our approach already predicts. Apart from this, "only" seems to be more or less immune to intervention effects. An intervening quantifier that could associate with a focused element, as is the case in (53), does not do this if it is in an intervening position for "only", as in (54).

(53) Ich habe gesagt, dass jeder Maria_{F} anruft.
I have said that everyone Mary calls
"I said that everyone calls Mary_{F}."
Reading:
"I said that everyone who calls someone, calls Mary."

(54) Ich habe nur gesagt, dass jeder Maria_{F} anruft.
I have only said that everyone Mary calls
"I only said that everyone calls Mary_{F}."
Reading:
"Mary is the only x of which I said that everyone calls x."

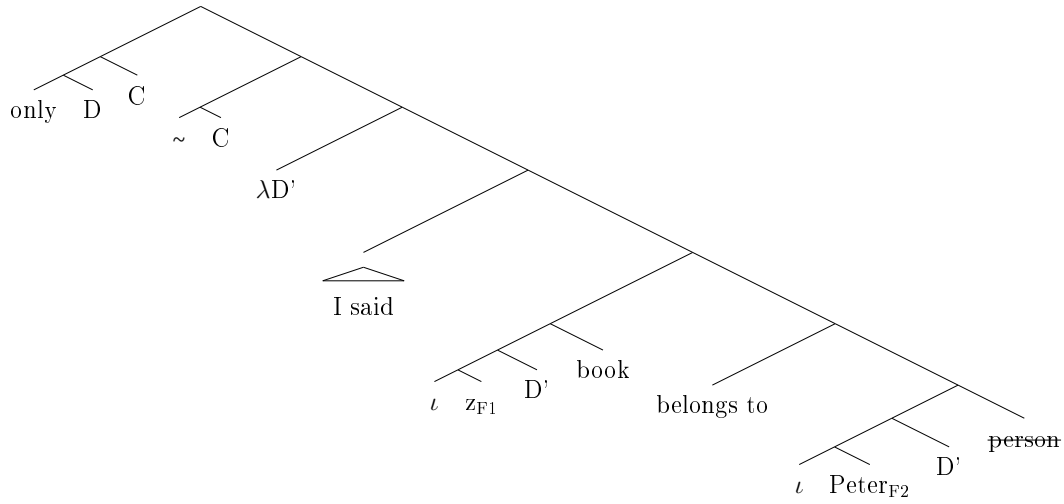
There is, however, an interesting effect to be observed when an indefinite is in an intervening position. Consider (55), which can have the following readings:

(55) Ich habe nur gesagt, dass ein Buch Peter_{F} gehört.
I have only said that a book Peter belongs.
"I only said that a book belongs to Peter_{F}."

a. "I said that some specific book x belongs to Peter. I said no other things about x belonging to someone."
b. "Peter is the only y, such that I said that there is a book belonging to y."
c. "I said that at least one book belongs to Peter. I said no other things about books belonging to people."

Reading (55-a.) is the specific reading. That this is not available is not surprising, as the specific reading does not involve focus. Readings (55-b.) and (55-c.) are a bit more surprising. (55-b.) should be an intervention configuration, as there seems to be some kind of existential quantification, probably existential closure, between "only" and "Peter". (55-c.) seems to be a result of "only" targeting "Peter" as well as the indefinite. Let us start with (55-b.).

The structure we have here is this:



The set of alternatives produced by ~ is this:

(56) g(C)⊆{λD.λw.I said that ιx[D(x) & book(x) & x=h(1)] belongs to ιy[D(y) & person(y) & y=h(2)] in w | h∈$D_{<h>}$}

If we apply "only" to this, the assertion is that I did not say anything about books belonging to people that is not "z belongs to Peter". The presupposition is that there is some domain containing Peter and a book and I said that the book in that domain belongs to Peter. Note that this does not even restrict

me to one book. I can follow up with (57-a.), but not (57-b.).

(57) a. "...and the one next to it as well."
b. "...and another one to Mary."

The truth conditions we generate say that if a domain makes one of the alternative propositions true, that domain is one that makes the ordinary semantic value true. The ordinary semantic value is (58):

(58) λD.λw.I said that ιx[D(x) & book(x) & x=z] belongs to ιy[D(y) & y=Peter] in w

The ordinary value of the entity variable z is infered as a context referent available in D. So any domain that contains Peter and some contextually available book (that I said belongs to Peter) would do. The presupposition created by "only" is that there is such a domain. That there is only one such domain is a scalar implicature that can be cancelled as seen above. There needs to be at least one book that the entity variable can be mapped to, however. So there is some specific book z, but there may be others as well. This creates the impression of existential quantification between ”only” and ”Peter”, but is not an intervention configuration.

Now let us consider the c. reading (example repeated below).

(59) Ich habe nur gesagt, dass ein Buch Peter_{F} gehört.
I have only said that a book Peter belongs.
"I only said that a book belongs to Peter_{F}."

a. ”I said that some specific book x belongs to Peter. I said no other things about x belonging to someone.”
b. ”Peter is the only y, such that I said that there is a book belonging to y.”
c. ”I said that at least one book belongs to Peter. I said no other things about books belonging to people.”

This reading is more prominent, if we put overt focus on the indefinite. If we do this, the alternatives picked up by "only" are not alternative books,

but scalar alternatives to indefinites. Assume that the only alternative to an indefinite is "every" and the only alternative to Peter is Mary. We get the following alternative things that I could have said:

(60) every book belongs to Peter,
every book belongs to Mary,
a/some book belongs to Peter,
a/some book belongs to Mary

So, applying "only", we are saying that the only amount/person combination of which I said that that amount of books belongs to that person is some/Peter. This creates reading (59-c.).

Reading (59-b.) is what we would expect from an intervention configuration, but as we just saw, we can generate the exact same reading without creating an interventin configuration. So, for now, we can only say that existential closure might cause intervention effects for "only", but since we can just leave out existential closure and allow "only" to evaluate the alternatives created by both sources, we cannot say for sure.

The question operator Q does not seem to interfere in focus association by "only". This seems to be crosslinguistically stable, as discussed in Howell et al. (submitted).

(61) Ich habe nur gefragt, was Peter_{F} denkt.
I have only asked what Peter thinks.
"I only asked what Peter_{F} thinks."

The reading we get here is "Peter is the only x such that I asked what x thinks." This is exactly what we would expect if Q does not cause an intervention effect. Likewise, modals do not cause an intervention effect, either.

(62) Ich habe nur gesagt, Peter kann Salat_{F} kaufen.
I have only said Peter can salad buy.
"I only said Peter can buy salad_{F}."

This is a bit puzzling and will be discussed later in this section when we have

a look at how modals behave in the presence of a critical intervener. Overall, we can say that focus evaluation by "only" is sensitive to intervention by quantifiers and maybe existential closure, but effectively takes precedence over them. Since "only" can evaluate the focus of an indefinite itself and quantifiers seem to stop being focus evaluating when they would cause an intervention effect for "only", the only elements that cause ungrammaticality when in an intervening position are other instances of "only". Modals and the question operator Q seem to be able to do their thing without causing an intervention effect, even when in a position to intervene.

Intervention in Focus Association by Quantifiers

Focus association by quantifiers is sensitive to intervention effects to a larger degree than "only". Having "only" in an intervening position unsurprisingly stops a quantifier from associating with focus.

(63) Jeder ruft nur Peter aufs Handy$_{F}$ an.
everyone calls only peter on mobile up
"Everyone calls only Peter on his mobile$_{F}$."

The reading ”Everyone who calls only Peter on some device, calls only Peter on his mobile.” is not available. This is the reading we would expect if the quantifier could associate with the focus on ”mobile” across the intervening ”only”. As we would expect from what we saw in the last subsection, a quantifier in an intervening position for ”only” cannot associate with focus. Instead, we get a reading along the lines of ”Every x is such that the only person/device combination such that x calls the person on the device, is Peter/Peter’s mobile.”.

In (64), ”every” can associate neither with Peter, nor Mary, independent of what ”only” associates with.

(64) Ich habe nur gesagt, dass jeder Maria$_{F}$ Peter$_{F}$ vorgestellt hat.
I have only said that everyone Mary Peter introduced has
”I only said that everyone introduced Mary$_{F}$ to Peter$_{F}$.”

This is not surprising, if we assume that a quantifier cannot be focus evaluating if that would cause an intervention effect for "only". As discussed in the preceding chapter, quantifiers do cause intervention effects for other quantifiers.

(65) Jeder ruft die meisten aufs Handy$_F$ an.
everyone calls the most on mobile up
"Everyone calls most people on their mobile$_F$."

In (65), "every" cannot associate with the focus on "mobile" across "most". So while "only" takes precedence over quantifiers when it comes to focus association, a quantifier cannot stop being focus evaluating to allow another quantifier to associate with focus across it. Even when there are two foci available, the lower quantifier blocks the higher one from associating with any of the available foci. In (66), "every" can associate neither with Mary nor Peter.

(66) Jeder sagt, dass die meisten Maria$_F$ Peter$_F$ vorgestellt haben.
everyone says that the most Mary Peter introduced have
"Everyone says that most people introduced Mary$_F$ to Peter$_F$."

The only available reading we have is "Everyone says that most people who introduced two people, introduced Mary to Peter." This is the reading in which "most" evaluates both foci in its scope. The interaction between a quantifier and an indefinite has been discussed in the previous chapter. There is, however, one interesting observation that we can make with regard to the topic at hand. Consider (67):

(67) Jeder sagt, dass ein Buch Peter$_F$ gehört.
everyone says that a book Peter belongs.
"Everyone says that a book belongs to Peter$_F$."

a. "There is some book x such that everyone who said something about books belonging to people said that x belongs to Peter."
b. "Everyone who said something about books belonging to people said that there is some book that belongs to Peter."

Even though both readings, (67-a.) and (67-b.) are available, they both seem to require some kind of overt focus on the indefinite. If we replace "ein" by its counterpart "'n", the sentence becomes ungrammatical:

(68) *Jeder sagt, dass 'n Buch Peter_{F} gehört.
everyone says that a book Peter belongs.
"Everyone says that a book belongs to Peter_{F}."

The relevant difference between "ein" and "'n" here seems to be that "'n" cannot be focused. In fact, even (67) sound very strange if we have a completely flat intonation for "ein". If we change the order of the elements, the effect vanishes:

(69) a. Jeder sagt, dass Peter_{F} ein Buch gehört.
everyone says that Peter a book belongs.
"Everyone says that a book belongs to Peter_{F}."

b. Jeder sagt, dass Peter_{F} 'n Buch gehört.
everyone says that Peter a book belongs.
"Everyone says that a book belongs to Peter_{F}."

This is interesting, but not entirely unexpected. If existential closure employs ~, it stops the quantifier from associating across it. If we put overt focus on the indefinite, the quantifier can associate with that focus as well as the one on Peter. This creates the specific reading, where the indefinite seems to take scope above the quantifier. But if we cannot have existential closure below the quantifier and the quantifier associating with focus across it, how does the low scope reading (repeated below) come to be?

(70) Jeder sagt, dass ein Buch Peter_{F} gehört.
everyone says that a book Peter belongs.
"Everyone says that a book belongs to Peter_{F}."

Reading:

"Everyone who said something about books belonging to people said that there is some book that belongs to Peter."

If this were due to existential closure, it should work with "'n" just as well, which is not the case. Similar to what I claimed for indefinites in an intervening position for "only", I would argue that in this case, this is not about alternative books, but, again, about the scalar alternatives to "ein", which, as mentioned above, is not only "a"/"some", but can also be "one". So a better paraphrase for the reading in (70-a.) would be this:

(71) Everyone who said something about amounts of books belonging to people said that one book belongs to Peter.

This behaviour is analogous to what we observed for quantifiers and "only". When the indefinite is in a position that would cause an intervention effect, it is instead read in a way that avoids the effect, i.e. as a focus for the quantifier to evaluate. If this is not an option, as is the case with "'n", we get an intervention effect. An indefinite can still be interpreted via existential closure in the immediate scope of a quantifier, but not if there is some overt focus below, which still needs something to associate with it.

As is the case for "only", the question operator does not cause intervention effects for quantifiers.

(72) Jeder fragt, was Peter_{F} denkt.
everyone asks what Peter thinks.
"Everyone asks what Peter_{F} thinks."

The corresponding reading "Everyone who asks what someone thinks asks what Peter thinks." is available. Modals do not seem to cause intervention effects either:

(73) Jeder denkt er kann Peter_{F} anrufen.
everyone thinks he can Pater call
"Everyone thinks he can call Peter_{F}."

The reading we get is "Everyone who thinks that he can call someone, thinks he can call Peter.", which is the reading we would expect to get if the modal does not cause an intervention effect. As mentioned above, this will be discussed in more detail below. So while "only" (which must associate with an overt focus) takes precedence over quantifiers and existential closure, quantifiers (which may associate with overt focus) take precedence over existential closure (which must associate with a covert focus).

4.3.2 Rules of Focus Intervention

If this pattern continues, we would expect modals to a.) optionally associate with covert focus and b.) to have a non-focus evaluating state. This would make them parallel to quantifiers. This is what seems to be the case. Take another look at the quantifier/modal combination from above (repeated in (74)):

(74) Jeder denkt er kann Peter_{F} anrufen.
everyone thinks he can Pater call
"Everyone thinks he can call Peter_{F}."

If "can" only had the lexicon entry we saw earlier (repeated below), which was an adaption of Aloni (2007b)'s proposal for FCIs, we would expect the reading in (76):

(75) $[\![\text{can}]\!]=$
$\lambda R_{<s,<s,t>>}.\lambda C_{<<s,t>,t>}.\lambda p_{<s,t>}.\lambda w.$
$\forall p'[p' \in C \rightarrow \exists w'[R(w)(w') \,\&\, p'(w')]]$

(76) Everyone thinks that for all propositions in which he calls someone, there is a compatible world, in which he does so.

This is not what the sentence means. Instead, we get a reading that we would expect from a more classical modal, i.e. one that quantifies over worlds, not alternative propositions. So we seem to have non-focus evaluating modals available. We can extend the lexical entries to something analogue to quantifiers:

(77) a. $[\![\text{can}_{\text{F}}]\!]=$
$\lambda R_{<s,<s,t>>}.\lambda C_{<<s,t>,t>}.\lambda p_{<s,t>}.\lambda w.$
$\forall p'[p' \in C \rightarrow \exists w'[R(w)(w') \,\&\, p'(w')]]$

b. $[\![\text{can}_{\text{O}}]\!]=$
$\lambda R_{<s,<s,t>>}.\lambda p_{<s,t>}.\lambda w.$
$\exists w'[R(w)(w') \,\&\, p(w')]$

c. $[\![\text{must}_{\text{F}}]\!]=$
$\lambda R_{<s,<s,t>>}.\lambda C_{<<s,t>,t>}.\lambda p_{<s,t>}.\lambda w.$

$\exists p'[p' \in C \ \& \ \forall w'[R(w)(w') \rightarrow p'(w')]]$

d. $[\![must_O]\!] =$
$\lambda R_{<s,<s,t>>}.\lambda p_{<s,t>}.\lambda w.$
$\forall w'[R(w)(w') \rightarrow p(w')]$

This would fit the intervention behaviour observed above quite well. We would then have the following pattern[2]:

(78) Observations on focus evaluation:

a. "only" - focus evaluation is obligatory - focus is overt
b. quant - focus evaluation is optional - focus is overt
c. $\exists$ - focus evaluation is obligatory - focus is covert
d. modals - focus evaluation is optional - focus is covert

This is accompanied by a set of rules, which take priority in this order:

(79) Rules of focus evaluation

a. A focus evaluating operator does not have any other focus evaluating operator between itself and the nearest focus it can associate with.
b. A focus evaluating operator that cannot associate with a certain type of focus does not have an item with focus of that type in its scope without a focus evaluating operator in between.
c. An operator that optionally evaluates focus does so if and only if there is a focused element in its scope and there is no focus evaluating operator in between.

The default mechanism to avoid violation of these rules is for elements that optionally associate with focus to use their non-focus evaluating form. For indefinites, the default solution is essentially the same, but since existential closure does not have a non-focus evaluating form, the indefinite instead switches to a form of focus that is not evaluated by existential closure and is allowed in the environment it is in, i.e. it gets overt focus.

[2] cf. Beaver and Clark (2008), especially with regard to the difference between "only" and quantifiers.

To give a few examples: If a quantifier is between "only" and the first overtly focused element in the scope of "only", it violates a.) if it is focus evaluating. Therefore, it is not focus evaluating. This contradicts c.), but since these rules are prioritized, a.) trumps c.)

When there are two quantifiers and a focused element below them, we have two options, either the higher one is focus evaluating or the lower one is. If both are, a.) is violated. If the higher one is and the lower one is not, c.) is violated. If the higher one is not and the lower one is, all is fine.

If we have an indefinite in the scope of a quantifier, either there is existential closure below the quantifier or the focus on the indefinite is overt with the quantifier associating with it, or b.) is violated. The quantifier cannot be non-focus evaluating in order to allow the indefinite in its scope to receive existential closure above it, as this would violate c.).

This works well to explain the observed intervention pattern, but it also makes some interesting predictions about the behaviour of FCIs. Compare the examples in (80):

(80) a. Mary said that Peter thinks he can tell her anything.
b. Mary only said that Peter_{F} thinks he can tell her anything.
c. Mary only said that Peter thinks he can tell her_{F} anything.

In (80-a.), there is no focus evaluating operator apart from "can. "any" gets a free choice interpretation. In (80-b.), we have "only", which associates with focus on Peter. Again, "any" gets a free choice interpretation. This changes in (80-c.), where "any" instead gets an NPI interpretation. This is what we would predict: In (80-b.), the modal can evaluate the focus, so in accordance with rule c.), "can" evaluates the focus, which results in a free choice interpretation. This does not work in (80-c.). In this case, the modal cannot be focus evaluating, as this would violate a.), as well as b.). So instead, the modal is not focus evaluating and "any" is instead picked up by "only", creating the NPI reading.

Excursus: Intervention in Question Formation

I do not intend to discuss the full scope of interactions between focus evaluating operators and questions. I merely want to provide a quick glance at this area to see how the rules we established perform there.

Questions are sensitive to intervention by all of the elements discussed above, except for modals. (81) does have a pair-list reading available.

(81) Wer kann was kaufen?
who can what buy
"Who can buy what?"

Let us first look at how questions behave in relation to the other critical interveners. For "only", we observe an intervention effect, as noted throughout the literature on the topic.

(82) *Wen hat nur Peter_F wann gesehen?
who has only Peter when seen
"Who did only Peter_F see when?"

What is more interesting is that the element carrying the focus also causes an intervention effect, even when the evaluating operator is not in an intervening position.

(83) *Ich habe nur gefragt, wen Peter_F wann gesehen hat.
I have only asked who Peter when seen has.
"I only asked who Peter_F saw when."

Since this is what we would expect from rule b.), this does not come as a surprise. The problem is that (84) violates a.):

(84) Ich habe nur gefragt, wen Peter_F gesehen hat.
I have only asked who Peter seen has.
"I only asked who Peter_F saw."

If Q is a focus evaluating operator, we have a configuration that should, following a.) not be possible. The sentence is perfectly fine, however. The same pattern can be observed for quantifiers. They do cause intervention effects in

questions as in (85):

(85) *Wen hat jeder wann gesehen?
who has everyone when seen
"Who did everyone see when?"

And, analogous to "only", having a focused element that the quantifier associates with in the intervening position also causes an intervention effect:

(86) *Jeder hat gefragt, wen Peter_{F} wann gesehen hat.
Everyone has asked who Peter when seen has.
"Everyone asked who Peter_{F} saw when."

And, again, it is not Q that causes an intervention effect, as there is no problem if we leave out the second wh-item:

(87) Jeder hat gefragt, wen Peter_{F} gesehen hat.
Everyone has asked who Peter seen has.
"Everyone asked who Peter_{F} saw."

Q does not cause intervention effects, so it seems likely that it 'knows' which sources of alternatives it is supposed to evaluate and which it is supposed to ignore. But even though it is able to ignore foci that are meant to be evaluated elsewhere, it is unable to see beyond them. A focused element that is not a wh-item creates a barrier. This is reflected by Baker-ambiguities (Baker 1970) as well. Consider (88):

(88) Wen fragt Ulla, wo Peter was gekauft hat?
who asks Ulla where Peter what bought has
"Who does Ulla ask where Peter bought what?"

a. "Which person x does Ulla ask which places y and items z are such that Peter bought z at y?"
b. "Which person x and item z are such that Ulla asks x which place y is such that Peter bought z at y?"

In (88), there are two Q operators. Each of them has a wh-item that they need to associate with ("who" and "where"). The third wh-item ("what") can either be used by the lower or the higher Q operator, resulting in reading

(88-a.) and (88-b.) respectively. Reading (88-b.) vanishes, if we put "only" between the higher Q operator and the third wh-item:

(89) Wen fragt nur Ulla, wo Peter was gekauft hat?
who asks only Ulla where Peter what bought has
"Who does only Ulla ask where Peter bought what?"

a. "Which person x is such that the only person that asks which places y and items z are such that Peter bought z at y is Ulla?"

b. *"Which person x and item z are such that the only person that asks x which place y is such that Peter bought z at y is Ulla?"

The same effect can be produced with a quantifier, as seen in (90):

(90) Wen fragt jeder, wo Peter was gekauft hat?
who asks everyone where Peter what bought has
"Who does everyone ask where Peter bought what?"

a. "Which person x does everyone ask which places y and items z are such that Peter bought z at y?"

b. *"Which person x and item z are such that everyone asks x which place y is such that Peter bought z at y?"

These do not come as a surprise, since our approach predicts this. In fact, most approaches that predict intervention effects by these items in multiple wh-questions would predict this, since if we ignore the lower Q operator, this is pretty much what we are looking at. What does come as a surprise, is that modals seem to disrupt this as well.

(91) Wen kann Ulla fragen, wo Peter was gekauft hat?
who can Ulla ask where Peter what bought has
"Who can Ulla ask where Peter bought what?"

a. "Which person x is such that there is some compatible world in which Ulla asks x which places y and items z are such that Peter bought z at y?"

b. #"Which person x and item z are such that there is some compatible world in which Ulla asks x which place y is such that Peter bought z at y?"

The reading in (91-b.) does not seem to be out entirely, but it is much harder to get. So in a multiple wh-question, modals do not cause an intervention effect, but in Baker sentences, they do. This is a bit puzzling, but analogue to what we observed above: If "only" needs to associate with a focused item across a quantifier, that quantifier ceases to be focus evaluating and does not cause an intervention effect. In a multiple wh-question, the lower wh-item needs to be evaluated by a Q operator and the modal would cause an intervention effect here, if it were focus evaluating.

We could now make the following argument: If a modal has a wh-item in its scope and there is no other focus evaluating operator inbetween, it would need to be focus evaluating, since otherwise, rule c.) would be violated. We can only override this, if this would violate a.) or b.). For a.), this is not the case, as the modal is not between Q and the closest wh-item. If we want to argue that b.) is violated, we would need to assume that wh-items are not the type of focus (covert) that a modal can associate with. I would argue that this is the case, as wh-items are essentially, for lack of a better term, a ”lexical” form of focus, meaning they are not overtly marked as sources of alternatives through intonation, but can also not said to be marked covertly, as they belong to category whose elements are all sources of alternatives.

Under this assumption, in a regular multiple wh-question, we have two options: Either the modal is focus evaluating and has a focus in its scope that it cannot evaluate, which violates b.), or it is not focus evaluating, which violates c.). Since b.) trumps c.), the modal is not focus evaluating and does not cause an intervention effect. This explains why modals do not disrupt multiple wh-questions.

But this does not help us with Baker sentences, since the lower Q operator satisfies the restrictions on rule b.) and c.). There is another focus evaluating operator inbetween the modal and any source of alternatives. We have no reason to assume that the modal is focus evaluating, so it should allow for the Baker ambiguity. One way around that would be to assume that, since Q is the only selective operator in our list, Q only counts as a focus evaluating

operator with regard to the foci it selects. Consider (91) (repeated in (92)) again:

(92) Wen kann Ulla fragen, wo Peter was gekauft hat?
who can Ulla ask where Peter what bought has
"Who can Ulla ask where Peter bought what?"

Here, the lower Q operator can either select "where" and "what" or only "where". If it selects both, there is no focused element in the scope of the modal that does not have an evaluating operator inbetween itself and the modal. If Q only selects "where", there is a focused element in the scope of the modal ("what") that does not have an evaluating operator inbetween itself and the modal. Under this assumption, the only way to not violate either b.) or c.), is for the lower Q operator to select both wh-items.

4.3.3 Implementing the Hierarchy

We used three elements to describe the observed patterns: Type of evaluating operator, type of focus and the rules of focus evaluation. An evaluating operator is either obligatorily or optionally focus evaluating. They can evaluate one of two kinds of foci: overt or covert[3].

Operator	Type of evaluation	Type of focus
only/even	obligatory	overt
quantifier	optional	overt
existential closure	obligatory	covert
modal	optional	covert

These elements follow a set of three rules. These rules are prioritized in the order presented below. If you cannot interpret a sentence in a way that does not violate any of the rules, you are allowed to ignore c.) if this preserves a.) and b.). You are allowed to ignore b.) if it preserves a.) and ignoring c.) does not solve the problem. If a.) is violated, the sentence is ungrammatical.

[3]And, if you want to include wh-items, lexical. I do not want to include them here, as properly discussing the interaction of focus evaluating operators with question formation is beyond the scope of this work.

(93) Rules of focus evaluation

a. A focus evaluating operator does not have any other focus evaluating operator between itself and the nearest focus it can associate with.

b. A focus evaluating operator that cannot associate with a certain type of focus does not have an item with focus of that type in its scope without a focus evaluating operator in between.

c. An operator that optionally evaluates focus does so if and only if there is a focused element in its scope and there is no focus evaluating operator in between.

We saw in the case of NPIs that "only" seems to be able to evaluate covert focus in indefinites and also saw that quantifiers can do that. The corresponding readings become more easily available when there is overt focus on the indefinite, but it is by no means mandatory. We interpreted the results of Ionin (2010), which showed that indefinites using "a" are more difficult to be read as taking intermediate scope, as evidence that elements that want to evaluate overt focus can evaluate the focus in an indefinite more easily, if the indefinite can be overtly focused, which is the case for "some", but not "a". Still, even "a" indefinites can take intermediate scope. I take this to mean that operators that evaluate overt focus can evaluate covert focus as well.

Operators that obligatorily evaluate overt focus are only licensed if such a focus is present, so if they evaluate covert focus, they do so as a side effect of evaluating overt focus. This is reflected by rule a.) and b.): If there is an operator that obligatorily evaluates overt focus and the next available focus is covert, we have two options: Option one is that there is another focus evaluating operator inbetween, which would violate a.). Option two is to ignore b.) and have the operator evaluate an overtly focused element below the covert focus, which effectively leads to the operator evaluating both foci.

Since operators that optionally evaluate overt focus can be present without overt focus being present, we can have a configuration where there is such an operator and the only available focus is covert. Again, we have two options:

Option one is to assume that the operator in question is not focus evaluating, which would violate c.). Option two is to treat the covert focus as overt, ignoring b.). Option two is what we assumed is happening when an indefinite outscopes a quantifier. The strong preference for overt focus on indefinites that take intermediate scope this way reflects the fact that not doing so violates b.). Keep in mind that this is not enough, since we had another option available: We could have used existential closure below the quantifier, violating none of the rules. This will be discussed further down.

More problematic are configurations where we have an operator that obligatorily evaluates covert focus, such as existential closure, and an overt focus as the next available focus. If we use the same reasoning as we did above for obligatory evaluators of overt focus, we would make some incorrect predictions. Consider (94) (repeated from above) again:

(94) Jeder sagt, dass ein Buch Peter_{F} gehört.
everyone says that a book Peter belongs.
"Everyone says that a book belongs to Peter_{F}."

In this configuration, we produced the available readings by assuming that the quantifier evaluates both foci. But we could just as well have assumed that existential closure evaluates both foci. With regard to the rules, this would have had the exact same effect, but it would have produced readings that are clearly not available:

(95) "Everyone said that there is a domain containing a person and a book, such that the book belongs to the person."

So while operators that want to evaluate overt focus can accept covert focus as matching, the other way round is not an option. We saw that this is the case for modals as well. I would argue that, while it is doable to assume some overt focus where there is none, it is much harder to assume that there is no overt focus, where there clearly is some. Basically: You are allowed to assume that you missed some overt focus, but you are not allowed to ignore it when you did not miss it.

(96) Covert focus can be treated as overt, but not vice versa.

If this is the case, rule b.) only applies to operators that evaluate covert focus and have an overt focus as the next available focus. So now, if there is an operator that obligatorily evaluates overt focus and the next available focus is covert with an overt one coming further down the line, evaluating both of them is not in violation of any of the rules. In the example of an operator that optionally evaluates overt focus with the only available focus being covert, i.e. an indefinite below a quantifier, we can now have both options without violating any of the rules: Either there is existential closure below the quantifier, or the quantifier assumes that the focus on the indefinite was just a bit hard to hear. Both work fine.

4.4 Conclusion

In this chapter, the goal was to show how the approach presented here interacts with other areas and to show how these interactions can be fruitful. The discussion on polarity items, especially those that are indefinites, such as "any" and "some" showed how the approach can be used to correctly predict large parts of the phenomenon with minimal additional assumptions. As the approach is based on alternative semantics, it integrates well with approaches that in some way rely on this mechanism to approach this phenomenon. Especially Chierchia (2013)'s domain alternatives seem to be close analogues to what we assumed for indefinites. Using assumptions that closely reflect the intuitions we have about NPIs and PPIs ("any" may not refer to a specific entity, "some" wants a specific entity to be available), we were able to predict the core parts of the behaviour observed for NPIs, PPIs and FCIs.

Furthermore, we observed a certain hierarchy of intervention effects, suggesting an order of critical interveners with regard to their behaviour towards each other. Using three rather intuitive rules of focus evaluation and two properties of focus evaluation, we were able to create different classes of interveners. Other elements that create intervention effects can now be categorized into one of these classes via their interaction with other focus evaluating elements.

One example hinted at above, where we could use this would be the behaviour of distributive operators, for example the one used for distributive readings of plural.

This hierarchy can be a starting point to investigate crosslinguistic differences with regard to intervention effects. One example would be a set of differences observed between German and English: In German, wh-items can be used as indefinites, which is not the case in English. English questions are only sensitive to intervention effects, if they are superiority violating, while in German, superiority does not seem to make any difference. German lacks a classic NPI indefinite in the style of "any", English "any" can be combined with wh-items or "one" (anywhere, anyone). An investigation into these differences could now start with a simple assumption: English wh-items behave similar to "any" in so far that their entity variable differs from that of regular indefinites in some way. The difference for wh-items could be that their focus is not of the right type to be evaluated by existential closure. This would make them unable to act as indefinites. They could also have some restriction similar to that of "some" requiring a possible referent, which would explain why superiority violating questions are only possible, if the wh-items are D-linked. If these peculiarities are not available in German, we would expect German to not have an "any"-style NPI. This example is an entirely baseless stipulation for now, but serves to illustrate how this approach can be used as a starting point for a wide array of investigations.

Chapter 5

Conclusion

5.1 Intervention Effects

In the preceding chapters, we saw that there is a wide, and currently unaccounted for, range of intervention effects. These are not restricted to question formation and focus association of 'classic' focus evaluating operators like "only", but can also be observed hampering the ability of indefinites to take irregular scope and disrupting donkey constructions. We also saw that the class of critical interveners is neither small nor homogeneous: It contains 'classic' focus evaluating operators, quantifiers, indefinites and negation and probably several other elements. All of these elements will, in different ways, influence the behaviour of the other elements of that class. As a result, the emerging pattern of intervention effects is quite complex.

We saw that Beck (2006)'s analysis of what causes intervention effects can be extended to cover a much larger range of these effects than previously assumed. Doing so allowed us to make remarkably specific predictions with regard to several phenomena, such as the interaction between indefinites and downward entailing operators or the availability of asymmetric readings in donkey constructions.

To correctly predict the interaction between different critical interveners, we stipulated three principles of focus evaluation, which effectively created a hierarchy within the class of critical interveners.

5.2 Indefinites and Donkey Constructions

The main theme of this work is the ability of indefinites to take irregular scope and the way this ability is restricted by intervention effects. We cataloged some of the peculiarities of indefinites and took a closer look at several approaches to wide scope indefinites to see how they handle these peculiarities. The first approach was what I called the singleton approach, which derives the scope taking capabilities of indefinites by reducing them to elements that are effectively scopeless. Attractive, due to its minimalism, this approach has no mechanisms in place that could be used or extended to account for intervention effects. The choice function approach could correctly predict several of them, but was unable to account for intervention effects and faced other problems (mainly those presented in Schwarz 2001, 2011) as well. The last approach we looked at was the approach based on Shimoyama (2001) and Kratzer and Shimoyama (2002), which analyzes indefinites as wh-items and used alternative evaluating operators to account for the irregular behaviour of indefinites. This seemed promising and naturally well equipped to handle intervention effects.

Building on this approach, we took into account Shan (2004)'s problems, as well as Romero and Novel (2013)'s solution for them, and transfered it into a Woldian distinguished variable framework. On the basis of Kratzer and Shimoyama (2002)'s "irgend-", we extended Heim (1982)'s notion of existential closure to a focus evaluating operator which allowed us to account for the scope talking capabilities of indefinites in a way that is sensitive to intervention effects. The indefinite itself, we analyzed, extending the notion in Elbourne (2005) and Elbourne (2013), as a definite description. This also allowed us to keep the close similarity between wh-items and indefinites described in Kratzer and Shimoyama (2002), as we essentially used Rullmann and Beck (1998b)'s internal composition of wh-items, which, as shown in Romero and Novel (2013), also solves Shan (2004)'s problem. This also supplied us with an element that could carry focus and could be evaluated by our closure operator.

Using the fact that other elements, such as quantifiers, are also focus evaluating, allowed us to account for intermediate and wide scope readings of

indefinites, while still upholding the status of these elements as critical interveners. This was done by having these elements evaluate the focus in the indefinite instead of employing a closure operator. To allow for binding by these elements, as well as indefinites, we introduced a notion of contextual domain variables that follows von Fintel (1994). We used these bindable domains and the presupposition of the covert definite article in the indefinite to replicate Jäger (2007)'s restrictions on partial variables and Onea (2013, 2015)'s constraints on assignment functions, allowing us, among other things, to account for the binder roof constraint. Similar to Schwarzschild (2002)'s restricted domains, this allowed us to create context referents that can be available at higher points in the structure, creating a wide or intermediate scope effect. Since these context referents are dependent on a domain, which in turn is dependent on a higher domain and so on, we were able to use this relation to account for the interaction of indefinites and downward entailing operators.

Using the existential closure operator to provide the quantificational force of an indefinite as well as for binding pronouns allows for binding by indefinites without the indefinite c-commanding the pronoun, as long as the closure operator c-commands both. This automatically accounts for donkey constructions, at least for those that embed the indefinite in a non-downward entailing environment. To account for donkey constructions that do embed the indefinite in a downward entailing environment, we introduced universal closure. This operator is not a focus evaluating operator and does not occur alone, but can be seen as more of a distributive effect for the domain of the existential closure operator. Universal closure not only enabled us to account for donkey constructions with a universal flavour, but also provided us with a mechanism to predict asymmetric readings in proportion problem sentences. Since donkey constructions rely on these closure operators, we automatically predicted that elements that allow for indefinites to seemingly outscope them would still disrupt donkey constructions, as the process by which indefinites outscope them does not employ any closure operators.

5.3 The Framework

The machinery we employed in this approach does not contain anything that is strictly speaking new: Existential closure has been used for a variety of phenomena since its introduction in Heim (1982). Making it focus evaluating follows Kratzer and Shimoyama (2002)'s analysis of German "irgend" and is analogous to Shimoyama (2001, 2006)'s analysis of Japanese "mo". Universal closure has, not in this specific form but very similar to it, been proposed by De Swart (2001). The internal structure of indefinites is not only what Rullmann and Beck (1998b) assume for wh-items, but one could also argue that the combination of existential closure and a definite description is basically a decomposition of the lexicon entry for "a" used in Elbourne (2013). Assuming that quantifiers associate with focus in some way has been proposed in several papers, with Eckardt (1999)'s approach being nearly identical to what we assumed. That quantifiers have a domain variable that can be bound is a variant of von Fintel (1994) among others. Our way of binding domain variables and of quantifying over related domains can be decomposed into the pronoun-like element in the restrictor of a quantifier that von Fintel (1994) argues for and that was convincingly demonstrated to exist by Martí (2003), and the contextual relation, also assumed by von Fintel (1994), that is applied to that element to create a 'bound domain'.

The only thing that we did in this approach, was to apply these elements in a more unified way. As a result, Beck (2006)'s analysis of intervention effects supplied us with everything we needed to explain the seemingly incoherent way in which indefinites and critical interveners interact.

5.4 Connecting to Other Phenomena

This approach can also be used to gain further insight into related topics. With regard to polarity and free choice items, the mechanism presented here produces effects that are highly compatible with alternative based approaches, such as, for example, Chierchia (2013). We saw that several behaviours observed for these items are easily predicted, adding only minor assumptions that

are very similar to those found in other approaches to these phenomena.

The last part of this work established an interaction pattern of critical interveners that allowed us to group critical interveners into several classes. These classes can be used as a starting point for future research.

Areas in which this could prove fruitful are for example further research into the behaviour of plural and distributivity, which has been known to be sensitive to intervention effects since Beck (1996b) and has been argued to cause intervention effects by several authors, for example Mayr (2014). We also know that universal quantifiers seem to be able to outscope certain speech act operators to avoid intervention effects and that their ability to move covertly is restricted by elements like "only". In light of Beck (2017)'s alternative semantic cycle, these behaviours could probably be explained using a variant of the approach presented here, promising further insight into the general nature and development of quantification and covert movement in general.

Appendix A

Appendix I - Formal Appendix

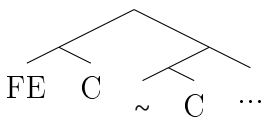
Machinery

Focus Evaluation

Focus evaluation is done via the ~-operator and a focus constant C:

(1) $[\![\sim]\!]$
Let D_h be the set of all total distinguished variable assignments and let α be [~ C β] , then for any g,h:
$[\![\alpha]\!]^{g,h}$ only defined if $g(C) \subseteq \{[\![\beta]\!]^{g,h} \mid h \in D_h\}$. Then:
$[\![\alpha]\!]^{g,h} = [\![\beta]\!]^{g}$

Any item FE that evaluates focus requires ~ in its immediate surrounding. The structure in which this is realized is this:



Intervention Effects

Binding

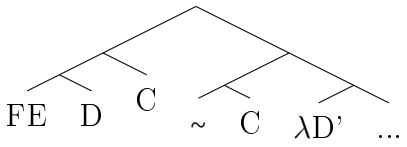
All binding in this framework is binding of domain variables. Elements that bind domain variables have a domain variable and quantify over domains. The domains quantified over are domains that stand in a relation to the domain variable of the quantifier. This relation is $\preccurlyeq$. The relation $\preccurlyeq$ can be relative to some property f. This is noted by a subscript attached to $\preccurlyeq$.

(2) $\preccurlyeq$:

a. $\forall$ D, D': D'$\preccurlyeq$D iff
$\exists$x[D(x) & D'= λy. y is contextually relevant for x]

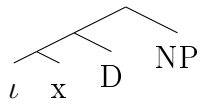
b. $\forall$ f, D, D': D'$\preccurlyeq_f$D iff
$\exists$x[f(x) & D(x) & D'= λy. y is contextually relevant for x]

Operators that bind domain variables and evaluate focus apply ~ on top of the λ-binder:



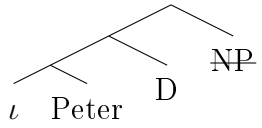
Entities

Indefinites, pronouns, traces, names, and definite descriptions have the following structure:

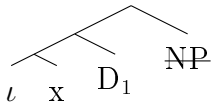


The NP is elided in the case pronouns and names. The entity variable "x" is focused in indefinites and a proper name in names. The domain D can be indexed.

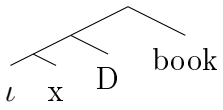
(3) Peter



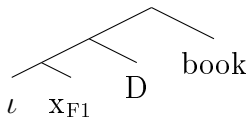
(4) he_1/t_1



(5) the book



(6) a book



The lexical entry for ι is in (7):

(7) $[\![\iota]\!] =$
$\lambda x.\lambda D_{<e,t>}.\lambda f_{<e,t>}:\exists!y[f(y)\&D(y)\&y=x].$The unique y:f(y)&D(y)&x=y

The ι-operator can have additional restrictions: For traces and pronouns, for example, the entity denoted by the ι-construct must be the central entity of the domain of ι. Other elements might have other restrictions.

Indefinites

Indefinites receive their scope and quantificational force in one of three ways:

(8) a. The entity variable is not focused and receives a value from the context.

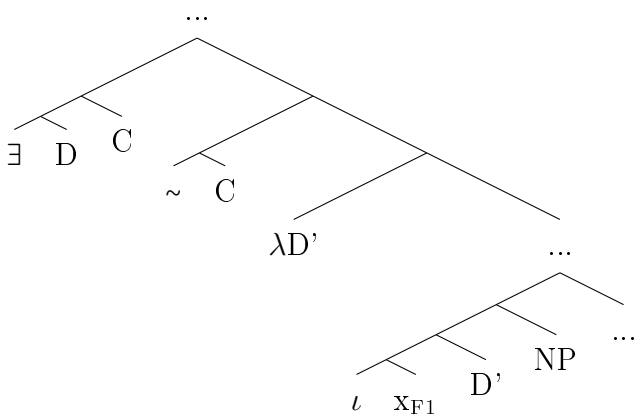
b. The entity variable is focused and the focus is evaluated by an overt focus evaluating operator already present in the structure.

c. The entity variable is focused and the focus is evaluated by existential closure.

In case of (8-a.), the indefinite is equivalent to a proper name and therefore scopeless. In case of (8-b.), the domain variable of the indefinite is either bound by the operator that evaluates the focus on the entity variable or free. In case of (8-c.), the entity variable is bound by the existential closure operator that evaluates the focus on the entity variable. Existential closure is a covert focus evaluating operator with the following lexical entry:

(9) $[\![\exists]\!] =$
$\lambda D_{<e,t>}.\lambda C_{<<<e,t>,<s,t>>,t>}.\lambda P_{<<e,t>,<s,t>>}.\lambda w.$
$\exists D'[D' \leqslant D \ \& \ \exists P'[P' \in C \ \& \ P'(D')(w)] \ \& \ P(D')(w)]$

Since existential closure is a focus evaluating operator that binds domains, a structure that contains an indefinite that is evaluated by existential closure has the following form:

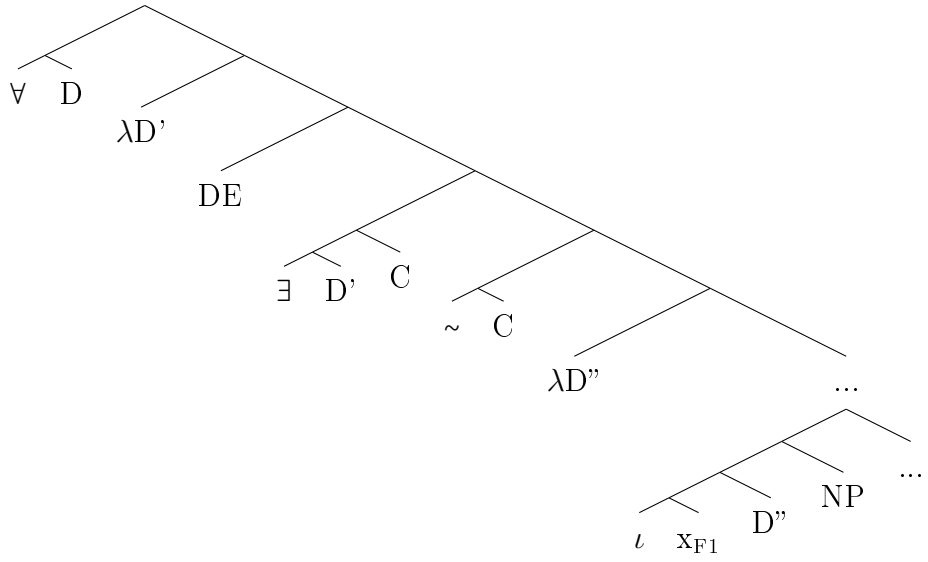


If existential closure is below a downward entailing operator and no other scope bearing operators are in between, universal closure can be applied to bind the domain variable of existential closure. Universal closure has the lexical entry in (10):

(10) $[\![\forall]\!]$:

$\lambda D_{<e,t>}.\lambda P_{<<e,t>,<s,t>>}.\lambda w.$
$\forall D'[D' \trianglelefteq D \rightarrow P(D')(w)]$

A structure with a downward entailing operator DE, an indefinite whose focus is evaluated by existential closure and universal closure binding the domain of existential closure has the following form:



Focus Evaluating Operators

Focus evaluating operators come in four shapes:

(11) a. Operators that obligatorily evaluate overt focus (only, even)
b. Operators that optionally evaluate overt focus (quantifiers, negation)
c. Operators that obligatorily evaluate covert focus (existential closure)
d. Operators that optionally evaluate covert focus (modals)

Operators that obligatorily evaluate overt focus have one lexical entry and are only licensed if there is an overtly focused item present.

(12) $[\![\text{only}]\!] =$
$\lambda D_{<e,t>}.\lambda C_{<<<e,t>,<s,t>>,t>}.\lambda P_{<<e,t>,<s,t>>}.\lambda w{:}\exists D'[D' \leqslant D \ \& \ P(D')(w)].$
$\forall D'[D' \leqslant D \ \& \ \exists P'[P' \in C \ \& \ P'(D')(w) \rightarrow P'=P]]]$

Operators that optionally evaluate overt focus have two lexical entries, one of which is focus evaluating (marked with a subscript "F") while the other one is not (marked with a subscript "O"). These are quantifiers like "every", as well as negation.

(13) a. $[\![\text{every}_F]\!] =$
$\lambda D_{<e,t>}.\lambda C_{<<<e,t>,<s,t>>,t>}.\lambda f_{<e,t>}.\lambda p_{<<e,t>,<s,t>>}.\lambda w.$
$\forall D'[D' \leqslant_f D \ \& \ \exists p'[p' \in C \ \& \ p'(D')(w)] \rightarrow p(D')(w)]$

b. $[\![\text{every}_O]\!] =$
$\lambda D_{<e,t>}.\lambda f_{<e,t>}.\lambda p_{<<e,t>,<s,t>>}.\lambda w.$
$\forall D'[D' \leqslant_f D \rightarrow p(D')(w)]$

The restriction imposed by the alternatives ($\exists p'[p' \in C \ \& \ p'(D')(w)]$) used here is sometimes too strong. A more correct way would be $\exists p'[p' \in C \ \& \ p'(D')$ is relevant in w].

Quantifiers bind domain variables, while negation does not.

(14) a. $[\![\text{not}_F]\!]=$
$\lambda C_{<<s,t>,t>}.\lambda p_{<s,t>}.\lambda w.\forall p'[p' \in C \ \& \ p'(w) \rightarrow p' \neq p]$

b. $[\![\text{not}_O]\!]=$
$\lambda p_{<s,t>}.\lambda w.\neg p(w)$

The only operator that obligatorily evaluates covert focus discussed in this text is existential closure. It has one lexical entry, which is stated above. Operators that optionally evaluate covert focus also have two lexical entries. These are, for example, modals like "can" and "must". They are focus evaluating, but do not bind domain variables. The argument "R" is a relation between worlds, which provides the modal base or flavour of the modal (i.e. deontic, epistemic, ...).

(15) a. $[\![\text{can}_F]\!]=$

$\lambda R_{<s,<s,t>>}.\lambda C_{<<s,t>,t>}.\lambda p_{<s,t>}.\lambda w.$
$\forall p'[p' \in C \rightarrow \exists w'[R(w)(w') \ \& \ p'(w')]]$

b. $[\![can_O]\!]=$
$\lambda R_{<s,<s,t>>}.\lambda p_{<s,t>}.\lambda w.$
$\exists w'[R(w)(w') \ \& \ p(w')]$

(16) a. $[\![must_F]\!]=$
$\lambda R_{<s,<s,t>>}.\lambda C_{<<s,t>,t>}.\lambda p_{<s,t>}.\lambda w.$
$\exists p'[p' \in C \ \& \ \forall w'[R(w)(w') \rightarrow p'(w')]]$

b. $[\![must_O]\!]=$
$\lambda R_{<s,<s,t>>}.\lambda p_{<s,t>}.\lambda w.$
$\forall w'[R(w)(w') \rightarrow p(w')]$

Appendix B

Appendix II - Data

The German data presented here is introspective data. I consulted a small number of informants and they agreed with my judgements, but the strength of the effects varied quite a bit. No proper study was done.

Scope of Indefinites

Wide Scope vs. Entity Reading

Indefinites can have a widest scope reading that is not the entity reading.

(1) Ein Student von mir hat promoviert. Das hätte ich nie für
a student of mine has graduated. that have I never for
möglich gehalten.
possible assumed
"A student of mine got his PhD. I would never have expected that."
(Heim 1991[p.517])

a. "There is a student of mine that got his PhD. I would never have expected that there is a student of mine that would get his PhD."

b. "Franz got his PhD. I would never have expected that Franz would get his PhD."

The widest scope reading ((2-b.)) can be blocked by the presence of a strong intervener, the entity reading ((2-c.)) is not affected.

(2) Nur Maria denkt, dass ein Student von mir promovieren wird. Das
only Mary thinks that a student of mine graduate will. that
hätte ich nie für möglich gehalten.
have I never for possible assumed
"Only Mary thinks that a student of mine will get his PhD. I would never have expected that."

a. "Only Mary thinks that there is a student of mine that will get his PhD. I would never have expected that only Mary thinks that there is a student of mine that will get his PhD."
b. *"There is a student of mine of whom only Mary thinks that he will get his PhD. I would never have expected that there is a student of mine of whom only Mary thinks that he will get his PhD."
c. "Only Mary thinks that Franz will get his PhD. I would never have expected that only Mary thinks that Franz will get his PhD."

Intermediate Readings

Indefinites can have intermediate scope readings across multiple intervening quantifiers.

(3) Jeder Dozent lässt in jedem Kurs jeden Studenten ein Buch lesen.
every lecturer makes in every course every student a book read

"Every lecturer makes every student in every course read a book."

a. "For all lecturers x: for all courses y: for all students z: there is a book a and x makes z read a in y."
b. "For all lecturers x: for all courses y: there is a book a and for all students z: x makes z read a in y."
c. "For all lecturers x: there is a book a and for all courses y: for all students z: x makes z read a in y."
d. "There is a book a and for all lecturers x: for all courses y: for all students z: x makes z read a in y."

Scope Restrictions

Restriction by strong intervener

An indefinite cannot take scope above a strong intervener. This holds for local scope ((5-a.)).

(4) Jeder hat ein Buch gelesen.
everyone has a book read
"Everyone read a book."

a. "There is a book x and for all y: y read x."

b. "For all y: there is a book x and y read x."

(5) Nur Peter hat ein Buch gelesen.
only Peter has a book read
"Only Peter read a book."

a. *"There is a book x and only Peter is y, such that y read x."

b. "Only Peter is y, such that there is a book x and y read x."

And for non-local scope ((7-a.))

(6) Jeder hat drei Seiten von einem Buch übersprungen.
everyone has three pages of a book skipped
"Everyone skipped three pages of a book."

a. "There is a book x and for all y: y skipped three pages of x."

b. "For all y: there is a book x and y skipped three pages of x."

(7) Nur Peter hat drei Seiten von einem Buch übersprungen.
only Peter has three pages of a book skipped
"Only Peter skipped three pages of a book."

a. *"There is a book x and only Peter is y, such that y skipped three pages of x."

b. "Only Peter is y, such that there is a book x and y skipped three pages of x."

Within the scope of a strong intervener, the indefinite can still take scope as usual.

(8) Nur Peter glaubt, dass niemand drei Seiten von einem Buch
only Peter believes that noone three pages of a book

übersprungen hat.
skipped has.
"Only Peter believes that noone skipped three pages of a book."

a. "Only Peter is y, such that there is no z, such that there is a book x and y believes that z skipped three pages of x."
b. "Only Peter is y, such that there is a book x and there is no z, such that y believes that z skipped three pages of x."

Restriction by DE Quantifiers

An indefinite in the scope of a DE quantifier can only take scope above that DE quantifier if no other quantifier is inbetween ((9-b.-d.)).

(9) Jeder Dozent lässt in jedem Kurs keinen Studenten ein Buch
every lecturer makes in every course no student a book
lesen.
read
"Every lecturer is such that in every course, he makes no student read a book."

a. "For all lecturers x: for all courses y: there is no student z such that there is a book a and x makes z read a in y."
b. "For all lecturers x: for all courses y: there is a book a and there is no student z such that x makes z read a in y."
c. "For all lecturers x: there is a book a and for all courses y: there is no student z such that x makes z read a in y."
d. "There is a book a and for all lecturers x: for all courses y: there is no student z such that x makes z read a in y."

If another quantifier is between the DE quantifier and the indefinite, the indefinite cannot outscope the DE quantifier ((10-c.-d.)).

(10) Jeder Dozent lässt in keinem Kurs jeden Studenten ein Buch
every lecturer makes in no course every student a book
lesen.
read
"Every lecturer has no course in which he makes every student read a book."

a. "For all lecturers x: there is no course y, such that for all students z: there is a book a and x makes z read a in y."
b. "For all lecturers x: there is no course y, such that there is a book a and for all students z: x makes z read a in y."
c. *"For all lecturers x: there is a book a and there is no course y, such that for all students z: x makes z read a in y."
d. *"There is a book a and for all lecturers x: there is no course y, such that for all students z: x makes z read a in y."

Donkey constructions

Intervention in Donkey binding

Donkey binding is blocked by the presence of strong intervener between the indefinite and the closest node c-commanding the indefinite and the pronoun. (11-b.) only works if it is about a specific donkey.

(11) a. Jeder Bauer, der Maria [einen Esel]$_1$ zeigt, mag [ihn]$_1$.
every farmer who Mary a donkey shows likes it
"Every farmer who shows Mary [a donkey]$_1$, likes it$_1$."

b. *Jeder Bauer, der nur Maria [einen Esel]$_1$ zeigt, mag [ihn]$_1$.
every farmer who only Mary a donkey shows likes it
"Every farmer who shows only Mary [a donkey]$_1$, likes [it]$_1$."

Weak interveners cause the same effect.

(12) a. *Jeder Bauer, der niemandem [einen Esel]$_1$ zeigt, mag [ihn]$_1$.
every farmer who noone a donkey shows likes it
"Every farmer who shows noone [a donkey]$_1$, likes [it]$_1$."

b. *Jeder Bauer, der den meisten Besuchern [einen Esel]$_1$ zeigt, mag [ihn]$_1$.
every farmer who the most visitors a donkey shows likes it
"Every farmer who shows most visitors [a donkey]$_1$, likes [it]$_1$."

The specific reading is still available. This is not an existential reading outscoping the donkey construction, which can be seen in (13), where the donkey construction is embedded. An intermediate reading above the donkey con-

struction ((13-b.)) is not available, but a widest scope/specific reading still is.

(13) Jeder sagt, dass jeder Bauer, der nur Maria [einen Esel]$_1$ everyone says that every farmer who only Mary a donkey zeigt, [ihn]$_1$ mag.
shows it likes
"Everyone says that every farmer who shows only Mary [a donkey], likes [it]$_1$."

a. "There is a (specific) donkey x and for every z: z says that for every farmer y who shows only Mary x: y likes x."

b. *"For every z: there is a donkey x and z says that for every farmer y who shows only Mary x: y likes x."

Intervention in asymmetric readings

A strong intervener between the donkey pronoun and the closest node c-commanding the indefinite and the pronoun does not block donkey binding.

(14) a. Jeder Bauer, der Maria [einen Esel]$_1$ zeigt, erlaubt Peter
every farmer who Mary [a donkey]$_1$ shows allows Peter
ihn$_1$ zu streicheln.
it$_1$ to pet
"Every farmer who shows Mary [a donkey]$_1$ allows Peter to pet it$_1$."

b. *Jeder Bauer, der nur Maria [einen Esel]$_1$ zeigt, erlaubt
every farmer who only Mary [a donkey]$_1$ shows allows
Peter ihn$_1$ zu streicheln.
Peter it$_1$ to pet
"Every farmer who shows only Mary [a donkey]$_1$ allows Peter to pet it$_1$."

c. Jeder Bauer, der Maria [einen Esel]$_1$ zeigt, erlaubt nur
every farmer who Mary [a donkey]$_1$ shows allows only
Peter ihn$_1$ zu streicheln.
Peter it$_1$ to pet
"Every farmer who shows Mary [a donkey]$_1$ allows only Peter to pet it$_1$."

A critical intervener between the donkey pronoun and the closest node c-commanding the indefinite and the pronoun does, however, block asymmetric readings. In (15), symmetric and asymmetric reading are available, in (16), the asymmetric reading is unavailable.

(15) Jeder, der eine Kreditkarte hat, erlaubt Peter, sie zu verwenden.
everyone who a credit card has allows Peter it to use
"Everyone who has a credit card, allows Peter to use it."

a. Symmetric reading:
"For all x and credit cards y owned by x: x allows Peter to use y."

b. Asymmetric reading:
"For all x: If there is a credit card z owned by x, then there is a credit card y owned by x and x allows Peter to use y."

(16) Jeder, der eine Kreditkarte hat, erlaubt nur Peter, sie zu verwenden.
everyone who a credit card has allows only Peter it to use
"Everyone who has a credit card, allows Peter to use it."

a. Symmetric reading:
"For all x and credit cards y owned by x: x allows only Peter to use y."

b. Asymmetric reading:
*"For all x: If there is a credit card z owned by x, then there is a credit card y owned by x and x allows only Peter to use y."

Weak interveners have the same effect:

(17) Jeder, der eine Kreditkarte hat, erlaubt niemandem, sie zu verwenden.
everyone who a credit card has allows noone it to use
"Everyone who has a credit card, allows Peter to use it."

a. Symmetric reading:
"For all x and credit cards y owned by x: x allows noone to use y."

b. Asymmetric reading:
*"For all x: If there is a credit card z owned by x, then there is a

credit card y owned by x and x allows noone to use y."

Quantifiers

Intervention in Quantifier Focus Association

Quantifiers can associate with focus in their scope.

(18) Jeder sagt, dass Maria Grippe_{F} hat.
everyone says that Mary flu has
"Everyone says that Mary has the flu_{F}."

a. "For all x, such that x says that Mary has something: x says that Mary has the flu."

This association is blocked by strong interveners:

(19) Jeder sagt, dass nur Maria Grippe_{F} hat.
everyone says that only Mary flu has
"Everyone says that only Mary has the flu_{F}."

a. "For all x: x says that only Mary has the flu."
b. *"For all x, such that x says that only Mary has something: x says that only Mary has the flu."

Weak interveners have the same effect. In (20), the lower quantifier can associate with the focus ((20-a.)), but the higher quantifier cannot associate with the focus across the lower quantifier ((20-b.)).

(20) Jeder sagt, dass niemand Grippe_{F} hat.
everyone says that noone flu has
"Everyone says that noone has the flu_{F}."

a. "For all x: x says that noone who has something has the flu."
b. *"For all x, such that x says that noone has something: x says that noone has the flu."

This association is also unavailable, if the quantifier is between a strong intervener and the first focused element in the scope of that strong intervener. In (21), the quantifier can associate with neither focus. The only available reading is (21-a.), in which the strong intervener associates with both foci.

(21) Ich habe nur gesagt, dass jeder Maria$_F$ aufs Handy$_F$ anruft.
I have only said that everyone Mary on mobile calls.
"I only said that everyone calls Mary$_F$ on her mobile$_F$."

a. "Mary/mobile is the only x/z combination of which I claim that for all y: y calls x on z."

b. *"Mary is the only x of which I claimed that for all y, if y calls x, y calls x on x's mobile."

c. *"Mobiles are the only devices x of which I claimed that for all y, if y calls someone on their x, y calls Mary on her x."

Indefinites cause this effect as well. In (22), a reading in which the quantifer associates with focus is unavailable if the indefinite does not have the specific reading ((22-a.)). If the indefinite is read as referring to a specific entity, the quantifier can associate with the focus ((22-b.)).

(22) Jeder gibt eine Hausaufgabe bei Peter$_F$ ab.
everyone hands an assignment at Peter in
"Everyone gives an assignment to Peter$_F$."

a. *"For all x, such that there is an assignment y and x gives y to someone: there is an assignment z and x gives z to Peter."

b. "There is a (specific) assignment y and for all x, such that x gives y to someone: x gives y to Peter."

Restrictions of Quantifier Scope

Non-locally construed indefinites cannot be outscoped by quantifiers that did not c-command them at spellout. In (23), the lower quantifier can take scope over the higher quantifier ((23-b.)). The indefinite can take scope above the higher quantifier ((23-c.)). But if the indefinite takes scope above the higher quantifier, the lower quantifier cannot take scope over the indefinite ((23-d.)). A reading where the lower quantifier takes scope above the higher quantifier

while the indefinite takes widest scope is (marginally) available ((23-e.)).

(23) Jeder Student, der ein Buch mag, mag die meisten Dozenten.
every student who a book likes likes the most lecturers
"Every student who likes a book likes most lecturers."

a. "For all students x, such that there is a book y and x likes y: for most lecturers z: x likes z."

b. "For most lecturers z: for all students x, such that there is a book y and x likes y: x likes z."

c. "There is a book y and for all students x, such that x likes y: for most lecturers z: x likes z."

d. *"For most lecturers z: there is a book y and for all students x, such that x likes y: x likes z."

e. "There is a book y and for most lecturers z: for all students x, such that x likes y: x likes z."

To see whether (23-e.) is a result of a specific reading of the indefinite, we would need to embed the whole structure below yet another quantifier and see whether the indefinite can take intermediate scope below that quantifier. That would be the reading in (24-a.).

(24) Niemand glaubt, dass jeder Student, der ein Buch mag, die
noone thinks that every student who a book likes the
meisten Dozenten mag.
most lecturers likes
"Noone thinks that every student who likes a book likes most lecturers."

a. "For no a: there is a book y and a thinks that for most lecturers z: for all students x, such that x likes y: x likes z."

It feels to me that this is not an available reading, but I do not think that this is a sentence/reading on which reasonable intuitions are possible. If this reading is not available, we could say that the QR path of a quantifier is not a valid scope site for an indefinite.

As a related data point: A lower quantifier cannot take scope above a higher

quantifier, if there is an indefinite that takes scope above the higher quantifier as well. Even if the lower quantifier takes scope above the indefinite and c-commands it at spellout. The reading that would result from that is (25-a.).

(25) Mehr als zwei studenten haben den meisten Dozenten das erste
more than two students have the most lecturers the first
Kapitel eines Buchs gezeigt.
chapter of-a book shown
"More than two students showed most lecturers the first chapter of a book."

a. *"Most lecturers x are such that there is a book y, such that more than two students showed the first chapter of y to x."

Even if an indefinite takes scope locally, a quantifier that does not c-command the indefinite at spellout can only outscope it, if there are alternatives to the indefinite. In (26), the quantifier can outscope the indefinite. While reading (26-a.) would require some very specific context to be available, (26-b.) is clearly available.

(26) Ein Auto erbt jeder Erbe.
a car inherits every inheritor
"Every inheritor inherits a car"

a. ??"There is a car x and for all inheritors y: y inherits x."

b. "For all inheritors y: there is a car x and y inherits x."

There are alternatives to cars when we talk about what can be inherited. In (27), there are no alternatives, as "Erbanteil" describes any share of inheritance including 0% and 100%.

(27) *Einen Erbanteil erbt jeder Erbe.
a share of inheritance inherits every inheritor
"Every inheritor inherits a share of inheritance."

a. ??"There is a share of inheritance x and for all inheritors y: y inherits x."

b. "For all inheritors y: there is a share of inheritance x and y inherits x."

While reading (27-a.) is unlikely for the same reasons it was in (26), (27-b.) is not available, either. (27) is ungrammatical or unfelicitous. In cntrast, (28) has a reading equivalent to (27-b.) and is fine.

(28) Jeder Erbe erbt einen Erbanteil.
every inheritor inherits a share of inheritance
"Every inheritor inherits a share of inheritance."

a. ??"There is a share of inheritance x and for all inheritors y: y inherits x."

b. "For all inheritors y: there is a share of inheritance x and y inherits x."

Appendix C

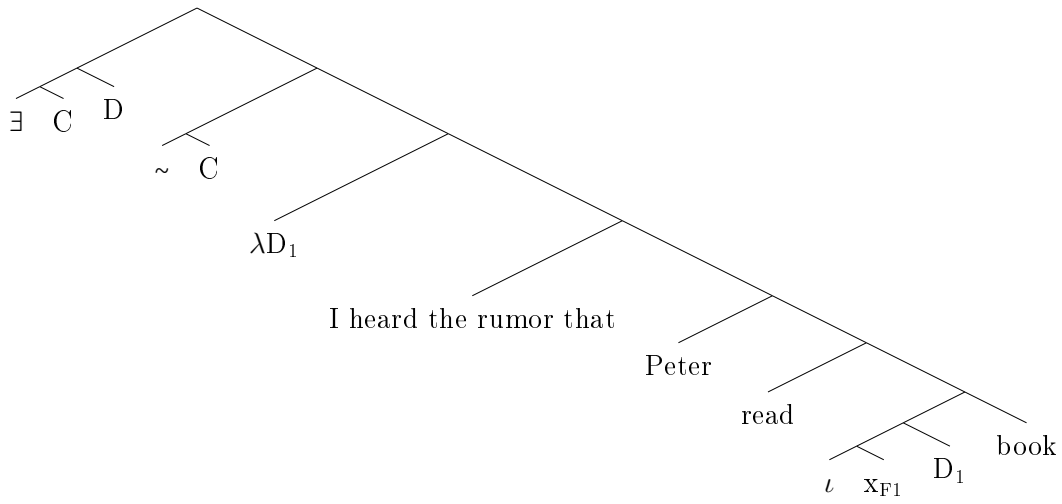
Appendix III - Benchmark

In chapter 2, we collected several observations about the scope-taking behaviour of indefinites. In the course of this work, I showed how the framework we developed predicts these observations. This appendix serves as a collection of these elements and the ways they are treated in this framework.

Scope and Scope Restrictions

Island-Free Scope

(1) I heard the rumor that Peter read a book.
Available:
"There is a book x, such that I heard the rumor that Peter read x."



(2) $[\![[\exists\ C\ D]\ [[\sim\ C\ ]\ [\lambda D_1$ I heard the rumor that Peter read $[\iota\ x_{F1}\ D_1$ book$]]]]]^g(w) = 1$ iff

a. $[\![[\exists\ C\ D]]\!]^g([\![[[\sim\ C\ ]\ [\lambda D_1$ I heard the rumor that Peter read $[\iota\ x_{F1}\ D_1$ book$]]]]\!]^g)(w)$

b. PSP $\sim$:
$g(C) \subseteq \{[\![\lambda D_1$ I heard the rumor that Peter read $[\iota\ x_{F1}\ D_1$ book$]]\!]^{g,h} \mid h \in D_{<h>}\}$

c. $[\![[\exists\ C\ D]]\!]^g(\lambda D'.\ [\![$I heard the rumor that Peter read $[\iota\ x_{F1}\ D_1$ book$]]\!]^{g[D'/1]})(w)$

d. $[\![[\exists\ C\ D]]\!]^g(\lambda D'.\ \lambda w'.$ I heard the rumor that Peter read $[\![[\iota\ x_{F1}\ D_1$ book$]]\!]^{g[D'/1]}$ in w')(w)

e. PSP ι:
$\exists!y[book(y)\ \&\ [\![D_1]\!]^{g[D'/1]}(y)\ \&\ y=[\![x]\!]^{g[D'/1]}]$

f. $[\![[\exists\ C]]\!]^g(\lambda D.\ \lambda w'.$ I heard the rumor that Peter read $\iota y[book(y)\ \&$ D'(y) & y=x] in w')(w)

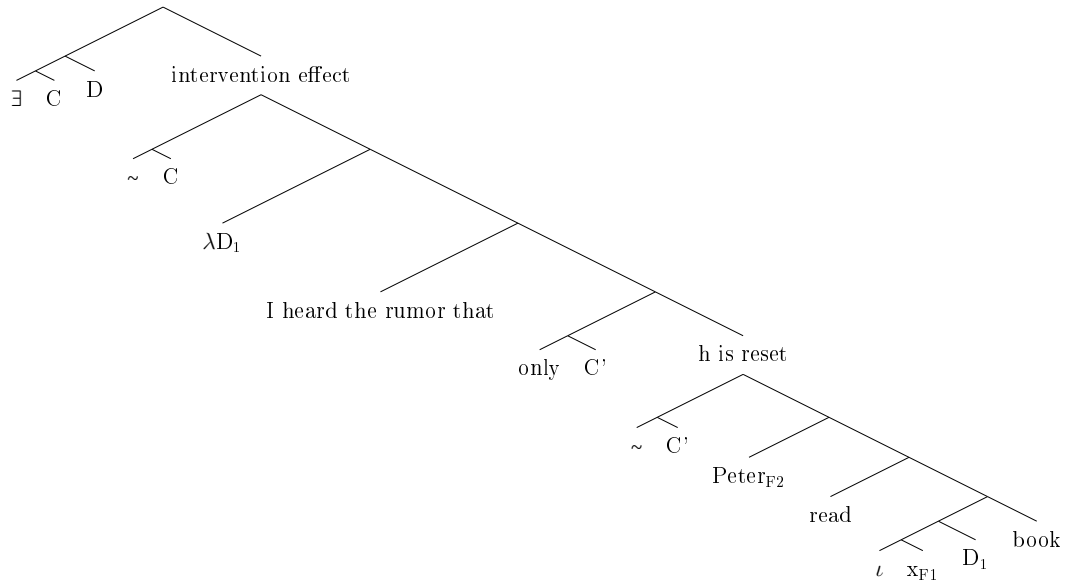
Truth conditions:
$\exists D'[D' \leqslant D\ \&\ \exists P'[P' \in g(C)\ \&\ P'(D')(w)]\ \&$ I heard the rumor that Peter read $\iota y[book(y)\ \&\ D'(y)\ \&\ y=x]$ in w]

Alternatives:
$g(C) \subseteq \{\lambda D.\ \lambda w'.$ I heard the rumor that Peter read $\iota y[book(y)\ \&\ D'(y)\ \&\ y=h(F1)]$ in w' $\mid h \in D_{<h>}\}$

Reading: "There is a domain D' in the context of D, which contains a book x such that I heard the rumor that Peter read x."

Scope Restriction through Intervention Effects

(3) I heard the rumor that only Peter read a book.
Not available:
"There is a book x, such that I heard the rumor that only Peter read x."



(3) is an intervention configuration. An indefinite in the scope of a ~-operator employed by another element cannot be existentially closed above that element.

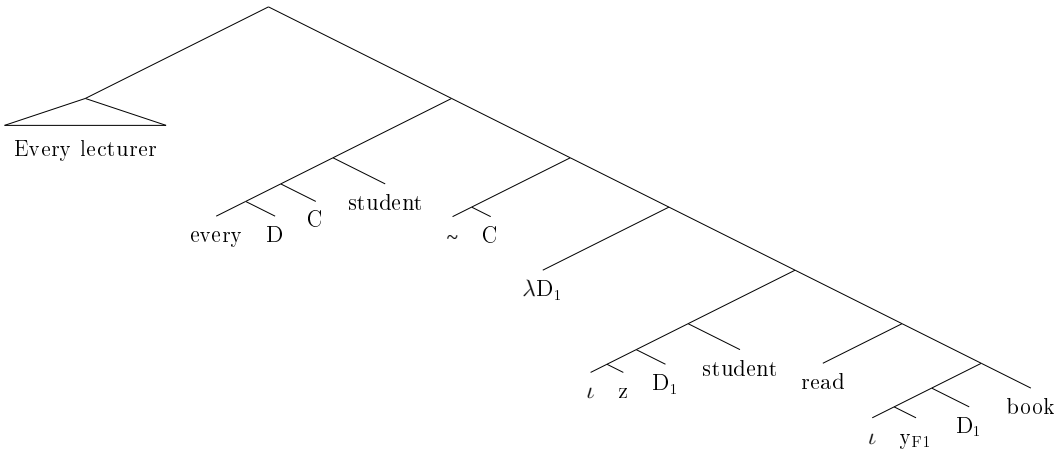
Intermediate Readings

(4) Every lecturer wants every student to read a book.

a. Available:
"For every lecturer x, there is a book y, such that for every student z, x wants z to read y."

b. Available:
"There is a book y, such that for every lecturer x and every student z, x wants z to read y."

Reading (4-a.), "Every lecturer" is simplified.



(5) $[\![$[Every lecturer] [wants [[every D C student] [[~ C] λD_1 [ι z D_1 student] reads [ι x_{F1} D_1 book]]]$]\!]^g(w) = 1$ iff

a. $\forall$x [lecturer(x) $\rightarrow$ x wants w': $[\![$[every D C student] [[~ C] λD_1 [ι z D_1 student] reads [ι y_{F1} D_1 book]]$]\!]^g$(w') in w]

b. $\forall$x [lecturer(x) $\rightarrow$ x wants w': $[\![$[every D C student]$]\!]^g([\![$[~ C] λD_1 [ι z D_1 student] reads [ι y_{F1} D_1 book]$]\!]^g)$(w') in w]

c. PSP ~:
$g(C) \subseteq \{[\![\lambda D_1$ [ι z D_1 student] reads [ι y_{F1} D_1 book]$]\!]^{g,h}$ | h$\in D_{<h>}\}$

d. $\forall$x [lecturer(x) $\rightarrow$ x wants w': $[\![$[every D C student]$]\!]^g(\lambda$D'. $[\![$[ι z D_1 student] reads [ι y_{F1} D_1 book]$]\!]^{g[D'/1]}$)(w') in w]

e. PSP ι (trace):
$\exists!$a[student(a) & $[\![D_1]\!]^{g[D'/1]}$(a) & a=z & a is central in $[\![D_1]\!]^{g[D'/1]}$]
PSP ι (indefinite):
$\exists!$b[book(b) & $[\![D_1]\!]^{g[D'/1]}$(b) & b=y]

f. $\forall$x [lecturer(x) $\rightarrow$ x wants w': $[\![$[every D C student]$]\!]^g(\lambda$D'.λw". ιa[student(a) & D'(a) & a=z] reads ιb[book(b) & D'(b) & b=y] in w")(w') in w]

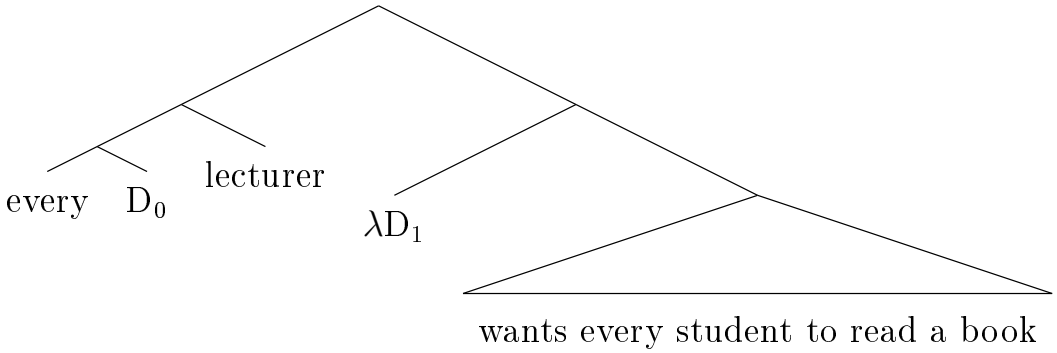
Truth conditions:
$\forall$x [lecturer(x) $\rightarrow$ x wants w': $\forall$D'[D'$\leqslant_{\text{student}}$D & $\exists$p'[p'$\in$C & p'(D')(w') is relevant] $\rightarrow$ ιa[student(a) & D'(a) & a=z] reads ιb[book(b) & D'(b) & b=y] in w'] in w]

Alternatives:
g(C)⊆{λD'.λw". ιa[student(a) & D'(a) & a=z] reads ιb[book(b) & D'(b) & b=h(F1)] in w" | h∈$D_{<h>}$}

Reading:
"For every lecturer x: x wants that for every student-domain D' in the context of D for which there is a relevant alternative in which the student in D' reads some book in D', the student in D' reads book y."

Inference about context referent y and domain D:
There is some salient book y. For every D'$\leqslant_{student}$D for which there is a relevant alternative in which the student in D' reads some book in D', y is in D'.
(i.e. y is stable relative to "every student".)

This inference produces reading (4-a.). Reading (4-b.), "Every lecturer" explicit, rest as above:



(6) [[every D_0 lecturer] [λD_1 wants every student to read a book]]^g(w) =1 iff

a. [[every D_0 lecturer]]^g(λD.λw".∀x [lecturer(x) → x wants w': ∀D' [D'$\leqslant_{student}$D & ∃p'[p'∈C & p'(D')(w') is relevant] → ιa[student(a) & D'(a) & a=z] reads ιb[book(b) & D'(b) & b=y] in w'] in w"])(w)

b. ∀D[D$\leqslant_{lecturer}$$D_0$→ ιc[lecturer(c) & D(c) & c=x] wants w': ∀D' [D'$\leqslant_{student}$D & ∃p'[p'∈C & p'(D')(w') is relevant] → ιa[student(a) & D'(a) & a=z] reads ιb[book(b) & D'(b) & b=y] in w'] in w]

Reading:
"For every lecturer-domain D in the context of D_0: the lecturer in D_0 wants that for every student-domain D' in the context of D for which there is a relevant alternative in which the student in D' reads some book in D', the student in D' reads book y."

Possible additional inference about context referent y and domain D_0:
There is some salient book y. For every $D \leqslant_{\text{lecturer}} D_0$, every $D' \leqslant_{\text{student}} D$ for which there is a relevant alternative in which the student in D' reads some book in D' is such that y is in D'.
(i.e. y is stable relative to "every lecturer" and "every student".)

This additional inference produces reading b.. Strictly speaking, the a. reading would require the following inference:

For every $D \leqslant_{\text{lecturer}} D_0$, there is some salient book y. Every $D' \leqslant_{\text{student}} D$ for which there is a relevant alternative in which the student in D' reads some book in D' is such that y is in D'.
(i.e. y is stable relative to "every student".)

It is not the case that there is some salient book y, such that for every $D \leqslant_{\text{lecturer}} D_0$, every $D' \leqslant_{\text{student}} D$ for which there is a relevant alternative in which the student in D' reads some book in D' is such that y is in D'.
(i.e. y is not stable relative to "every lecturer".)

Binder-Roof Constraint

(7) [Every lecturer]$_1$ wants every student to read a book she$_1$ wrote.

a. Available:
"For every lecturer x, there is a book y written by x, such that for every student z, x wants z to read y."

b. Unavailable:
"There is a book y, such that for every lecturer x, x wrote y and for every student z, x wants z to read y."

The calculation is the same as above, but the denotation of the indefinite is (8):

(8) ιb[book(b) & ιc[lecturer(c) & D(c) & c=x] wrote b & D'(b) & b=y]

To produce the unavailable reading (8-b.), the following inference would be necessary:
There is some salient book y. For every $D \leqslant_{\text{lecturer}} D_0$, every $D' \leqslant_{\text{student}} D$ for which there is a relevant alternative in which the student in D' reads some book in D' which was written by the lecturer in D, is such that y is in D'.
(i.e. y is stable relative to "every lecturer" and "every student".)

This inference cannot be correct, unless all lecturers in D_0 together wrote one book. In this case, we would have the effect of Cresti (1995)'s example:

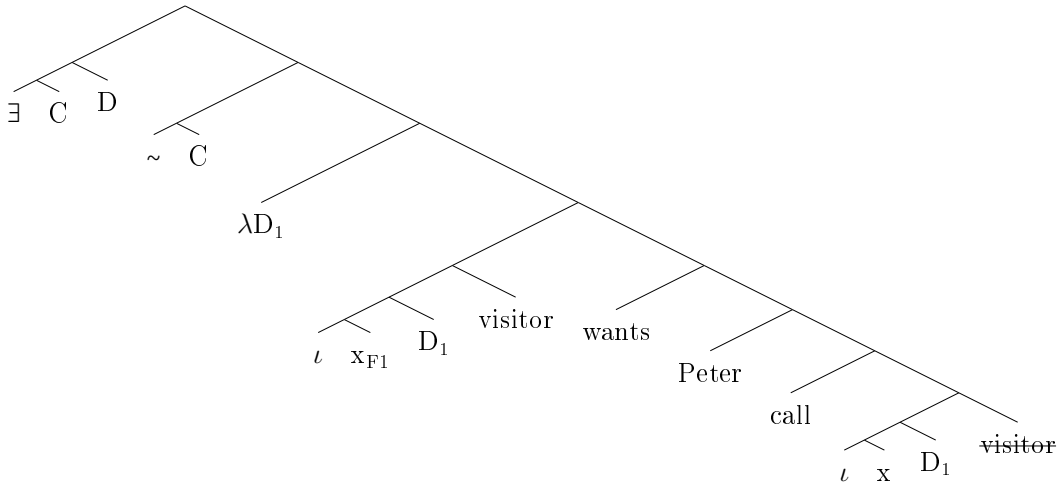
(9) If every Italian in this room (could manage to) watch a (certain) program about his country (that will be aired tonight on PBS), we might have an interesting discussion tomorrow.

This approach correctly predicts that an indefinite containing a bound variable can only be construed as outscoping the binder if the indefinite refers to the same context referent independent of the value assigned to the bound variable.

Binding

Pronoun Binding

(10) [A visitor]$_1$ wants Peter to call him$_1$.



(11) $[\![[\exists\ C\ D]\ [[\sim C]\ [\lambda D_1\ [\iota\ x_{F1}\ D_1\ visitor\ ]\ wants\ Peter\ call\ [\iota\ x\ D_1\ visitor\ ]]]]\!]^g(w) = 1$ iff

a. $[\![[\exists\ C\ D]]\!]^g([\![[\sim C]\ [\lambda D_1\ [\iota\ x_{F1}\ D_1\ visitor\ ]\ wants\ Peter\ call\ [\iota\ x\ D_1\ visitor\ ]]]\!]^g)(w)$

b. PSP of ~:
$g(C) \subseteq \{[\![\lambda D_1\ [\iota\ x_{F1}\ D_1\ visitor\ ]\ wants\ Peter\ call\ [\iota\ x\ D_1\ visitor\ ]]\!]^{g,h} \mid h \in D_{<h>}\}$

c. PSP ι (indefinite):
$\exists!y[visitor(y) \& [\![D_1]\!]^{g[D'/1]}(y) \& y=x]$
PSP ι (pronoun):
$\exists!y[visitor(y) \& [\![D_1]\!]^{g[D'/1]}(y) \& y=x \& y \text{ is central in } [\![D_1]\!]^{g[D'/1]}]$

d. $[\![[\exists\ C\ D]]\!]^g(\lambda D'.\lambda w''.\ \iota y[\ D'(y) \& visitor(y) \& y=x]$ wants w': Peter calls $\iota y[\ D'(y) \& visitor(y) \& y=x]$ in w' in w")(w)

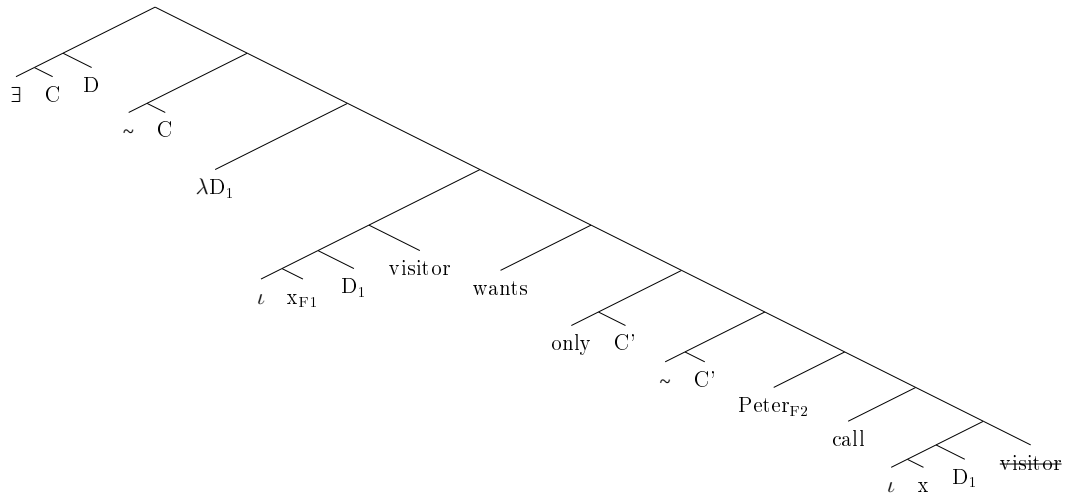
Truth conditions:
$\exists D'[D' \leqslant D \& \exists P'[P' \in C \& P'(D')(w)] \& \iota y[\ D'(y) \& visitor(y) \& y=x]$ wants w': Peter calls $\iota y[\ D'(y) \& visitor(y) \& y=x]$ in w' in w]

Reading:
"There is a domain D' in the context of D, which contains a visitor. The visitor x in D' wants Peter to call the visitor x in D'."

Binding Across Critical Interveners

Binding a pronoun via ∃ does not involve focus association between ∃ and the pronoun. As a result, (12) is not an intervention structure.

(12) [A visitor]$_1$ wants only Peter to call him$_1$.

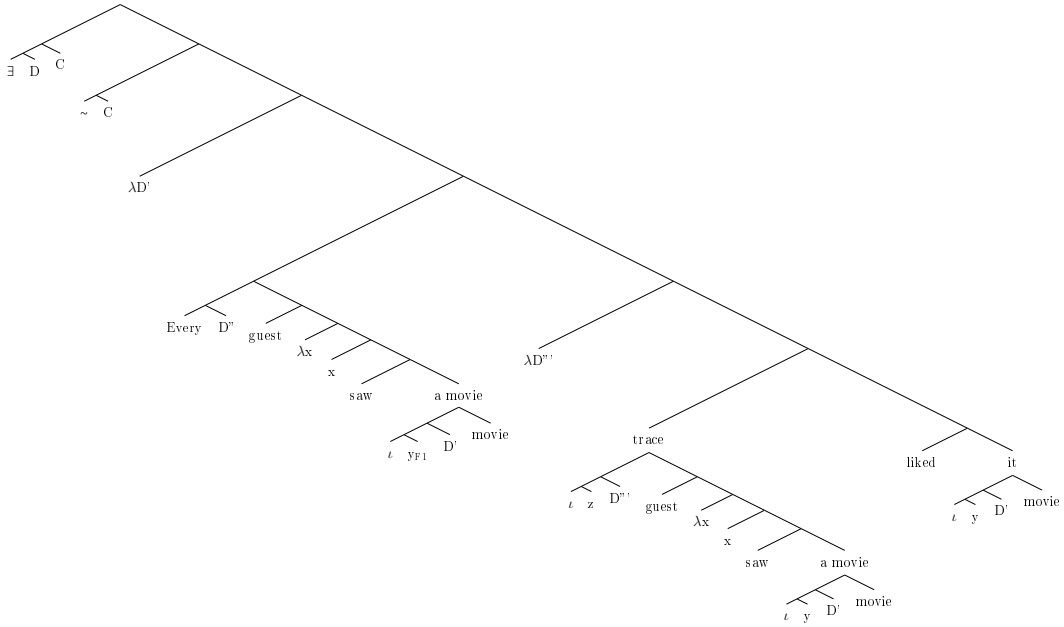


An indefinite can bind a pronoun across a critical intervener.

Donkey Binding

The first example is a donkey construction with an existential reading. The first part of (13) ("every cinema") will not be part of the example, but is there to make sure we are not talking about a specific/entity reading of the indefinite.

(13) (In every cinema,) every guest that saw a movie, liked it.
"(Every cinema is such that) there is some movie x such that every guest that saw x liked x."



(14) $[\![[\exists\ D\ C\ ]]\!]^g$ [[~ C] [λD' [[Every D" guest λx x saw ι[y_{F1} D' movie]] [ι[guest λx x saw ι[y D' movie]] liked ι[y D' movie]]]]]$[\![]\!]^g$(w) =1 iff

a. $[\![[\exists$ D C $]]\!]^g$ ($[\![$[[~ C] [λD' [[Every D" guest λx x saw ι[y_{F1} D' movie]] [ι[guest λx x saw ι[y D' movie]] liked ι[y D' movie]]]]]$[\![]\!]^g$)(w)

b. PSP of ~:
g(C)⊆{ λD'.λw'.∀D"'[D"'$\preccurlyeq_{\lambda x.\ guest(x)\ \&\ x\ saw\ \iota a[D'(a)\ \&\ movie(a)\ \&\ a=h(1)]}$D" → ιb[guest(b) & b saw ιa[D'(a) & movie(a) & a=y]D"] liked ιa[D'(a) & movie(a) & a=y]D"] in w' |hϵD_h}

c. $[\![\exists$ D C$]\!]^g$(λD'.λw'.∀D"'[D"'$\preccurlyeq_{\lambda x.\ guest(x)\ \&\ x\ saw\ \iota a[D'(a)\ \&\ movie(a)\ \&\ a=y]}$D" → ιb[guest(b) & b saw ιa[D'(a) & movie(a) & a=y] & D"'(b)] liked ιa[D'(a) & movie(a) & a=y]] in w')(w)

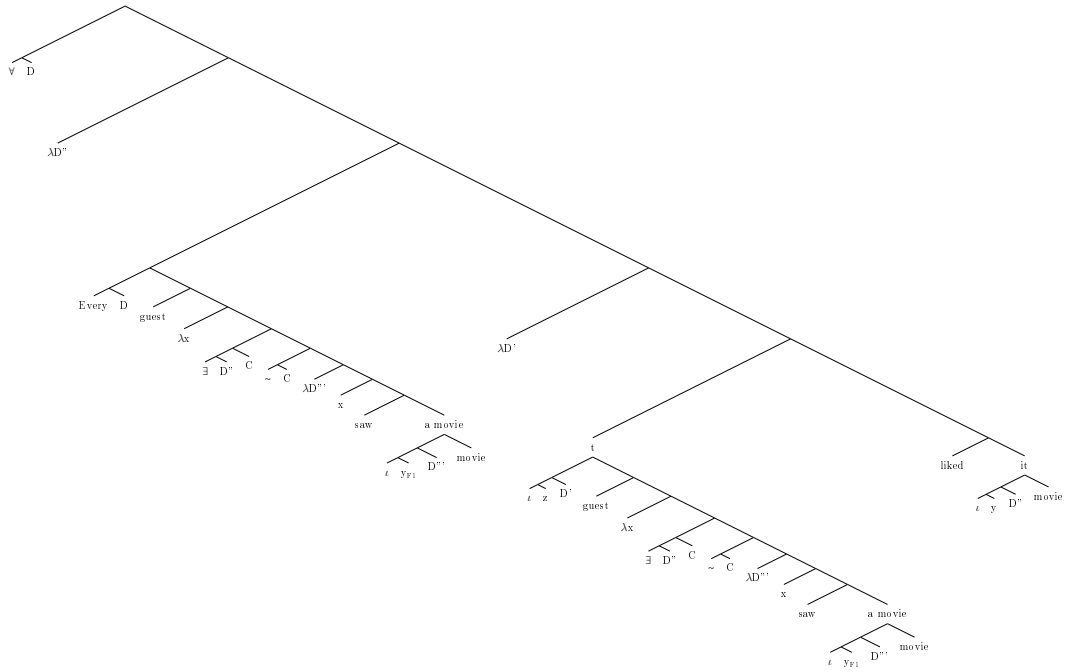
Truth conditions:
∃D'[D'≼D & ∃P'[P'ϵC & P'(D')(w)] & ∀D"'[D"'$\preccurlyeq_{\lambda x.\ guest(x)\ \&\ x\ saw\ \iota a[D'(a)\ \&\ movie(a)\ \&\ a=y]}$D" → ιb[guest(b) & b saw ιa[D'(a) & movie(a) & a=y] & D"'(b)] liked ιa[D'(a) & movie(a) & a=y]]] in w

Reading:
"There is a D' in the context of D that contains a movie y. Every D"' centered

around a guest in D" that saw y is such that the guest in D"' liked y."

The second example is a donkey construction with a universal reading. Since most of the calculation is the same as above, I will skip several steps.

(15) Every guest that saw a movie, liked it.
"For all movies x, every guest that saw x liked x."



(16) $[\![$[∀ D] [λD" [[Every D guest λx [[∃ D" C] [[~ C] [λD"' x saw ι[y_{F1} D" movie]]]]] [λD' ι[z D' guest λx x saw ι[y D" movie]]]] [liked ι[y D" movie]]]$]\!]^g$(w) =1 iff

a. PSP of ~:
g(C)⊆{λD"'.λw'. x saw ιa[D"'(a) & movie(a) & a=h(1)] in w' |hϵD_h}

b. $[\![$∀ D$]\!]^g$(λD".λw'. ∀D'[D'≼$_{\lambda x.\ guest(x)\ \&\ \exists D"'[D"'\preccurlyeq D"\ \&\ \exists P'[P'\epsilon C\ \&\ P'(D"')(w')]\ \&\ x\ saw\ \iota a[D"'(a)\ \&\ movie(a)\ \&\ a=y]}$D → ιb[D'(b) & guest(b) & ∃D"'[D"'≼D" & ∃P'[P'ϵC & P'(D"')(w')] & b saw ιa[D"'(a) & movie(a) & a=y]]] liked ιa[D"(a) & movie(a) & a=y]])(w)

Truth conditions:
$\forall$D"[D"$\preccurlyeq$D $\rightarrow$ $\forall$D'[D'$\preccurlyeq_{\lambda x.\ guest(x)\ \&\ \exists D"'[D"'\preccurlyeq D"\ \&\ \exists P'[P'\in C\ \&\ P'(D"')(w')]\&\ x\ saw\ \iota a[D"'(a)\ \&\ movie(a)\ \&\ a=y]}$D $\rightarrow$ ιb[D'(b) & guest(b) & $\exists$D"'[D"'$\preccurlyeq$D" & $\exists$P'[P'$\in$C & P'(D"')(w')] & b saw ιa[D"'(a) & movie(a) & a=y]]] liked ιa[D"(a) & movie(a) & a=y]]

Reading:
"For all D" centered around a movie in D: For all D' centered around a guest in D for whom there is a D"' in the context of D" containing a movie that the guest saw: The guest in D' who saw a movie in D"' liked the movie in D"."

The presupposition that the entity variable in the pronoun needs to refer to the central element of its domain restricts $\forall$ to quantifying over domains that have a movie as their central element. For the entity variable in the indefinite, a salient context referent in D" is infered, and as D" is centered around a movie, that one is chosen. The result is that the pronoun and the indefinite refer to the same entity, even though they have different domains.

It should be noted that there is another instance of $\exists$ in the trace of "every guest that saw a movie". This might just as well be left out, following our version of the novelty condition in 3.5.2:

(17) Novelty Condition:
The entity variable of an ι-construction can only carry focus if it does not refer to a context referent that was already introduced.

The result are truth conditions, which are a bit simpler:

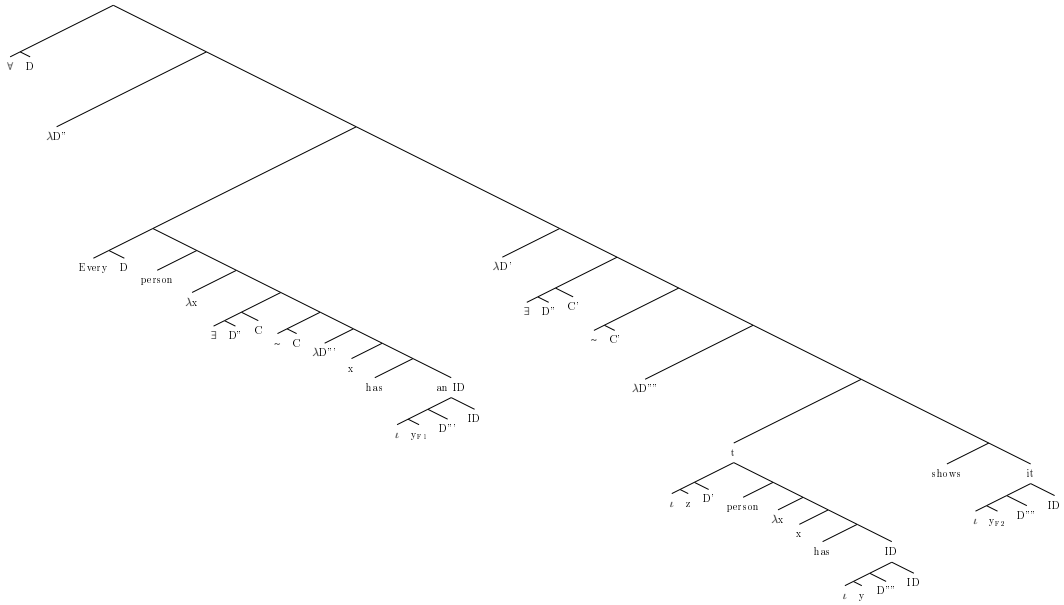
Truth conditions:
$\forall$D"[D"$\preccurlyeq$D $\rightarrow$ $\forall$D'[D'$\preccurlyeq_{\lambda x.\ guest(x)\ \&\ \exists D"'[D"'\preccurlyeq D"\ \&\ \exists P'[P'\in C\ \&\ P'(D"')(w')]\&\ x\ saw\ \iota a[D"'(a)\ \&\ movie(a)\ \&\ a=y]}$D $\rightarrow$ ιb[D'(b) & guest(b) & b saw ιa[D"(a) & movie(a) & a=y]] liked ιa[D"(a) & movie(a) & a=y]]

Reading:
"For all D" centered around a movie in D: For all D' centered around a guest in D for whom there is a D"' in the context of D" containing a movie that the

guest saw: The guest in D' who saw the movie in D" liked the movie in D"."

The third example is a proportion problem construction that has an asymmetric reading: In (18), a German person may have their driver's license, their Personalausweis and their passport on hand, all of them valid forms of ID, but only show one without falsifying the sentence. As discussed in the section on the proportion problem, the assumption here is that this is done via a second instance of existential closure. For this example, I will assume no existential closure in the trace.

(18) Everyone who has an ID shows it.



(19) $[\![$[∀ D] [λD" [[Every D person λx [[∃ D" C] [[~ C] [λD"' x has ι[y_{F1} D" ID]]]]] [λD' [∃ D" C] [[~ C] λD"" ι[z D' guest λx x has ι[y D"" ID]]]] [showed ι[y D"" ID]]]$]\!]^g$(w) =1 iff

a. Restrictor of "every":
λx. person(x) & ∃D"'[D"'⩽D" & ∃P'[P'∈C & P'(D"')(w')] & x has ιa[D"'(a) & ID(a) & a=y]

b. Consequent of "every":
λD'.λw'.∃D""[D""⩽D" & ∃P'[P'∈C' & P'(D"")(w')] & ιb[D'(b) &

person(b) & b has ιa[D""(a) & ID(a) & a=y]] shows ιa[D""(a) & ID(a) & a=y] in w']

Truth conditions:
$\forall$D"[D"$\preccurlyeq$D $\rightarrow$ $\forall$D'[D'$\preccurlyeq_{\lambda x.\ person(x)\ \&\ \exists D"'[D"'\preccurlyeq D"\ \&\ \exists P'[P'\in C\ \&\ P'(D"')(w)]\ \&\ x\ has\ \iota a[D"'(a)\ \&\ ID(a)\ \&\ a=y]}$ $\rightarrow$ $\exists$D""[D""$\preccurlyeq$D" & $\exists$P"[P"$\in$C' & P"(D"")(w)] & ιb[D'(b) & person(b) & b has ιa[D""(a) & ID(a) & a=y]] shows ιa[D""(a) & ID(a) & a=y] in w]]

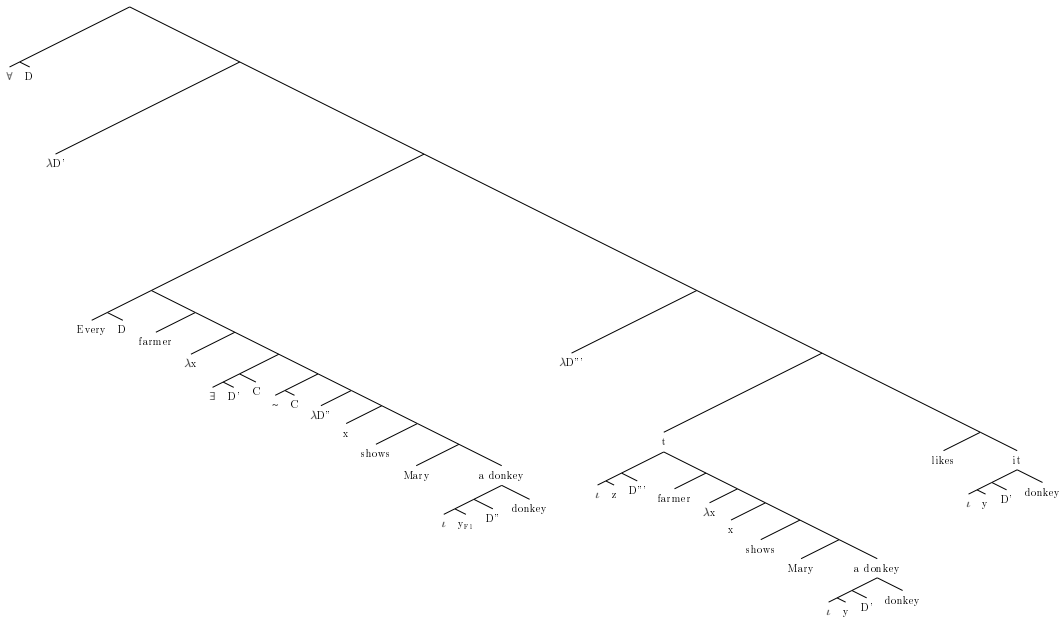
Reading: "For all D" in the context of D: For every D' in the context of D that is centered around a person for whom there is a D"' in the context of D" containing an ID that the person has: D' is such that there is a D"" in the context of D" centered around an ID and the person in D' shows the ID in D""."

i.e. "For all D": If a person is such that there is an ID in the context of D" that they have, there is one in the context of D" that they show."

Intervention in Donkey Binding

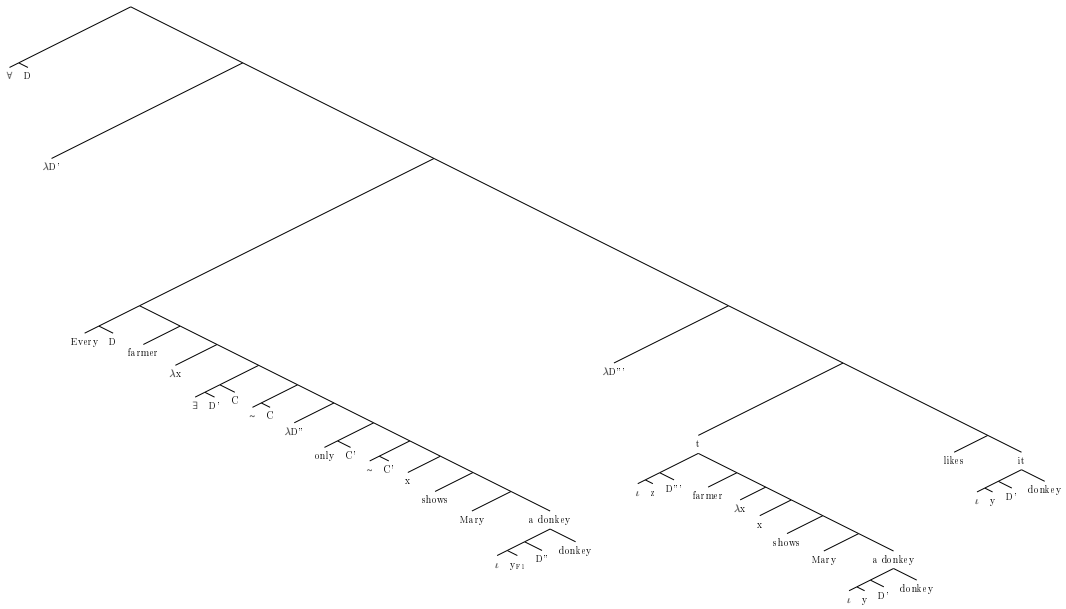
Donkey binding is sensitive to intervention effects. (20) is a regular, working donkey construction:

(20) Every farmer who shows Mary a donkey likes it.



In (21), "only" in the restrictor of "every" employs ~, which makes this an intervention structure:

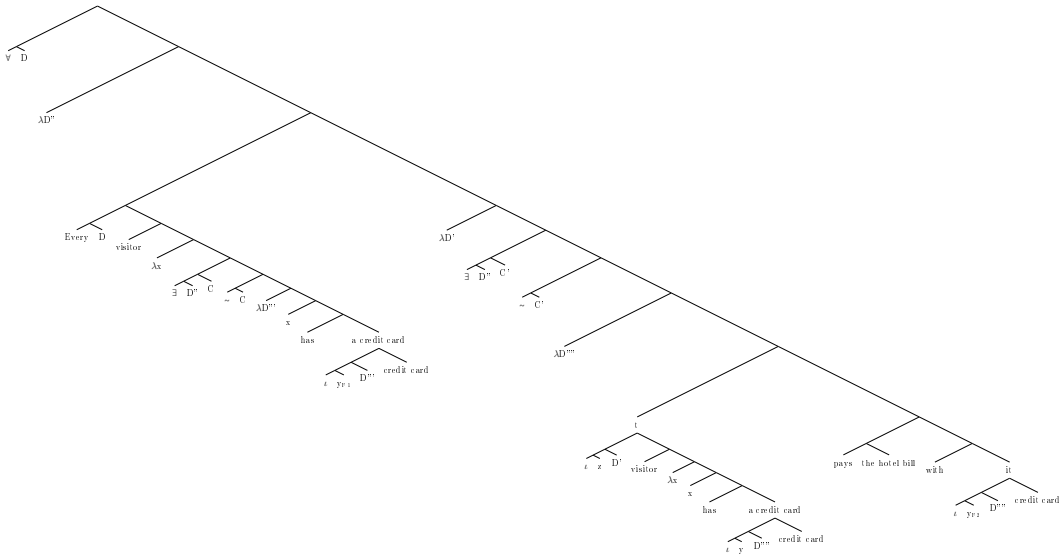
(21) *Every farmer who shows only Mary a donkey likes it.



We correctly predict that the bound reading is not available anymore. We could place a quantifier in the position of "only" to get the same effect. If the critical intervener is in the consequent instead, nothing happens, as no focus evaluation happens in the consequent.

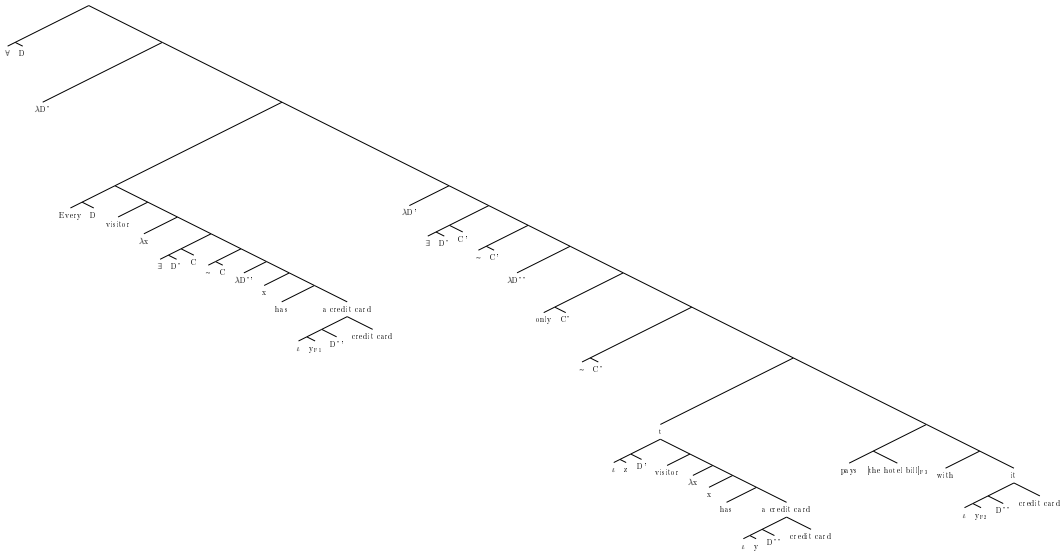
In asymmetric readings, focus evaluation does happen in the consequent. If there is a critical intervener in the consequent, no asymmetric reading is available. (22) has an asymmetric reading:

(22) Every visitor who has a credit card pays the hotel bill with it.
Available:
"Every visitor who has one or more credit cards uses one of them to pay the hotel bill."



This reading is lost, if a critical intervener is in the consequent:

(23) Every visitor who has a credit card only pays the hotel bill with it.
Unavailable:
"Every visitor who has one or more credit cards has one which he only uses to pay the hotel bill."



Interaction with Quantifiers

Bound Closure

Indefinites can have an existential reading, where the quantified over domain is bound by a higher quantifier. We used a modified version of Schlenker (1998, 2006)'s example:

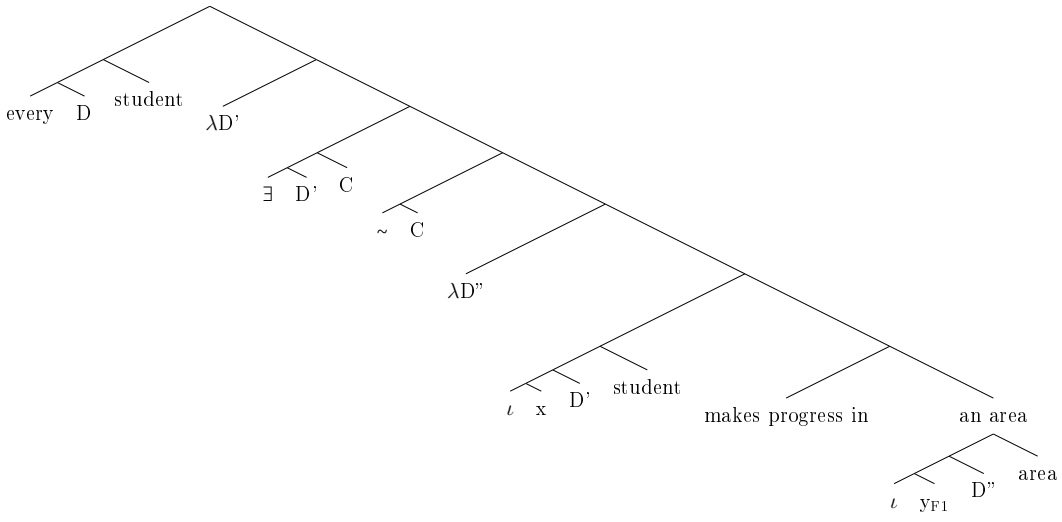
(24) Context: Every student in my syntax class has two weak points: John doesn't understand Case Theory and Islands, Mary has problems with Binding Theory and adjuncts, etc. I structured the exam in a way that allows people to still pass, if they have only one weak point. Before the final, I say:

a. If every student makes progress in an area, nobody will flunk the exam.

b. Available:
There is a certain distribution of fields per student such that if each student makes progress in one of the fields assigned to him/her, nobody will flunk the exam.

c. Unavailable:
If each student makes progress in at least one area, nobody will flunk the exam.

(25) every student makes progress in an area



Reading:
"If for every student-domain D' in the context of D there is a D" in the context of D', such that the student in D' makes progress in the area in D", nobody will flunk the exam."

i.e.: "If every student makes progress in an area *contextually relevant to the student*, nobody will flunk the exam."

The correct reading is predicted.

Scope Barrier for Lower Quantifiers

Chierchia (2001) observes that non-local indefinites cannot be outscoped by a quantifier that did not c-command them at spellout.The solution proposed in 3.4.3 was that ∃ employs ~ and is therefore a barrier to QR, just as "only" is. This is problematic, as it would also mean that ∃ cannot be applied above the trace of a quantified phrase that c-commands the indefinite at spellout. In several of the examples above, this is exactly what we did.

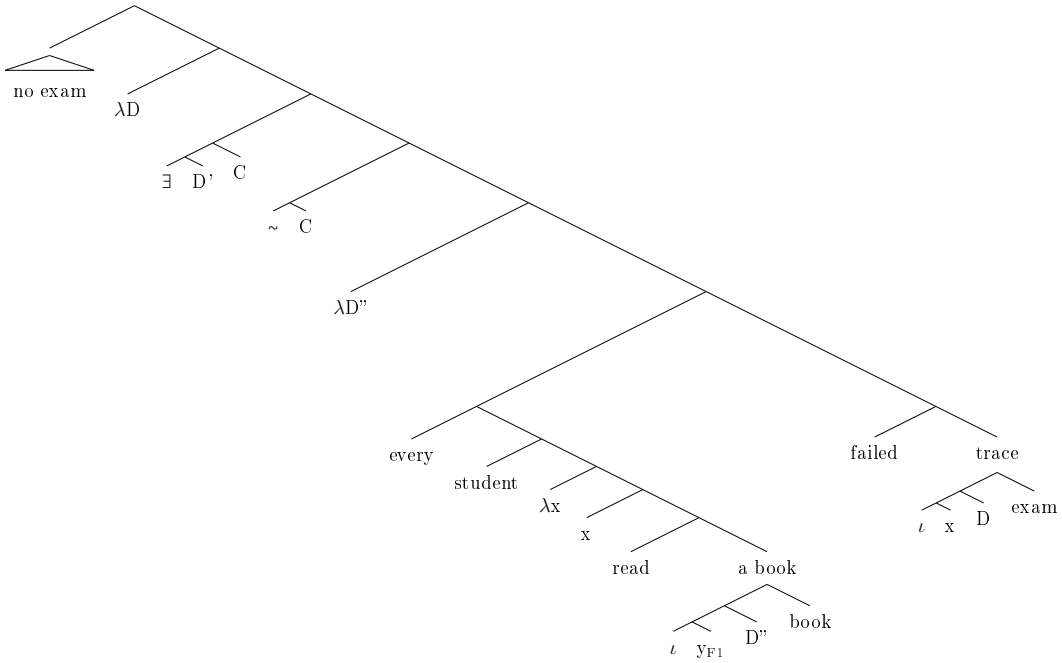
As a quick fix, we could simply apply ∃ below the corresponding traces. But as these nodes do not denote propositions, we would need typeshifted versions of ∃, to allow it to be applied at property denoting nodes. This works for the phenomena discussed in this work, but it would require at least one additional lexical entry for ∃.

(26) $[\![\exists]\!]$ (at property denoting node)=
$\lambda D_{<e,t>}.\lambda C_{<<<e,t>,t>,t>}.\lambda P_{<<e,t>,<e,t>>}.\lambda x.\ \exists D'[D' \leqslant D\ \&\ \exists P'[P' \in C\ \&\ P'(D')(x)]\ \&\ P(D')(x)]$

Examples like the one Chierchia (2001) discusses are then still predicted, as the unavailable readings still require ∃ to be in a position where it creates a barrier for QR.

(27) Every student who read some book failed no exam.
Unavailable:
"There is no exam, for which there is a book such that every student

who read the book failed the exam."



This would be the structure that creates the unavailable reading. ∃ is at the lowest point that outscopes "every", but still puts ~ in the QR-path of "no exam". Further research on where exactly in the syntax ∃ can be employed and on why ~ blocks QR is needed.

Appendix D

Appendix IV - Hierarchy of Intervention

As mentioned above, focus evaluating operators can be divided into four categories:

Operator	Type of evaluation	Type of focus
only/even	obligatory	overt
quantifier	optional	overt
existential closure	obligatory	covert
modal	optional	covert

The interaction between focus evaluating operators is guided by three rules of focus evaluation:

(1) Rules of focus evaluation

a. A focus evaluating operator does not have any other focus evaluating operator between itself and the nearest focus it can associate with.

b. A focus evaluating operator that cannot associate with a certain type of focus does not have an item with focus of that type in its scope without a focus evaluating operator in between.

c. An operator that optionally evaluates focus does so if and only if there is a focused element in its scope and there is no focus evaluating operator in between.

Rule b.) comes with the caveat that covert focus can be interpreted as overt, but not vice versa.

Examples

The German data presented here is introspective data. I consulted a small number of informants and they agreed with my judgements, but the strength of the effects varied quite a bit. No proper study was done.

Combining focus evaluating operators from different (the same) classes, allows us to see how these rules work. With regard to the following examples, I will call the first focus evaluating operator 'evaluator' and the intervening one 'intervener'. Overt focus will be marked with a subscript "Fo", while covert focus will be marked "Fc".

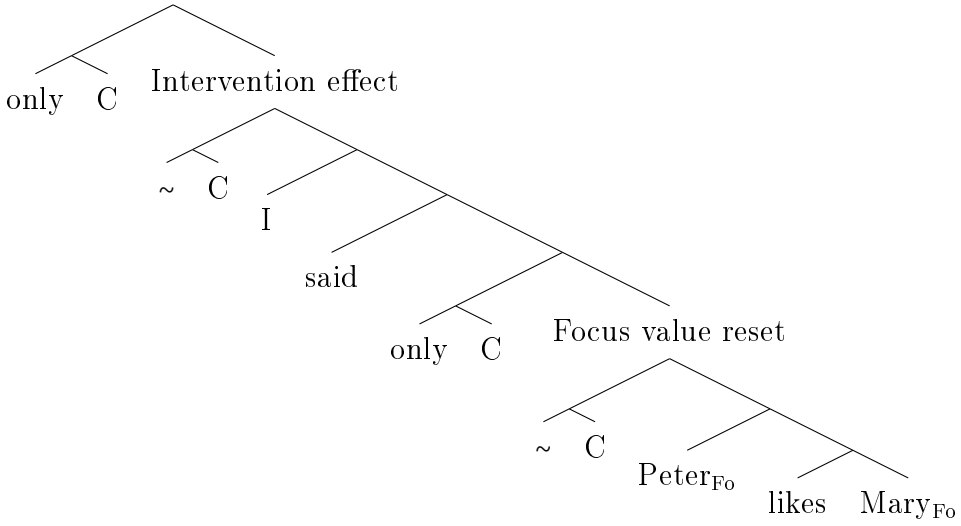
obligatory/overt

The first batch of examples puts different focus evaluating operators between "only" and the focus it tries to associate with. (2) has another instance of "only" in an intervening position:

(2) *Ich habe nur gesagt, dass nur Peter_{F} Maria_{F} mag.
I have only said that only Peter Mary likes
"I only said that only Peter_{Fo} likes Mary_{Fo}."

Rule c.) does not apply, since neither evaluator nor intervener optionally evaluate focus. Rule b.) does not apply either, since the available focus matches the operators. Rule a.) is violated, leading to the ungrammatical structure in (3):

(3)



In (4), the intervener is "every".

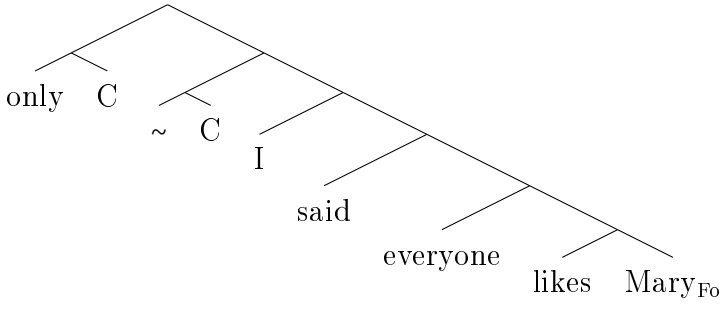
(4) Ich habe nur gesagt, dass jeder Maria$_F$ mag.
I have only said that everyone Mary likes
"I only said that everyone likes Mary$_F$."

a. Mary is the only x for which I claim that everyone likes x.

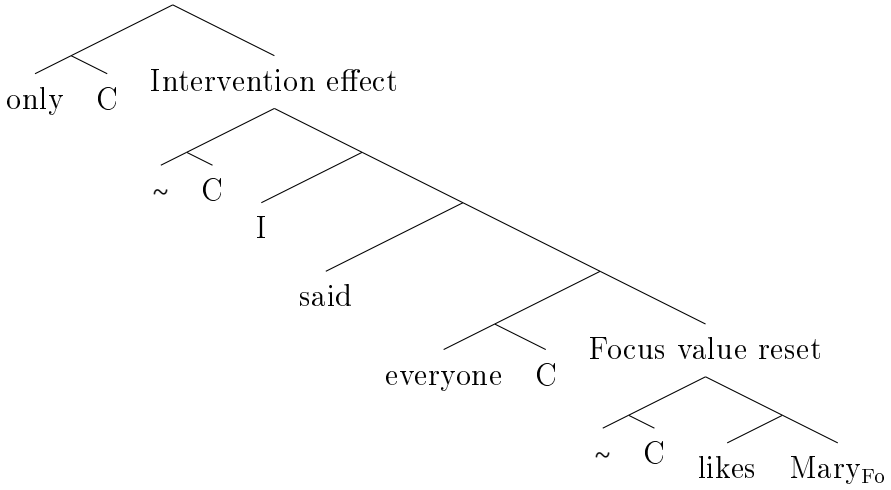
b. *Mary is the only x for which I claim that everyone who likes someone likes x.

Rule c.) can be applied to the intervener, but not the evaluator. Rule b.) does not apply, since the available focus matches the operators. Rule a.) is violated, but can be saved by ignoring c.). The result is that the evaluator evaluates the focus and the intervener is not focus evaluating. (4-a.) is available, while (4-b.) is not.

(5) a.



b.



In (6), the possible intervener is existential closure, i.e. an indefinite is in an intervening position.

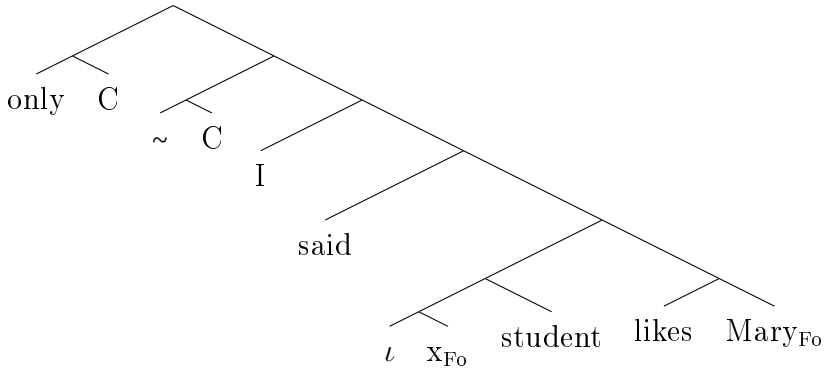
(6) Ich habe nur gesagt, dass eine Studentin Maria$_F$ mag.
I have only said that a student Mary likes
"I only said that a student likes Mary$_F$."

a. The only thing I said about some student liking someone is that some student x likes Mary.

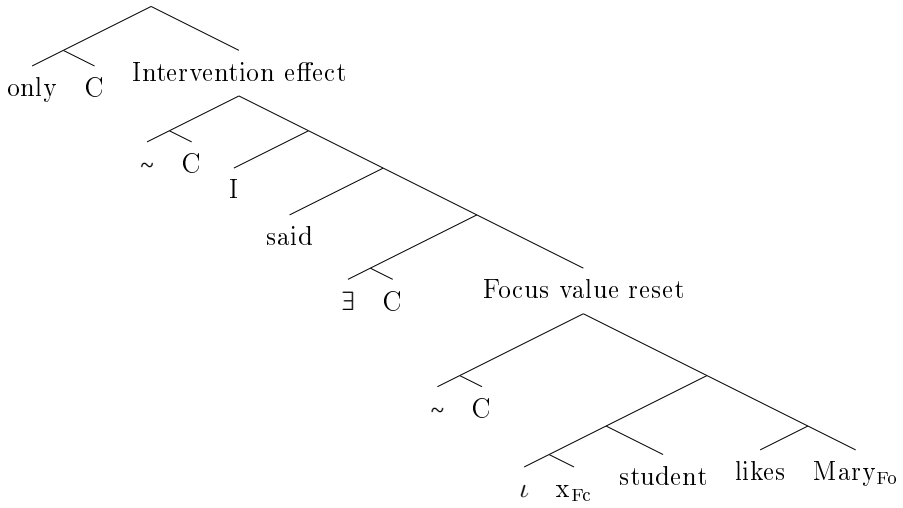
b. Mary is the only x for which I said that some student likes x.

If we assume existential closure below the evaluator, rule c.) does not apply, since neither evaluator nor intervener optionally evaluate focus. Rule b.) does not apply either, since the available focus matches the operators. Rule a.) is violated. Since this leads to the ungrammatical structure in (7-b.), existential closure is not applied. Instead, the focus in the indefinite is interpreted as overt and the evaluator evaluates both foci. This results in structure (7-a.) and reading (6-a.).

(7) a.



b.



(6-b.) differs from (6-a.) only in so far that in (6-b.) I might not have had a specific student in mind. (6-b.) would be the result of the ungrammatical configuration (7-b.), but can also be generated (as discussed in 4.3.1) by having focus on the entire definite, using the scalar alternatives as the focus alternatives, i.e. "the only amount/person combination of which I said that that amount of students likes that person is a/Mary."

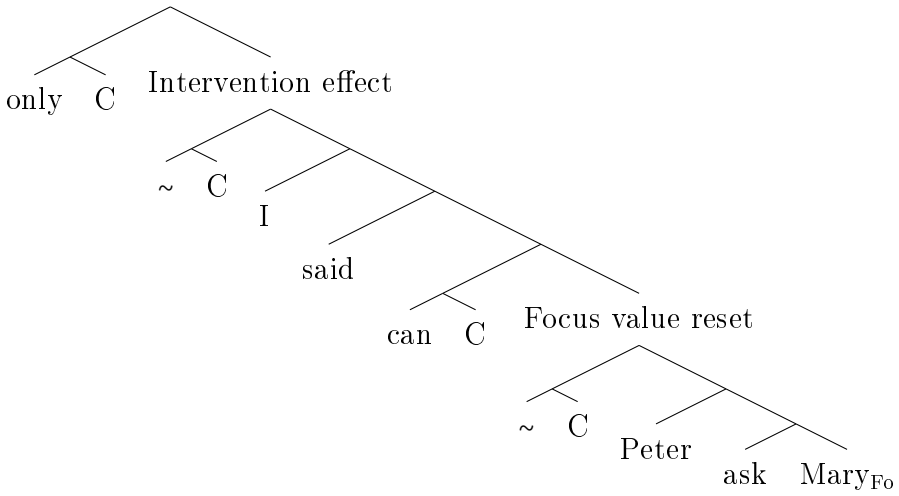
In (8), the intervener is the modal "can".

(8) Ich habe nur gesagt Peter kann Maria_{F} fragen.
I have only said Peter can Mary ask
"I only said that Peter can ask Mary_{F}."

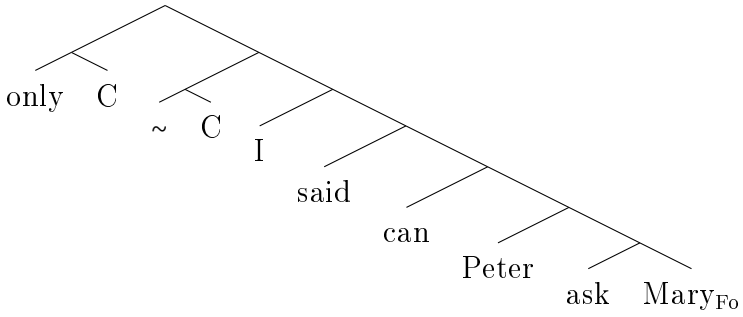
a. Mary is the only x for which I said that Peter can ask x.

Rule c.) can be applied to the intervener, but not the evaluator. Rule b.) applies to the intervener and is violated, as the focus does not match the operator. Rule a.) is violated as well. This would be the ungrammatical structure (9-a.). Both can be saved by ignoring c.). The result is that the evaluator evaluates the focus and the intervener is not focus evaluating ((9-b.)).

(9) a.



b.



optional/overt

The next batch of examples uses the quantifier "every" as evaluator. In (10), the intervener is "only":

(10) Jeder denkt dass nur Peter Maria$_F$ mag.
Everyone thinks that only Peter Mary likes
"Everyone thinks that only Peter likes Mary$_F$."

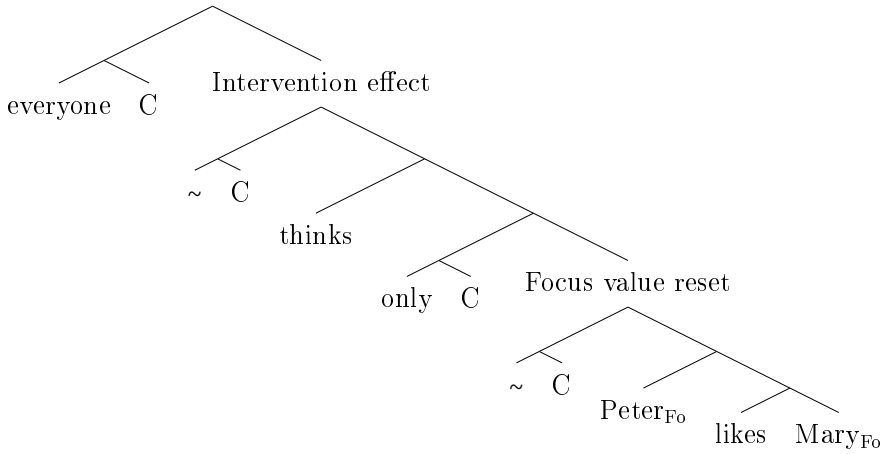
a. *Everyone who thinks that Peter is the only x who likes someone, thinks that Peter is the only x who likes Mary.

b. Everyone thinks that Peter and Mary are the only x and y such that x likes y.

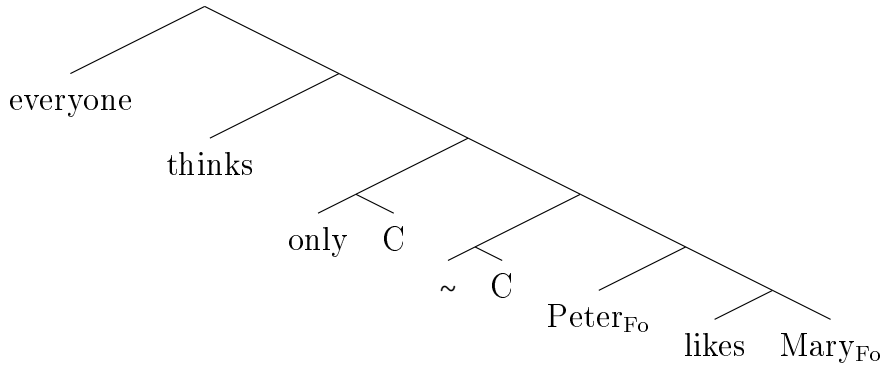
Rule c.) can be applied to the evaluator, but not the intervener. Since there is no focus in the immediate scope of the evaluator, it is not focus evaluating. Rule b.) does not apply, since the available focus matches the operators. Rule a.) is kept, as the evaluator is not focus evaluating. The result is that the intervener evaluates the focus and the evaluator is not focus evaluating, resulting in the structure in (11-b.). This generates reading (10-b.). Reading

(10-a.) would be the result of "every" evaluating the focus on Mary across "only", i.e. the structure in (11-b.).

(11) a.



b.



In (12), the intervener is another instance of "every":

(12) Jeder denkt dass jeder Maria$_F$ mag.
Everyone thinks that everyone Mary likes
"Everyone thinks that everyone likes Mary$_F$."

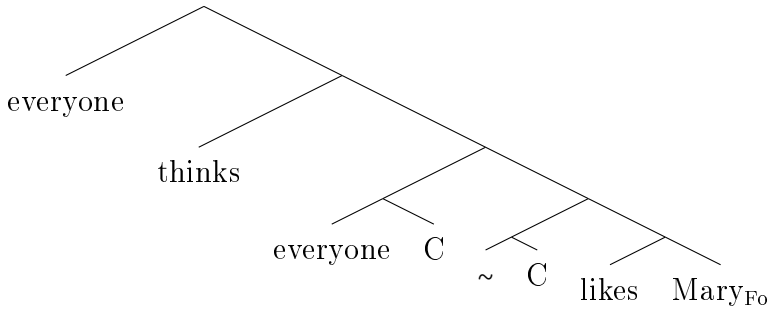
a. Everyone thinks that everyone who likes someone, likes Mary.

b. *Everyone who thinks that everyone likes someone, thinks that everyone likes Mary.

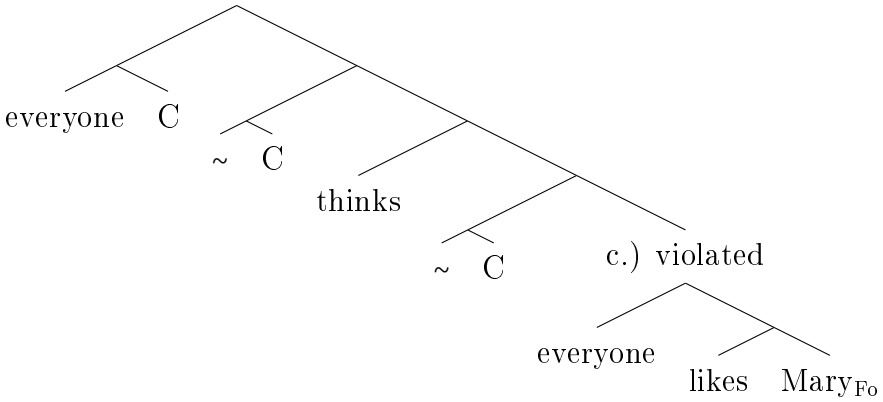
Rule c.) can be applied to both operators. Since there is no focus in the immediate scope of the evaluator, it is not focus evaluating. Rule b.) does not apply, since the available focus matches the operators. Rule a.) is kept, as the evaluator is not focus evaluating. The result is that the intervener evaluates the focus and the evaluator is not focus evaluating. This is reading (12-a.), produced by structure (13-a.). Reading (12-b.), which would be the result of

the evaluator evaluating the focus across the intervener, structure (13-b.), is not available, as it would violate rule c.).

(13) a.



b.



In (14), the possible intervener is existential closure, i.e. an indefinite is in an intervening position.

(14) ??Jeder denkt dass eine Studentin Maria$_F$ mag.
Everyone thinks that a student Mary likes
"Everyone thinks that a student likes Mary$_F$."

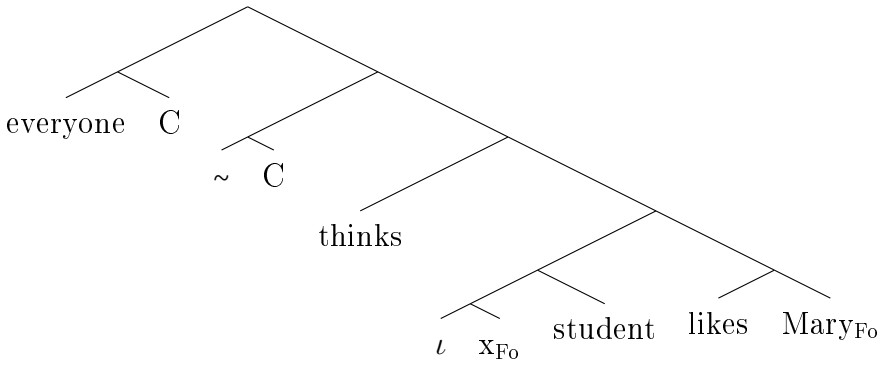
a. There is some student x such that everyone who thinks that some student likes someone, thinks x likes Mary.

b. *Everyone who thinks that there is a student that likes someone, thinks there is a student that likes Mary.

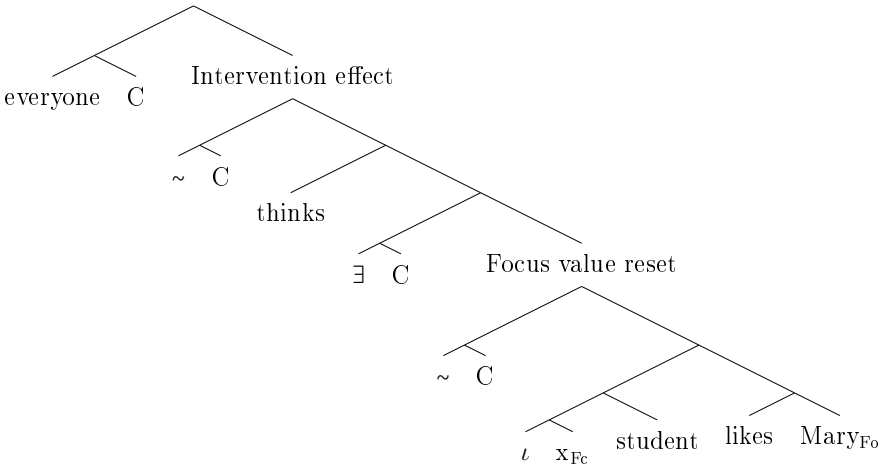
If we assume existential closure below the evaluator, rule c.) can only apply to the evaluator, which would mean the evaluator is not focus evaluating. Rule b.) applies to the intervener and is violated, since there is a non-matching focus in its scope without another evaluating operator inbetween. Rule a.) is kept, as the evaluator is not focus evaluating. Rule b.) cannot be saved, since the overt focus cannot be interpreted as covert. This would be the ungrammatical

structure (15-b.), creating reading (14-b.). Instead, existential closure is not applied, the focus in the indefinite is interpreted as overt and the evaluator evaluates both foci, creating structure (15-a.) and reading (14-a.). Note that (14) is slightly degraded if the indefinite is not overtly focused. If it is, the sentence is fine.

(15) a.



b.



In (16), the intervener is the modal "can".

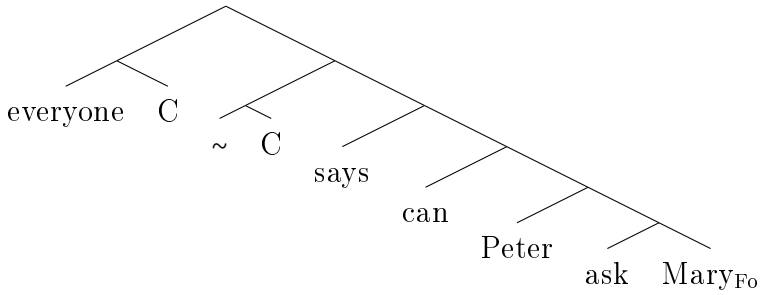
(16) Jeder sagt Peter kann $Maria_F$ fragen.
Everyone says Peter can Mary ask
"Everyone says that Peter can ask $Mary_F$."

a. Everyone who said that Peter can ask someone, said that Peter can ask Mary.

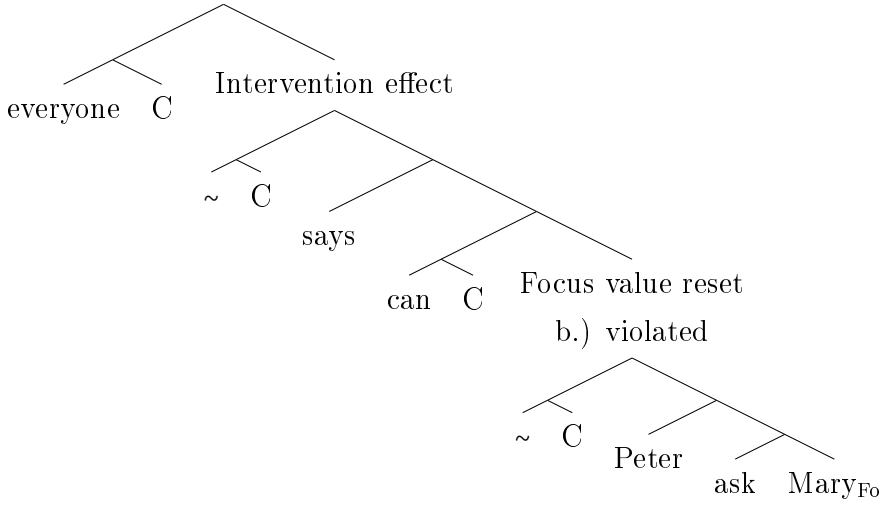
Rule c.) can apply to both operators, making the intervener focus evaluating and the evaluator not focus evaluating. Rule b.) applies to the intervener and is violated, since the focus does not match the operator. Rule a.) is kept. Rule b.) can be saved by ignoring c.) with regard to the intervener, making

the intervener not focus evaluating. Instead, c.) now applies to the evaluator, making it focus evaluating instead of the intervener. The result is that the evaluator evaluates the focus and the intervener is not focus evaluating, creating structure (17-a.) and reading (16-a.).

(17) a.



b.



obligatory/covert

The following examples use existential closure as evaluator. This is done by placing an indefinite below the intervener, trying to create a reading where the indefinite outscopes the intervener.

(18) Nur Peter hat ein Buch gelesen.
only Peter has a book read
"Only Peter read a book."

a. Peter and some book z are the only x and y such that x read y.

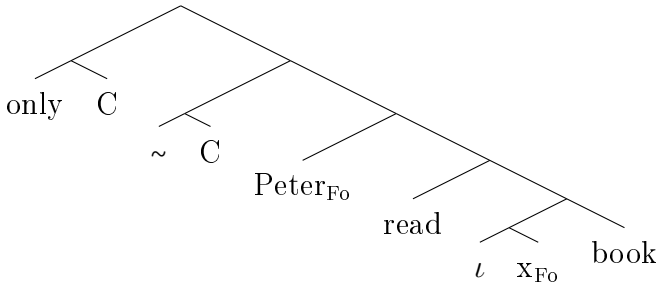
b. *There is some book that noone but Peter read.

c. (Peter is the only x such that there is a book that x read)[1].

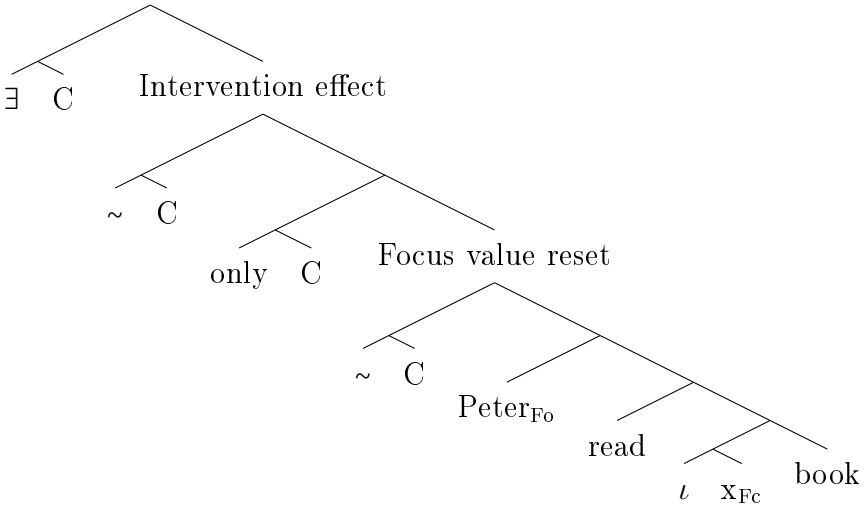
[1]Reading (18-c.) is quite similar to (18-a.). This reading would be created by applying ∃ below "Peter". This requires a typeshifted version of ∃. See Appendix III - "Scope barrier

If we assume existential closure above the intervener, rule c.) does not apply, since neither evaluator nor intervener optionally evaluate focus. Rule b.) applies to the intervener, but can be saved by interpreting the focus in the indefinite as overt. Rule a.) is violated. Since this leads to ungrammaticality, creating structure (19-b.) and reading (18-b.), existential closure is not applied. Instead, the focus in the indefinite is interpreted as overt and the intervener evaluates both foci, creating structure (19-a.) and reading (18-a.).

(19) a.



b.



In (20), the intervener is "every":

(20) Jeder hat ein Buch gelesen.
everyone has a book read
"Everyone read a book."

a. There is some book x such that everyone who read a book, read x.

b. Every x is such that there is a book y such that x read y.

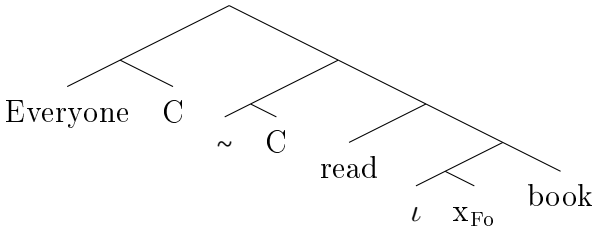
---

for lower quantifiers" for that version. As this would not be an intervention structure, I will not discuss it here.

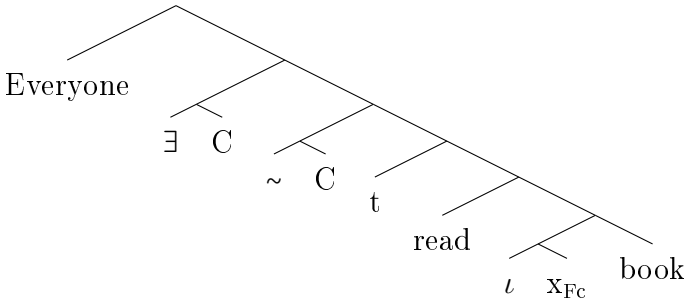
c. *There is some book x such that everyone read x.

If we assume existential closure above the intervener, rule c.) applies to the intervener, making it focus evaluating. Rule b.) applies to the intervener, but can be saved by interpreting the focus in the indefinite as overt. Rule a.) is violated. Since this leads to ungrammaticality, one of two options apply instead. Option one is that existential closure is not applied, the focus in the indefinite is interpreted as overt and the intervener evaluates the focus. This creates the impression of a wide scope reading, but as discussed earlier, this reading, reading (20-a.), is not generated via existential closure. Option two is that existential closure is applied below the intervener. In this case, rule c.) applies to "every", making it not focus evaluating. This is the narrow scope reading (20-b.).

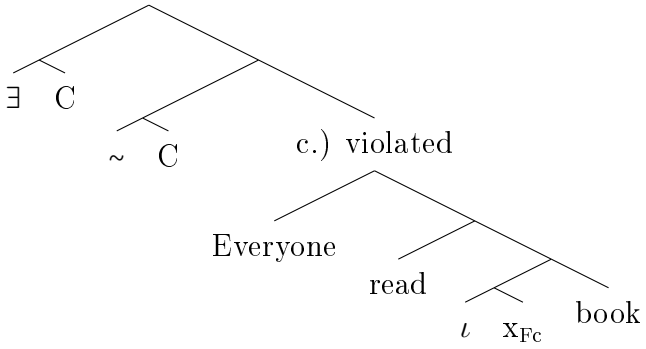
(21) a.



b.



c.



(20-c.) is what we would get from applying existential closure above "every", i.e. (21-c.). I would argue that this structure, which produces reading (20-c.)

(which is nearly identical to (20-a.), especially considering that the focus effect for ”every” is closer to ”everyone for whom reading a book is relevant”), is not available. Consider (22):

(22) Jeder hat ein Buch gelesen. Das hätte ich nie gedacht.
everyone has a book read. that had I never thought
"Everyone read a book. I would never have expected that."

a. I did not expect that there is some book x such that everyone read x.

b. I did not expect that every x is such that there is a book y such that x read y.

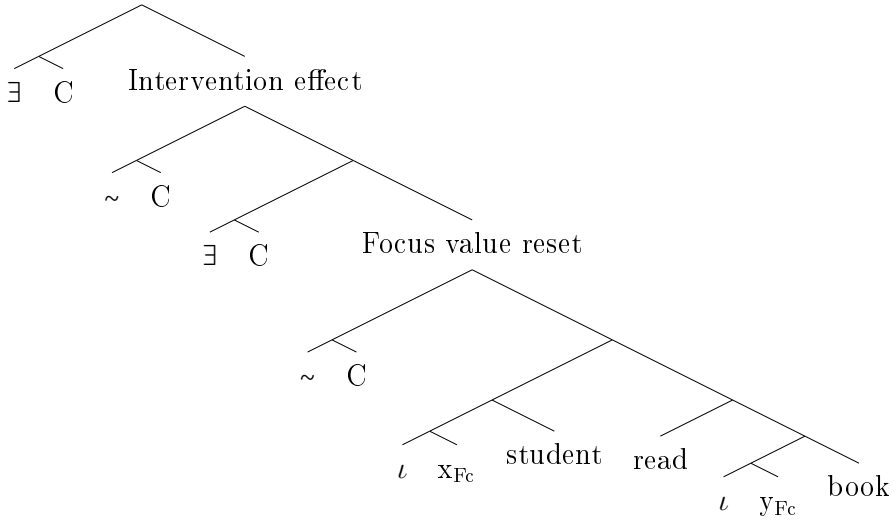
(22-b.) is the reading we get without overtly focusing the indefinite. (22-a.) is very hard to get without putting overt focus on the indefinite. This would be expected, if the reading is the result of ”every” evaluating the focus (i.e. (21-a.)), but rather surprising if we assume (21-c.).

In (23), the intervener is another indefinite.

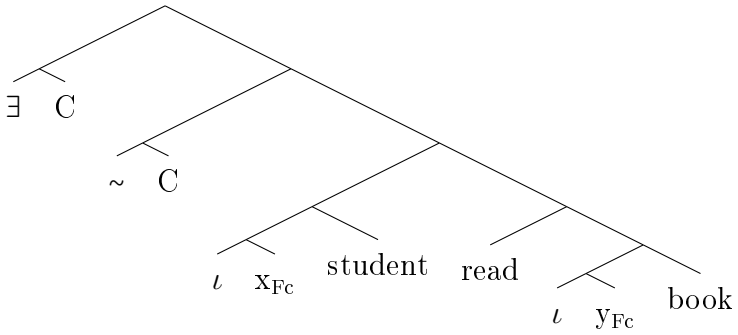
(23) Eine Studentin hat ein Buch gelesen.
a student has a book read
"A student read a book."

In this case, the rules would only apply if we assumed two instances of existential closure ((24-a.)). This would lead to a violation of rule a.), which would not be salvageable. Instead, both foci are evaluated by one instance of existential closure((24-b.)), creating the exact same truth conditions.

(24) a.



b.



In (25), the intervener is the modal "can":

(25) Peter kann ein Buch lesen.
Peter can a book read
"Peter can read a book."

a. ??There is a book x for which there is a world in which Peter reads x.

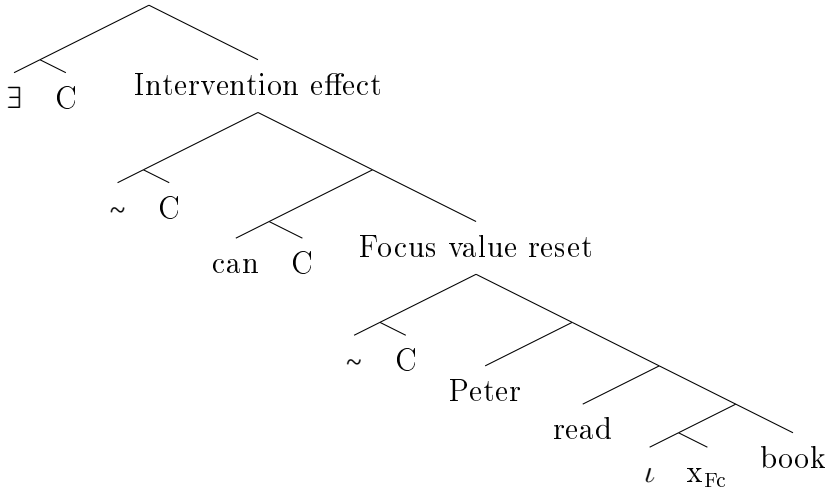
b. There is a world in which there is a book that Peter reads.

c. For all books x: There is a world in which Peter reads x.

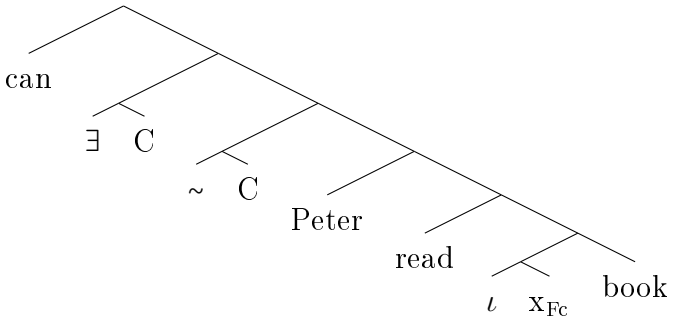
If we assume existential closure above the intervener, rule c.) applies to the intervener, making it focus evaluating. Rule b.) applies to the intervener as well, the focus matches the operator, so the intervener is focus evaluating. This would result in (26-a.), violating rule a.). There are two ways around this: Option one is to apply existential closure below the modal. In this case, rule c.) applies to the modal, making it not focus evaluating. This results in (26-b.), producing the narrow scope reading (25-b.). Option two is not to

apply existential closure at all. This would lead to the free choice-like reading in (25-c.), but since "ein" does not come with the same restrictions as "any", there might be a restrictive domain containing valid book choices.

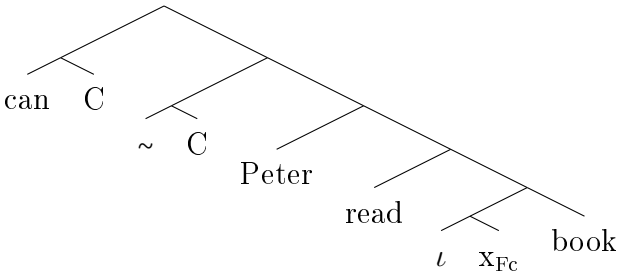
(26) a.



b.



c.



optional/covert

As operators that optionally evaluate covert focus are only focus evaluating if there is no intervener of any kind, the only options that I can think of that would illustrate their behaviour are ones that involve free choice readings of "any" across an intervener. Since extending this approach to provide a proper, full fledged analysis of NPIs and FCIs is beyond the scope of this work, I will not discuss the examples in any detail or claim that they are actual evidence for anything. But I will point out that in the following examples, free choice

readings do not seem to be easily available. I do not construe this as evidence for this approach, but at least, they do not seem to falsify it. Consider (27), which has a free choice reading, and (28), which has four scope options, but only two available readings:

(27) Peter can tell Mary about anything.

a. Free choice reading:
"For all x, there is a world in which Peter tells Mary x."

(28) Peter can tell only Mary_{F} anything.

a. Free choice reading I (unavailable):
"For all x, there is a world w. Peter tells only Mary x in w."

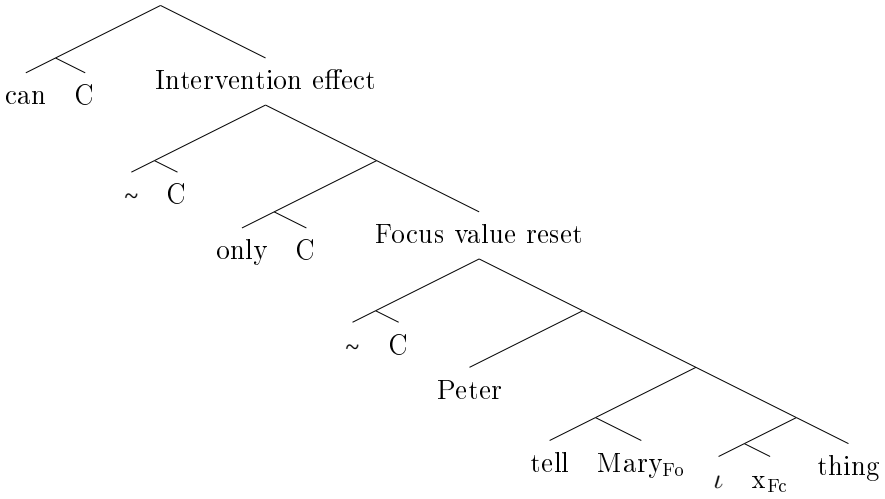
b. Free choice reading II (unavailable):
"Only Mary is y, such that for all x, there is a world w and Peter tells y x in w."

c. NPI reading I:
"Only Mary is y, such that there is a world w and there is an x and Peter tells y x in w."

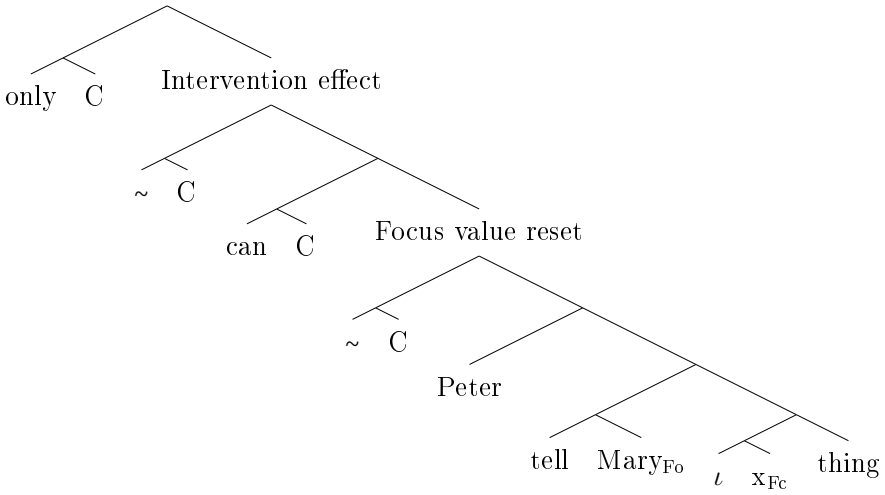
d. NPI reading II:
"There is a world in which only Mary is y, such that there is an x and Peter tells y x in w."

For the free choice readings (28-a.) and (28-b.), we would need the corresponding structures (29-a.) and (29-b.). As outlined in 4.2.2, these readings require "can" to evaluate the alternatives generated by "any".

(29) a.

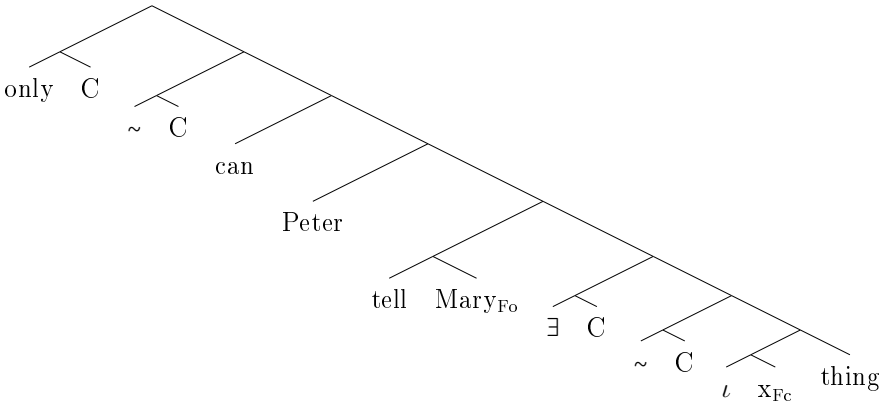


b.



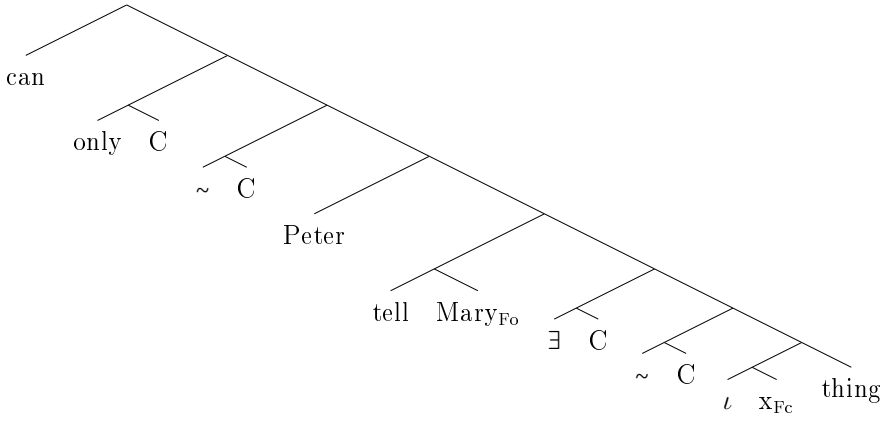
Both structures are blocked by rule a.). Readings (28-c.) and (28-d.) are available through the corresponding structures in (29-c.) and (29-d.)[2].

(29) c.



[2]As with example (18-c), ∃ needs to apply at a node that does not denote a proposition. Again, we need a typeshifted ∃. See Appendix III - "Scope barrier for lower quantifiers".

d.



In both readings, "can" is not focus evaluating. In (29-c.), this is prevented by rule b.) trumping rule c.), while in (29-d.), rule c.) suffices.

The same effect can be observed for optional/overt interveners:

(30) Peter can tell noone anything.

a. Free choice reading (unavailable):
"For all x, there is a world w and no y is such that Peter tells y x in w."

b. NPI reading:
"There is a world w and no y is such that there is an x and Peter tells y x in w."

Similarly, inserting "must" blocks the free choice construction, but since this blocks the NPI reading as well, the result is ungrammaticality.

(31) *Peter can tell Mary that he must do anything.

We can get a free choice-like reading if the intervener is an indefinite:

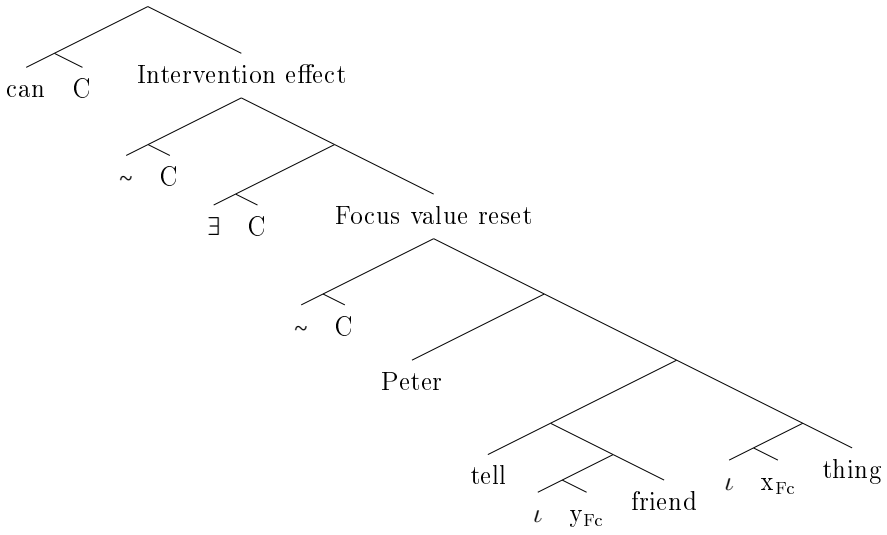
(32) Peter can tell a friend anything.

a. Free choice reading (unavailable):
"For all x, there is a world w. There is a friend y and Peter tells y x in w."

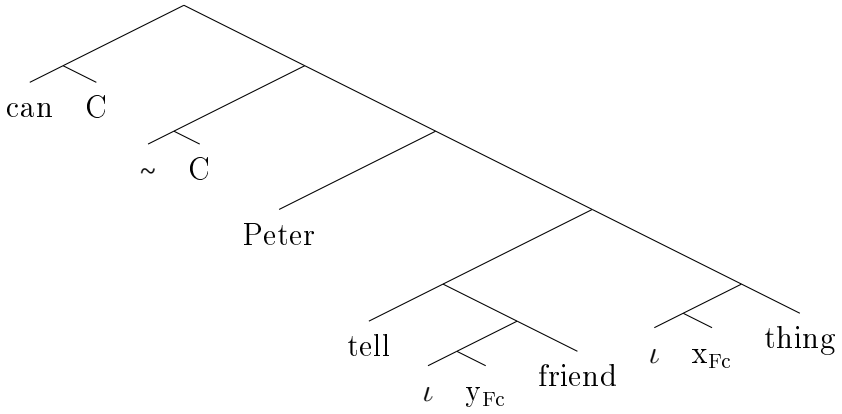
b. Free choice-like reading:
"For all x and friends y, there is a world w. Peter tells y x in w."

The corresponding structures are (33-a.) and (33-b.). The free choice-like reading is generated by the modal evaluating both foci.

(33) a.



b.



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