Implicatures in the DP domain

by

Paul P. Marty

B.A. in Philosophy, University of Paris X (2009)
B.A. in Modern Literature, University of Paris X (2009)
M.A. in Cognitive Science, ENS-EHESS-Paris V (2011)

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

Doctor of Philosophy

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

September 2017

Author .....
Department of Linguistics and Philosophy
September, 2017

Certified by .....
Irene Heim
Professor of Linguistics
Thesis Supervisor

Certified by .....
Danny Fox
Professor of Linguistics
Thesis Supervisor

Certified by .....
David Pesetsky
Professor of Linguistics
Thesis Supervisor

Accepted by .....
David Pesetsky
Professor of Linguistics, Head of Department

Implicatures in the DP domain

by

Paul P. Marty

Submitted to the Department of Linguistics and Philosophy
on September, 2017, in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

Abstract

In this thesis, I investigate a set of apparently disparate phenomena that relate, more or less closely, to the interpretation of Determiner Phrases (DPs): the restrictiveness effects associated with NP modification, the proper partitivity effects associated with the use of partitive *of*, the disjoint reference 'i-within-i' effects and finally anti-presuppositions. In the previous literature, these interpretative effects have been subsumed under different generalizations and accounted for by means of different primitive principles (e.g., *Minimize Restrictors!*, *The 'i-within-i' Condition*, *Maximize Presupposition!*). The claim that I put forward in this thesis is twofold. First of all, I show that, upon closer examination, all these phenomena are reducible to the theory of implicatures. Second, I argue that an implicature-based approach to these phenomena offers a better empirical coverage of the relevant effects than previously achieved. Capitalizing on Magri (2009, 2011, 2014, and subsequent works), I offer a conceptualization of implicature computation on which assertive and presuppositional implicatures are derived in grammar, allowing a uniform account of the phenomena of interest.

Thesis Supervisor: Irene Heim
Title: Professor of Linguistics

Thesis Supervisor: Danny Fox
Title: Professor of Linguistics

Thesis Supervisor: David Pesetsky
Title: Professor of Linguistics

Acknowledgments

First and foremost, I wish to thank my committee: Danny Fox, Irene Heim and David Pesetsky. I am grateful for their invaluable help throughout the elaboration and writing of this thesis, for the many hours we have spent over the last years discussing other topics, for their encouragement, their advice, their patience and much more. I owe each of them an enormous intellectual debt that, hopefully, I will be able to pass sooner or later to my own students. I also wish to thank Emmanuel Chemla, Paul Egré, Edward Flemming, Martin Hackl, Benjamin Spector and Donca Steriade for their support and discussion through the years. Thanks to all my colleagues in the Department of Linguistics and Philosophy at MIT. I have learned a lot from them. Special thanks to my cohort and their families — Despina Oikonomou, Amanda Swenson and Snejana Iovtcheva — and special thanks to Jennifer Purdy and Matthew Sikorski for making my life at MIT so much easier. Finally, I would like to thank my family and Sophie for their love and support.

Contents

Chapter 1

Preamble

'What is your aim in Philosophy?'
'To show the fly the way out of the fly-bottle'
— Wittgenstein, *Philosophical Investigations* —

In this dissertation, I investigate a set of well-established phenomena which have been subsumed under different generalizations in the previous literature. These phenomena are illustrated in (1)-(4). The diacritic '#' is used to indicate that a sentence is perceived as odd by speakers.

(1) **Anti-Presuppositional Effects**

a. A brother of John arrived.
Inference: John has more than one brother

b. *Context: John has a unique father*
#A father of John arrived.

Maximize Presupposition! (Heim, 1991)
Make your contribution presuppose as much as possible!

(2) **Restrictiveness Effects**

a. John's brother that is brown-haired arrived.
Inference: John has more than one brother

b. *Context: John has a unique father*
#John's father that is brown-haired arrived.

Minimize Restrictors! (Schlenker, 2005a, (13)/(52))
A description *the A B* [where the order of *A* and *B* is irrelevant] is deviant if *A* is redundant, i.e. if (i) *the B* is grammatical and has the same reference as *the A B*, and (ii) *A* does not serve another purpose.

(3) **Proper Partitivity Effects**

a. Two of John's brothers arrived.
Inference: John has more than two brothers

b. *Context: John has exactly two parents*
#Two of John's parents arrived.

Partitivity = Proper Partitivity (Barker, 1998; Zamparelli, 1998)
Partitives have in their extension only proper parts of the entity denoted by the DP within the *of*-phrase.

(4) **Disjoint Reference 'i-within-i' Effects**

a. The wife of Sue's childhood sweetheart arrived.
Inference: Sue is not the wife of her childhood sweetheart

b. *Context: Sue married her childhood sweetheart*
#The wife of Sue's childhood sweetheart arrived.

The 'i-within-i' Condition (Chomsky, 1981, 1993a)
No description may co-refer with a description that contains it.

Each of these phenomena has been accounted for by means of different primitive principles. The starting point of this dissertation is the mere observation that these phenomena have more in common than we might think at first glance. Specifically, each of these phenomena seems to involve some form of competition between minimally different sentences. This notion of competition is already at the core of previous accounts of (1) and (2).

The phenomenon in (1) has commonly been analyzed in terms of *Maximize Presupposition!*, a condition that Irene Heim devises to account for certain differences between indefinites and definites. The idea is that if there is an alternative ψ to a sentence ϕ that makes the same assertive contribution as ϕ but has a stronger presupposition than ϕ, then ψ should be preferred. If ψ is not used, then *Maximize Presupposition!* triggers the inference that ψ could not have been used. In case this inference conflicts with speakers' assumptions (because ψ's presuppositions are in fact already commonly accepted), an utterance of ϕ is perceived as odd.

(1) *Maximize Presupposition!*
Context: John has a unique father

a. ϕ: #A father of John arrived

b. ψ: John's father arrived (presuppositionally stronger)

For the phenomenon in (2), Philippe Schlenker proposes a principle called *Minimize Restrictors!* that rules out the use of redundant linguistic materials within the restrictor of definite descriptions. The idea is that if there is an alternative β to a description α that has the same reference and the same pragmatic contribution as α but is structurally simpler than α, then β should be preferred. Whenever such an alternative is available, the use of α is deemed deviant by *Minimize Restrictors!*.

(2) *Minimize Restrictors!*
Context: John has a unique father

a. ϕ: #[$_{\alpha}$ John's father that is brown-haired] arrived
b. ψ: [$_{\beta}$ John's father ~~that is brown-haired~~] arrived (simpler)

Let me now observe that similar competitions seem to be at work in (3) and (4). In (3) for instance, we could envision that a sentence like *Two of John's parents arrived* competes with the minimally different sentence *John's two parents arrived*. In a context where it is common ground that John has exactly two parents, it is easy to verify that this presuppositionally stronger alternative ends up contextually equivalent to the sentence it competes with. If this description is on the right track, then the proper partitivity effects associated with the interpretation of partitives could thus reduce to genuine *Maximize Presupposition!* effects.

(3) Proper Partitivity Effects via *Maximize Presupposition!*
Context: John has exactly two parents

a. ϕ: #Two of John's parents arrived.
b. ψ: John's two parents arrived. (presuppositionally stronger)

Similarly, the 'i-within-i' effects in (4) seem to fall under the explanatory scope of Schlenker's *Minimize Restrictors!*. In a context where it is commonly accepted by the interlocutors that Sue is married to her childhood sweetheart, the two descriptions *the wife of Sue's childhood sweetheart* and *Sue* are presupposed in context to have the same denotation and, arguably, the description *the wife of Sue's childhood sweetheart* does not bring about any specific pragmatic contribution. Hence, by *Minimize Restrictors!*, the simpler description *Sue* should be favored over the more complex description *the wife of Sue's childhood sweetheart* in order to avoid redundancy.

(4) Disjoint Reference 'i-within-i' Effects via *Minimize Restrictors!*
Context: Sue married her childhood sweetheart

a. ϕ: #[$_{\alpha}$ The wife of Sue's childhood sweetheart] arrived.
b. ψ: [$_{\beta}$ ~~The wife of~~ Sue~~'s childhood sweetheart~~] arrived. (simpler)

Hence, it seems that the set of primitives posited to account for the phenomena in (1)-(4) could reduce in the end to two principles, *Maximize Presupposition!* and *Minimize Restrictors!*. The research question that I investigate in this dissertation is the following: can we go one reduction step further?

A priori, *Maximize Presupposition!* and *Minimize Restrictors!* are intended to cover distinct empirical phenomena and the range of application of one principle does not reduce to that of the other. For instance, one cannot readily account for the restrictiveness or the disjointness effects in terms of *Maximize Presupposition!*: in (2), the presupposition of the odd sentence *John's father that is brown-haired arrived* is logically independent from that of its competitor *John's father arrived* and, in (4), the odd sentence *The wife of Sue's childhood sweetheart arrived* is contextually equivalent but also presuppositionally stronger than its competitor *Sue arrived*. Similarly, one cannot readily account for the anti-presuppositional or the proper partitivity effects

in terms of *Minimize Restrictors!*: the anti-presuppositional effects in (1) are simply beyond the scope of *Minimize Restrictors!* and, in the case of partitives, although the structure of the whole DP looks somewhat simpler, we see that the restrictor of the competing DP need not be (*John's two parents* vs. *John's parents*). In sum, we are left at this point with the same two primitives as before.

The proposal that I will develop throughout this dissertation is that the different primitives posited to account for the phenomena at hands are in fact reducible to one unique theory, namely the theory of implicatures. The core intuition underlying this proposal is that there is a common feature to all the phenomena in (1)-(4): in each case, the competing alternative ψ is logically non-weaker than the sentence ϕ it competes with, as illustrated in (5). The notion of logical entailment used in (5) is to be understood as follows: $\phi \Rightarrow \psi$ iff whenever ϕ is true, ψ is defined and true (and thus $\phi \not\Rightarrow \psi$ iff it is not the case that, whenever ϕ is true, ψ is defined and true).

(5) a. A father of John arrived (anti-presupposition)
$\not\Rightarrow$ John's father arrived
b. John's father that is brown-haired arrived (restrictiveness)
$\not\Rightarrow$ John's father arrived
c. Two of John's parents arrived (proper partitivity)
$\not\Rightarrow$ John's two parents arrived
d. The wife of Sue's childhood sweetheart arrived (disjointness)
$\not\Rightarrow$ Sue arrived

The idea that I will put forward is that the interpretative effects of interest can be analyzed as resulting from the computation of an implicature that delivers for the target sentences the negation of either the presuppositional or the assertive content of their logically non-weaker alternatives, that is of those alternatives that can be denied consistently with the sentence they compete with, as illustrated in (6).

(6) a. A brother of John arrived. (anti-presupposition)
(i) ALTERNATIVE: John's brother arrived
(ii) IMPLICATURE: John does not have exactly one brother
Hence, John has more than one brother
b. John's brother that is brown-haired arrived. (restrictiveness)
(i) ALTERNATIVE: John's brother arrived
(ii) IMPLICATURE: John does not have exactly one brother
Hence, John has more than one brother
c. Two of John's brothers arrived. (proper partitivity)
(i) ALTERNATIVE: John's two brothers arrived
(ii) IMPLICATURE: John does not have exactly two brothers
Hence, John has more than two brothers
d. The wife of Sue's childhood sweetheart arrived (disjointness)
(i) ALTERNATIVE: Sue arrived
(ii) IMPLICATURE: Sue did not arrive
Hence, Sue is not the wife of her childhood sweetheart

To achieve a uniform account of these phenomena, I will capitalize on two key assumptions which have been worked out in the previous literature on implicatures. The first assumption is that the notion of entailment relevant to determine the set of excludable alternatives to a given sentence is this of logical entailment rather than that of entailment given common knowledge (as it is assumed in (6)). The idea that the computation of excludable alternatives is blind to contextual assumptions has been proposed in Fox and Hackl (2006) and Chierchia et al. (2008), and it has been fully spelled-out in Magri (2009, 2011, 2014, and subsequent works) in terms of the **Blindness** hypothesis. The version of the **Blindness** hypothesis I will rely on is given in (7). This formulation assumes a partial approach to presuppositions, consistent with the theory of implicatures that will be developed in the following.

(7) **Blindness**
The excludable alternatives to a sentence ϕ are those alternatives ψ that are *logically* non-weaker than ϕ, that is ψ can be denied consistently with ϕ.

The second assumption, developed and defended by Giorgio Magri, is that, when an excludable alternative to a sentence ϕ is contextually equivalent to ϕ, the computation of the implicature associated with this alternative is mandatory, (8). In the spirit of Magri's proposal, I will argue that **Mandatoriness** is the source of the oddity effects observed in (1)-(4): when the ϕ-sentences are contextually equivalent to their ψ-alternatives, the implicatures associated with the ψ-alternatives becomes mandatory, resulting in representations that contradict speakers' contextual assumptions, hence the oddness of the ϕ-sentences. It will be shown that, on these two assumptions, a theory of implicatures provides a better empirical coverage of the phenomena (1)-(4) than previously achieved.

(8) **Mandatoriness**
Whenever an excludable alternative ψ to a sentence ϕ is contextually equivalent to ϕ, the computation of the implicature associated with ψ is mandatory.

This dissertation is organized as follows. In Chapter 2, I discuss Magri (2009)'s previous proposal to reduce anti-presuppositions to the theory of implicatures, a proposal on which the computation of excludable alternatives and meaning strengthening is performed at level of assertion and at the level of presupposition *separately*. I will discuss some problematic data for this proposal, some of them pointed out by Magri (2009) himself, and offer a minimally different conceptualization of implicature computation in partial semantics that preserves the original results of Magri's proposal while avoiding its drawbacks. The rest of the dissertation can be read as a proof of concept in that I will show that the restrictiveness effects (Chapter 3), the proper partitivity effects (Chapter 4) and the 'i-within-i' effects (Chapter 5) follow from the theory of implicatures devised in Chapter 2.

THIS PAGE INTENTIONALLY LEFT BLANK

Chapter 2

Presuppositional Implicatures

Summary This chapter discusses Magri (2009)'s previous proposal to reduce *Maximize Presupposition!* effects to the grammatical theory of implicatures, a proposal on which the computation of excludable alternatives as well as meaning strengthening is performed at level of assertion and at the level of presupposition *separately*. I will discuss some problematic data for this proposal that suggest that the computation of excludable alternatives is in fact performed by considering all at once presuppositional and assertive content. I will offer a minimally different conceptualization of implicature computation that achieves this result on a partial approach to presuppositions, preserving Magri's original results while avoiding some of its drawbacks. The formal notions introduced in this chapter will be used throughout this thesis.

Keywords: antipresuppositions, implicatures, partial semantics, exhaustivity

2.1 Anti-Presuppositions and Implicatures

On standard assumptions, the items in the table below differ with respect to the relative logical strength of their presuppositional component of meaning: the 'stronger' items trigger a semantic presupposition that their 'weaker' counterpart lacks.

weaker item	stronger item	differential presupposition
a	the	uniqueness
all/every	both	domain contains two elements
believe	know	complement is true

For such pairs, two kinds of interpretative effects have previously been observed. First, it has been observed that the use of a weaker form in a context that does not satisfy the presupposition of its stronger alternative tends to implicate that this presupposition is false. For descriptive purposes, I will refer to these potential implications as *anti-presuppositions* (the term, coined by Kai von Fintel, is introduced in Percus (2006)). This first kind of effects is exemplified in (1)-(3).[1]

(1) a. John lives with a brother of his. $\langle$a, the$\rangle$
   (i) Presupposition: $\emptyset$
   (ii) Assertion: John lives with a brother of his
   b. John lives with his brother.
   (i) Presupposition: John has only one brother
   (ii) Assertion: John lives with a brother of his
   Anti-presupposition for (1-a): ¬[John has only one brother]

(2) a. John brought all his children. $\langle$all, both$\rangle$
   (i) Presupposition: $\emptyset$
   (ii) Assertion: John brought all his children
   b. John brought both his children.
   (i) Presupposition: John has exactly two children
   (ii) Assertion: John brought all his children
   Anti-presupposition for (2-a): ¬[John has exactly two children]

(3) a. John believes that I am 6 feet tall. $\langle$believe, know$\rangle$
   (i) Presupposition: $\emptyset$
   (ii) Assertion: John believes that the speaker is 6 feet tall
   b. John knows that I am 6 feet tall.
   (i) Presupposition: the speaker is 6 feet tall
   (ii) Assertion: John believes that the speaker is 6 feet tall
   Anti-presupposition for (3-a): ¬[the speaker is six feet tall]

[1] Here and throughout this chapter, I will ignore for clarity the presuppositions of a given utterance that are shared by its competing alternative(s) as these presuppositions are irrelevant to our purposes. For instance, the sentence in (1-a) could be analyzed as presupposing that the speaker has a brother and, more generally, that all these people are alive. Yet since these presuppositions are shared by its competing alternative, (1-b), they have no impact on our evaluation of the relative logical strength of the presuppositions of (1-b), and thus can be safely ignored.

In each of these minimal pairs, the (a)-sentence can generate the inference that the differential presupposition at hand in their (b)-alternative is false. For instance, the sentence in (1-a) can be understood as implicating that it is not the case that John has only one brother, and consequently that John has more than one brother and lives with one of them. Note that these inferences do not go through when it is clearly not the case that the speaker is opinionated, as illustrated in (4).[2]

(4) a. I have no idea whether John has only one or two brothers; however, I know for sure that he lives with a brother of his.
b. I don't know how many children John has, but he will bring them all.
c. I don't know how tall I am. John believes I am 6 feet tall.

Second, it has been observed that the use of a presuppositionally weaker item is perceived as odd in contexts that already entail the presupposition of its stronger alternative. This second kind of effects is exemplified in (5)-(7). The diacritic '#' is used to indicate that a sentence is perceived as odd by speakers.

(5) $C \subseteq$ *there is only one sun* $\langle$a, the$\rangle$
a. #A sun is shining.
b. The sun is shining

(6) $C \subseteq$ *John has exactly two parents* $\langle$all, both$\rangle$
a. #John talked to all his parents.
b. John talked to both his parents.

(7) $C \subseteq$ *2+2 equals 4 and John just proved it* $\langle$believe, know$\rangle$
a. #John believes that 2+2 equals 4.
b. John knows that 2+2 equals 4.

[2]In the tradition of dynamic semantics (Stalnaker, 1970, 1978, 2004; Karttunen, 1974; Heim, 1982, and much subsequent work), I assume that conversations take place against a background of information shared by the participants that evolves through discourse. Following the Stalnakerian model of context and context update, this body of shared information, called the *common ground*, is defined as the set of propositions CG that participants in a conversation are willing to believe and treat as mutually believed for the purpose of the exchange, (i).

(i) **Common Ground**
Let A be any set of interlocutors. The common ground CG among the interlocutors in A is the set of all possible propositions $\phi \in \mathcal{P}(W)$ such that every $a \in A$ believes or assents to ϕ (written $B_a(\phi)$), and if $\phi \in CG$, then $B_a(\phi) \in CG$ and $B_a(B_b(\phi)) \in CG$ for all $a, b \in A$.

The *context set* (or 'context' for short) of utterance, notated C, can be then defined as usual as the intersection of that set of propositions, (ii).

(ii) **Context Set**
The context set C is $\bigcap CG = \{w \in W | \forall \phi \in CG : w \in \phi\}$

On this view, to make an utterance amounts to add information to the common ground and thus to shrink the context set. Setting aside for now possible dynamic effects, including the most genuine ones, we can consider that, when a (declarative) sentence ϕ is uttered in C and ϕ is not already entailed by C, then C is updated by discarding all the worlds in C that do not comply with the assertive component of ϕ, i.e. all the worlds that are not ϕ-worlds.

The (a)-sentences above are perceived as odd in comparison to their (b)-alternative. Intuitively, the oddness of these sentences is related to the fact the speaker does not take for granted the truth of the presuppositions of their (b)-alternatives, although these presuppositions are already part of the common ground. For instance, the sentence in (5-a) is an odd thing to say in normal contexts where the presupposition of (5-b), i.e. there is only one sun, is known to be true by the interlocutors. I will henceforth refer to these effects as *anti-presuppositional effects*.

In order to capture these effects, Heim (1991) proposed to postulate an independent principle, which has come to be known as *Maximize Presupposition!* (following Sauerland, 2008), exhorting speakers to presuppose more rather than less: 'Presuppose as much as possible!'.[3] Since Heim's original proposal, many researchers have claimed that anti-presuppositions and anti-presuppositional effects are derived via *Maximize Presupposition!* (MP) and have contributed to refine Heim's natural language formulation of this principle (a.o. Percus, 2006; Sauerland, 2008; Singh, 2009; Schlenker, 2012; Leahy, 2016). A version of this principle is given in (8):[4]

(8) Maximize Presupposition (MP)
If the following is true for any $\psi \in \text{ALT}(\phi)$, then the sentence ϕ cannot be felicitously uttered in context C:
a. ψ's presupposition asymmetrically entails ϕ's presupposition and
b. ϕ and ψ are contextually equivalent.

The core idea is that if there is an alternative ψ to a sentence ϕ that makes the same assertive contribution as ϕ but has a stronger presupposition than ϕ, then ψ should be preferred. If ψ is not used, then MP triggers the inference that ψ could not have been used. To illustrate, let ϕ and $\phi_{\langle\pi\rangle}$ be any two sentences with the same assertive content that minimally differ in that $\phi_{\langle\pi\rangle}$ carries an additional semantic presupposition π that ϕ lacks (as in the minimal pairs above). Suppose now that a cooperative speaker chooses to utter ϕ instead of $\phi_{\langle\pi\rangle}$ in a conversation. Since the speaker did not presuppose π, MP predicts that the speaker shall not be in a position to presuppose π, e.g. because the speaker does not believe that π holds. This prediction correctly accounts for the oddness of the (a)-sentences in (5)-(7) which are uttered in contexts where the corresponding π-presupposition is assumed to be commonly believed by the interlocutors. It also paves the way for an explanation of the anti-presuppositions in (1)-(3): the application of MP, together with the additional assumption that the speaker is opinionated about the truth of the presuppositions of $\phi_{\langle\pi\rangle}$, delivers the stronger inference that the speaker believes π to be false.[5]

[3]It should be noted that another proposal along these lines is Hawkins (1991)'s which, by coincidence, was more or less contemporaneous and similar in content as Heim (1991)'s.

[4]Here and throughout this thesis, I adopt a structural approach to alternatives à la Katzir (2007, 2008) (see also Fox and Katzir, 2009, 2011). On this approach, the set $\text{ALT}(\phi)$ of alternatives to a sentence ϕ contains only those sentences ψ that are structural alternatives to ϕ and therefore that are structurally at most as complex as ϕ.

[5]In the spirit of Spector (2003), Sauerland (2004) and Van Rooij and Schulz (2004), one can think of this stronger inference as the result of an epistemic step following from the contextual assumption that the speaker is opinionated about the truth of the presuppositions of competing alternatives.

At first sight, postulating *Maximize Presupposition* as an independent principle seems reasonable and the principle itself is quite appealing in light of the range of interpretative effects it offers to capture. Yet Magri (2009, 2011, 2014) observes that the effects captured by MP at the presuppositional level are not peculiar to the domain of presuppositions so to speak: similar effects are observed for alternatives competing with regard to the logical strength of their assertive content. First of all, it has long been observed that anti-presuppositions are very similar to classical cases of scalar implicatures like those in (9)-(11). In a way parallel to what we observe in (1)-(3), the use of a weaker item in the (a)-sentence (e.g., *some*, *two*, *or*) tends to implicate that the assertively stronger (b)-alternative is false.

(9) a. John brought some of his children. ⟨some, all⟩
b. John brought all of his children.
Implicature for (9-a): ¬[John brought all of his children]

(10) a. John has two children. ⟨two, three⟩
b. John has three children.
Implicature for (10-a): ¬[John has three children]

(11) a. John talked to Mary or Sue. ⟨or, and⟩
b. John talked to Mary and Sue.
Implicature for (11-a): ¬[John talked to Mary and Sue]

Second, in a way parallel to what we observe in (5)-(7), the use of an assertively weaker sentence is perceived as odd in contexts where this sentence is contextually equivalent to an assertively stronger alternative, as exemplified in (12)-(14).

(12) $C \subseteq$ *the professor gave the same grade to every student* ⟨some, all⟩
a. #The professor gave an A to some students.
b. The professor gave an A to all students.

(13) $C \subseteq$ *John has three children of the same gender* ⟨two, three⟩
a. #John has two sons.
b. John has three sons.

(14) $C \subseteq$ *John, Mary and Sue talked all together* ⟨or, and⟩
a. #John just told Mary or Sue that he was leaving.
b. John just told Mary and Sue that he was leaving.

As a follow-up to these previous observations, I would like to add a third point of comparison which relates to the characterization of the set of alternatives considered by speakers in deriving anti-presuppositions. Previous works on (assertive) implicatures have provided compelling evidence that speakers consider not only stronger alternatives but also logically independent alternatives (see in particular Fox, 2007; Spector, 2007; Chemla and Spector, 2011; Chierchia et al., 2012, for discussion). The question I will ask is thus the following: do logically independent alternatives also play a role in deriving anti-presuppositions? Consider the following examples:[6]

[6]The example in (16) and related cases are analyzed and discussed in detail in Chapter 3.

(15) $C \subseteq$ *John has only one father*

a. What happened? - A brother of John left.
   ϕ: A brother of John left
   ψ: John's brother left
   Anti-presupposition: ¬[John has only one brother]

b. What happened? - #A father of John left.
   ϕ: A father of John left
   ψ: John's father left
   Anti-presupposition: ¬[John has only one father]

FACT: ψ's presupposition asymmetrically entails ϕ's presupposition

(16) $C \subseteq$ *John has only one father*

a. What happened? - John's brother that is brown-haired left.
   ϕ: John's brother that is brown-haired left
   ψ: John's brother left
   Anti-presupposition: ¬[John has only one brother]

b. What happened? - #John's father that is brown-haired left.
   ϕ: John's father that is brown-haired left
   ψ: John's father left
   Anti-presupposition: ¬[John has only one father]

FACT: ψ's presupposition and ϕ's presupposition are logically independent

There are two interesting observations about these examples. To begin with, (15-a) and (16-a) give rise to the same inference, i.e. John does not have a unique brother, which corresponds to the negation of the presupposition of their common ψ-alternative. Next, in contexts where it is mutually accepted that John has only one father, both (15-b) and (16-b) are perceived as odd. In face of these similarities, it is tempting to analyze the effects in (16) along the same lines as the classical MP effects in (15). Yet MP does not allow us to provide a uniform of these two cases: in (16), the presuppositions of the ψ-alternatives are not logically stronger but logically independent from the presuppositions of the ϕ-sentences.[7] Since the relevant formal alternatives in (16) do not presuppose more than the sentences they compete with, there is no reason why they should be favored by *Maximize Presupposition*.

Following these observations, one could attempt to redefine the principle in (8) by modifying the clause (8-a) so as to allow anti-presuppositions to be derived on the basis of presuppositionally non-weaker alternatives. However, it is worth noting that this possible move would deeply impact on the logic of MP. As it is originally stated in Heim (1991) and subsequent works, the descriptive generalization is that speakers should make their contribution presuppose as much as possible. If we allow MP to operate on presuppositionally non-weaker alternatives, the generalization becomes that

[7]If it is true at a possible world w that John has exactly one brown-haired father, it does not follow that John has a exactly one father in w, for John may have more than one father in w, only one of which is brown-haired. Similarly, if it is true at a possible world w that John has only one father, it does not follow that John has a brown-haired father in w, for John's father need not be brown-haired. Hence, in (16), ψ's presupposition and ϕ's presupposition are logically independent.

speakers should make the presuppositional content of their contribution as exhaustive as possible. That is, when speakers have to choose between contextually equivalent competing sentences, they would be now expected to choose not the presuppositionally strongest one but the one that has no presuppositionally non-weaker alternatives (since their contribution would be infelicitous otherwise). On this amendment, the logic of revised MP would now mimic the logic at the core of current approaches to implicatures. Yet this would still leave us with the following question: why do anti-presuppositions and genuine implicatures appear to obey the same logic?

Magri (2009, p.61-67) has offered a stimulating answer to this question: anti-presuppositions and implicatures obey the same logic because anti-presuppositions are run-of-the-mill implicatures computed at the level of presupposition by means of the exact same mechanisms as those used to compute implicatures at the level of assertion (for similar suggestions see Singh, 2009; Gajewski and Sharvit, 2012). Magri further proposed that implicatures, traditionally thought of as optional, are sometimes mandatory: whenever an (excludable) alternative ψ to a sentence ϕ is contextually equivalent to ϕ, then the computation of the implicature associated with ψ becomes mandatory. On this proposal, the oddity effects observed in (5)-(7) and (12)-(14) are to be analyzed as resulting from the mandatory computation of a mismatching implicature, i.e. an implicature that contradicts speakers' contextual assumptions.

The next section presents the specifics of Magri's proposal to reduce *Maximize Presupposition* effects to the theory of implicatures. The point I will take issue with concerns Magri's implementation of this working hypothesis and, specifically, the assumption that implicatures are derived in the presuppositional and assertive domain by performing meaning strengthening at level of presupposition and at the level of assertion *separately*. In substance, I will argue that (i) existing arguments in favor of such a separation suffer from several confounding factors, and that (ii) there is a class of examples for which such a separation systematically leads to wrong results. A solution to the 'separation' problem will be offered in Section 2.3. This solution will be shown to preserve the core of Magri's results and to provide an adequate characterization of the projection behavior of presuppositional implicatures and of the presuppositions of asserted implicatures. Section 2.4 concludes. For continuity, I will defer to Appendix A the discussion of certain technical questions left open by Magri concerning the computation of mandatory implicatures and, in particular, concerning the assessment of contextual equivalence in the case of embedded presuppositional and asserted implicatures.

2.2 Magri (2009)'s proposal

2.2.1 Specifics of the Proposal

Magri (2009) put forward the hypothesis that anti-presuppositions are not a peculiar class of inferences but rather plain implicatures derived at the level of presupposition by applying separately the same mechanisms as those used for deriving implicatures at the level of assertion (for similar suggestions see Gajewski and Sharvit, 2012).

The skeleton of Magri's implicature-based approach to anti-presuppositions has three essential components. First of all, the approach assumes a two-dimensional theory of meaning on which a sentence ϕ denotes two propositions, its presupposition ϕ_{prs} and its assertion ϕ_{asr}. Thus, $[\![\phi]\!] = \langle \phi_{prs}, \phi_{asr} \rangle$. Second, the approach assumes that, whenever the meaning of a sentence ϕ is strengthened, strengthening is performed at the level of its assertion ϕ_{asr} and at the level of its presupposition ϕ_{prs} by using the same mechanisms twice. On Magri's approach, the strengthened meaning of a sentence is computed recursively with the compositional side of meaning by applying a covert but syntactically realized operator akin to overt 'only', called the *exhaustivity operator* and notated EXH (a.o., Chierchia, 2006; Fox and Hackl, 2006; Fox, 2007; Chierchia et al., 2008; Fox and Spector, 2009; Fox and Katzir, 2009; Magri, 2011; Chierchia et al., 2012; Romoli, 2012; Spector, 2014; Magri, 2014). Just like any overt quantifier, the domain of the exhaustivity operator is hypothesized to be restricted by a contextually assigned relevance predicate $\mathcal{R}$, hence the notation $\text{EXH}_{\mathcal{R}}$. On these assumptions, the strengthened meaning of a sentence obtains by applying the exhaustivity operator at the level of both its presupposition and its assertion:

(17) $[\![[\text{EXH}_{\mathcal{R}}\ \phi]]\!] = \langle \text{EXH}_{prs}\ (\phi_{prs}), \text{EXH}_{asr}\ (\phi_{asr}) \rangle$

The most straightforward way to make (17) explicit is (18):

(18) a. **Strengthened Presupposition**
   (i) $\text{EXCL}_{prs}(\phi) = \{\psi \in \text{ALT}(\phi) :\ \phi_{prs} \not\to \psi_{prs}\}$
   (ii) $\text{EXH}_{prs}(\phi) = \phi_{prs} \wedge \forall\psi\ [\psi \in \text{EXCL}_{prs}(\phi) \to \neg\psi_{prs}]$

b. **Strengthened Assertion**
   (i) $\text{EXCL}_{asr}(\phi) = \{\psi \in \text{ALT}(\phi) :\ \phi_{asr} \not\to \psi_{asr}\}$
   (ii) $\text{EXH}_{asr}(\phi) = \phi_{asr} \wedge \forall\psi\ [\psi \in \text{EXCL}_{asr}(\phi) \to \neg\psi_{asr}]$

Let ϕ be any sentence and $\text{ALT}(\phi)$ be the set of formal alternatives to ϕ.[8] Next, let $\text{EXCL}_{prs}(\phi)$ be the set of those alternatives whose presupposition is logically non-weaker than the presupposition of ϕ (i.e., excludable presuppositions) and $\text{EXCL}_{asr}(\phi)$ be the set of those alternatives whose assertion is logically non-weaker than the assertion of ϕ (i.e., excludable assertions).[9] Following Magri's conceptualization, the

[8] On Magri's view, $\text{ALT}(\phi)$ contains all and only those LFs that can be obtained from ϕ by replacing one or more scalar items in ϕ with their Horn-mates. On our view, $\text{ALT}(\phi)$ corresponds to the set of structural alternatives to ϕ (see Katzir, 2007, 2008; Fox and Katzir, 2009, 2011). That is, $\text{ALT}(\phi)$ contains all and only those alternatives which can be derived from ϕ by a finite series of deletions, contractions, and replacements of constituents in ϕ with constituents of the same category taken from the lexicon of the language. For our immediate purposes (i.e., in this chapter), the differences between these two characterizations of alternatives can be ignored.

[9] Two clarifications are in order. First, it should be noted that the original formulation in Magri (2009) relies on the notion of logically stronger alternatives rather than on that of logically non-weaker alternatives. However, since Magri explicitly makes use of this second, weaker notion in more recent works (see for instance Magri, 2011), I propose here to adjust Magri (2009)'s proposal accordingly (see previous section for discussion and evidence that this weaker notion is needed). Second, the present characterization of excludable alternatives is a simplified version of a proposal in Fox (2007) that I will later discuss when I develop my own proposal in Section 2.3. For the time being, this simplified version will do.

exhaustivity operator $\text{EXH}_{\mathcal{R}}$ takes a proposition ϕ, called the prejacent, and it does two things: (a) at the level of presupposition, it outputs ϕ_{prs} conjoined with the negation of all excludable presuppositions ψ_{prs}, and (b) at the level of assertion, it outputs ϕ_{asr} conjoined with the negation of all excludable assertion ψ_{asr}. Note that the notion of entailment relevant for the computation of excludable alternatives is that of logical entailment rather than that of contextual entailment. The hypothesis that implicatures are computed over the output of semantics without access to contextual information has been proposed in Fox and Hackl (2006) and Chierchia et al. (2008), and fully spelled-out in Magri (2009, 2011, 2014) as follows:

(19) **Blindness (based on Magri, 2009, 2011)**
The notion of entailment relevant for the computation of excludable alternatives is that that of logical entailment rather than that of entailment *relative to common knowledge*.

The third component of Magri's proposal concerns the distribution of the exhaustivity operator and the context-dependency of implicatures. To begin with, as a *covert* operator, $\text{EXH}_{\mathcal{R}}$ raises the question its 'recoverability' at LF. Since $\text{EXH}_{\mathcal{R}}$ is a syntactic operator taking propositions as arguments, it can be inserted in principle at any propositional level. So, how do speakers recover whether $\text{EXH}_{\mathcal{R}}$ is instantiated or not in a given LF? It is suggested in Magri (2011) that there is not really any recoverability problem since $\text{EXH}_{\mathcal{R}}$ is syntactially mandatory at every scope site. In the following, I will assume that the distribution of $\text{EXH}_{\mathcal{R}}$ is as suggested by Magri, although for presentational purposes I will often set aside possible embedded occurrences of $\text{EXH}_{\mathcal{R}}$ in cases these occurrences are irrelevant to the discussion.

Next, one of the characteristics of implicatures is that they are to some degree context-dependent. This can be illustrated by the contrast in (20): the *not-all* implicature generally triggered by the (a)-example can be suspended in certain contexts, as in the (b)-example (similar observations hold of anti-presuppositions, see (4)).

(20) *Suspension of Implicatures*
a. The judge talked to some Jury members.
$\rightsquigarrow$ The judge didn't talk to all the Jury members.
b. The judge talked to some Jury members. In fact, he talked to them all.
$\not\rightsquigarrow$ The judge didn't talk to all the Jury members.

Several mechanisms have been proposed to capture in grammatical approaches the context-dependency of implicatures (e.g., Chierchia, 2006; Fox, 2007; Fox and Spector, 2009; Magri, 2009). In the spirit of Fox and Spector (2009) and Fox and Katzir (2009), the possibility to suspend certain implicatures on Magri's proposal can be related to general considerations of relevance which may, in some definite circumstances, bring about contextual restrictions on the domain of quantification of $\text{EXH}_{\mathcal{R}}$ (via the relevance predicate $\mathcal{R}$). However, Magri proposes that the possibility to prune an alternative ψ from the domain of $\text{EXH}_{\mathcal{R}}$ is restricted to those alternatives that are not contextually equivalent to the prejacent of $\text{EXH}_{\mathcal{R}}$. Hence, the implicature associated with an alternative ψ of a sentence ϕ becomes mandatory whenever ψ

is contextually equivalent to ϕ. This aspect of Magri's proposal is presented and discussed in Appendix A. For the time being, we can simply take Magri's hypothesis as a restriction on prunability, forcing the computation of implicatures associated with alternatives contextually equivalent to the prejacent of $\text{EXH}_{\mathcal{R}}$, (21).[10]

(21) **Mandatoriness (Condition on Prunability)**
Whenever an excludable alternative ψ to a sentence ϕ is contextually equivalent to ϕ, the computation of the implicature associated with ψ is mandatory.

2.2.2 Scope of the Proposal

Magri's proposal has an immediate and substantial payoff: we no longer need to appeal to an independent principle like *Maximize Presupposition* to account for the interpretative effects in (1)-(3) and (5)-(7) for these effects can be shown to reduce to the theory of implicatures. First of all, anti-presuppositions like those in (1)-(3) can be now derived as entailments of sentences whose LFs contain an exhaustivity operator, just like the classical implicatures in (9)-(11). To illustrate, consider the sentence in (22) and (23) and let us go over the derivation of their relevant implicatures.

(22) Some of the Jury members left.
Implicature: ¬[all the Jury members left]

(23) A brother of Mary left.
Implicature: ¬[Mary has exactly one brother]

Let us assume for (22) the LF in (24-a), where the exhaustivity operator $\text{EXH}_{\mathcal{R}}$ occurs at matrix scope. By the definition in (18-b), the sentence ψ, i.e. all the Jury members left, is an excludable alternative to ϕ at the level of assertion since ψ_{asr} is logically non-weaker than ϕ_{asr}, (24-b). Suppose now that (22) is uttered in a context where ψ is relevant, that is in a context where ψ is in the extension of the contextually supplied relevance predicate $\mathcal{R}$. Then, by the definition (18-b) of the exhaustivity operator, the LF in (24-a) gets interpreted as in (24-c). This result delivers for (22) the implicature that not all the Jury members left, as expected.

(24) **Implicatures at the Level of Assertion**

a. $\text{EXH}_{\mathcal{R}}$ $[_{\phi}$ some of the Jury members left]

b. $\text{EXCL}_{asr}(\phi) \supseteq \{[_{\psi}$ all the Jury members left]$\}$

c. $\text{EXH}_{asr}(\phi) = \phi_{asr} \wedge \neg\psi_{asr}$
$= \underbrace{\text{some of the Jury members left}}_{\phi_{asr}}$ and $\underbrace{\text{not all the Jury members left}}_{\neg\psi_{asr}}$

[10] In extending his theory of implicatures to anti-presuppositions, Magri (2009, p.61-67) did not make explicit how the condition in (21) is to be evaluated on a two-dimensional approach to presuppositions. Given the conceptualization of $\text{EXH}_{\mathcal{R}}$ in (17)-(18), this leaves open two options: (21) is assessed by considering all at once the presupposition and the assertion of competing sentences or else by considering their presupposition and their assertion separately. I will show in the next section that either option runs into similar problems.

The implicature in (23) obtains through a similar strengthening process, this time performed at the level of presupposition. Just as before, let us assume for (23) the LF in (25-a). By the definition (18-a), the sentence ψ, i.e. John's brother left, is an excludable alternative to ϕ at the level of presupposition since ψ_{prs} is logically non-weaker than ϕ_{prs}, (25-b). Suppose now that (23) is uttered in a context where ψ is relevant. Then, by the definition (18-a) of the exhaustivity operator, the LF in (25-a) gets interpreted as in (25-c). This result delivers for (23) the implicature that John doesn't have exactly one brother, which is now a logical entailment of the strengthened meaning of (23).

(25) **Implicatures at the Level of Presupposition**

a. $\textsc{exh}_{\mathcal{R}}$ [$_{\phi}$ a brother of Mary left]

b. $\textsc{excl}_{prs}(\phi) \supseteq \{[_{\psi}$ Mary's brother left$]\}$

c. $\textsc{exh}_{prs}(\phi) = \phi_{prs} \wedge \neg\psi_{prs}$

$= \underbrace{\text{A brother of Mary left}}_{\phi_{prs}}$ and $\underbrace{\text{Mary doesn't have exactly one brother}}_{\neg\psi_{prs}}$

Second, Magri's proposal offers a uniform account of the oddity effects in (5)-(7) and (12)-(14). All we have to observe in these cases is that the odd (a)-sentences are contextually equivalent to their (b)-alternatives. By Mandatoriness (21), it follows that these alternatives cannot be pruned from the domain of the exhaustivity operator that occurs at the root of the (a)-sentences and, consequently, the computation of the implicature associated with these alternatives becomes mandatory. In each case, the computation of this implicature results in an interpretation that conflicts with speakers' contextual assumptions, hence the oddness of these sentences:

(12) **Mandatory Implicatures at the Level of Assertion**

$C \subseteq$ *the professor gave the same grade to every student*

#The professor gave an A to some students.

a. $\textsc{exh}_{\mathcal{R}}$ [$_{\phi}$ the professor gave an A to some students] $(\phi \Leftrightarrow_C \psi)$

b. $\textsc{excl}_{asr}(\phi) \supseteq \{[_{\psi}$ the professor gave an A to every student$]\}$

c. $[\![\textsc{exh}_{\mathcal{R}}(\phi)]\!] \Rightarrow$ the professor didn't give an A to every student

Therefore, a contextual contradiction obtains: $[\![\textsc{exh}_{\mathcal{R}}(\phi)]\!] \cap C = \emptyset$.

(5) **Mandatory Implicatures at the Level of Presupposition**

$C \subseteq$ *there is only one sun*

#A sun is shining.

a. $\textsc{exh}_{\mathcal{R}}$ [$_{\phi}$ a sun is shining] $(\phi \Leftrightarrow_C \psi)$

b. $\textsc{excl}_{prs}(\phi) \supseteq \{[_{\psi}$ the sun is shining$]\}$

c. $[\![\textsc{exh}_{\mathcal{R}}(\phi)]\!] \Rightarrow$ there isn't exactly one sun

Therefore, a contextual contradiction obtains: $[\![\textsc{exh}_{\mathcal{R}}(\phi)]\!] \cap C = \emptyset$.

In addition to these main results, I would like to point out another good result of Magri's proposal. Since anti-presuppositions are derived as implicatures at the level of presupposition, Magri's approach captures the basic fact that *anti-presuppositions*

are presuppositions, a fact that may be obvious to some readers, but that is often overlooked. Let me establish this fact by using a test discussed in von Fintel (2004), namely the availability of *wait a minute!* responses. The claim is that expressions of negation or disagreement are linked to acceptance of presuppositions, while *wait a minute!* responses are used to call what has just been presupposed into dispute. To illustrate, consider the following examples adapted from George (2008b):

(26) a. Smith: Watson knows that Mary left.
Jones: Wait a minute! Mary didn't leave.
b. Smith: Watson knows that Mary left.
Jones: #I disagree! Mary didn't leave.
c. Smith: Watson believes that Mary left.
Jones: I disagree! Mary didn't leave.
d. Smith: Mary left.
Jones: I disagree! Mary didn't leave.

Smith's statement in (26-a)-(26-b) presupposes that Mary left and asserts that Watson believes that Mary did. We observe in (26-a) that Jones can felicitously call into question the truth of the relevant presupposition by means of a *wait a minute!* response; by contrast, the use of an expression of disagreement to achieve the same purpose is perceived as odd, (26-b). Note that the use of such an expression becomes unproblematic if the proposition expressed by this presupposition is not presupposed, (26-c)-(26-d). Consistent with these observations, the examples in (27)-(29) show that speakers can use an expression of disagreement to deny the truth of the meaning component contributed to by an asserted implicature, i.e. an implicature negating the assertion of an alternative.

(27) Smith: The accused convinced some of the Jury members.
Jones: I disagree! He convinced them all.

(28) Smith: The accused convinced two Jury members.
Jones: I disagree! He convinced more than two Jury members.

(29) Smith: The accused convinced the first or the second Jury member.
Jones: I disagree! He convinced them both.

By contrast, I notice that the truth of the meaning component contributed to by an anti-presupposition cannot be felicitously denied using expressions of disagreement. In order to dispute the truth of an anti-presupposition, speakers must resort to a *wait a minute!* response, as in the case of conventional presuppositions. The contrasts in (30)-(32) establish this point. I take these data to indicate that anti-presuppositions are subject to the same projection mechanism(s) as conventional presuppositions, consistent with Margi's proposal.

(30) Smith: A judge left the courtroom.
a. Jones: #I disagree! There is only one judge.
b. Jones: Wait a minute! There is only one judge.

(31) Smith: All the Jury members left the courtroom.

a. Jones: #I disagree! There are only two Jury members.

b. Jones: Wait a minute! there are only two Jury members.

(32) Smith: Watson believes that $2 + 2 = 4$

a. Jones: #I disagree! It's a matter fact that $2 + 2 = 4$.

b. Jones: Wait a minute! It's a matter fact that $2 + 2 = 4$.

2.2.3 The 'Separation' Problem

The point I will take issue with in the following concerns the specific assumption that the set of excludable presuppositions and the set of excludable assertions to a given sentence are computed *separately*. I argue in substance that (i) existing arguments in favor of such a separation suffer from confounding factors, and that (ii) there is a class of examples for which such a separation systematically leads to wrong results. I will offer a solution to the 'separation' problem in Section 2.3.

Weaknesses of Existing Arguments

Magri (2009) proposes that the following contrasts provide empirical support for the 'separation' hypothesis (example (33) is due to Spector (2007) and (34) to Magri) :

(33) *Context: Speaking of the atoms of a molecule which cannot be separated.*

a. ϕ: #Every atom went right.

b. ψ: The atoms went right.

(34) *Context: Mary is conducting a survey on names and last names of Italian children. She knows that all children inherit the last name of their father; hence, all children of a given couple share the same last name. This week, she has interviewed the children of five couples, A through E, in order to record their names and last names.*

a. #Every child of couple C has a French last name.

b. The children of couple C have a French last name.

Magri suggests that the oddness of the (a)-sentences is due to the fact that they compete with the (b)-sentences which have the same logical meaning as the (a)-sentences but nonetheless carry different presuppositions. To understand this suggestion, let us consider the case in (33). Magri's starting point is the simple observation that distributive predication with definite subjects, as in the case of ψ, requires the VP predicate to be operated upon the distributive operator (Link, 1983).[11] By the semantics of the distributive operator, ψ_{asr} is true just in case the property *went right*

[11] Following the previous literature (Link, 1983; Löbner, 1985; von Fintel, 1997; Gajewski, 2005), Magri (2009) takes the semantics of the distributive operator DIST to be that in (i).

(i) $\text{DIST}([\![\text{VP}]\!]^w) = \lambda x_e.\ \text{YES}^w(x) \vee \text{NO}^w(x) :\ \text{YES}^w(x)$

a. $\text{YES}^w(x) = 1$ iff for every $y \leq_{\text{atom}} x$, $[\![\text{VP}]\!]^w(y) = 1$

b. $\text{NO}^w(x) = 1$ iff for every $y \leq_{\text{atom}} x$, $[\![\text{VP}]\!]^w(y) = 0$

holds of every atomic part of the plurality *the atoms* — and thus ψ and ϕ end up having the same meaning. Yet the distributive operator does something more: it also introduces an homogeneity presupposition, namely the presupposition that the property denoted by the VP predicate either holds of every atomic part of the plural subject or else does not hold of any of them.[12] By the semantics of the distributive operator, ψ bears the homogeneity presupposition ψ_{prs} in (35-b), according to which either all the atoms went right or else none of them did. No such presupposition is carried by ϕ, as stated in (35-a) (following Magri, we will ignore here other potential presuppositions that are irrelevant to the present discussion). Since ψ_{prs} is logically non-weaker than ϕ_{prs}, it follows that $\psi \in \text{EXCL}_{prs}(\phi)$.

(35) a. $\phi_{prs} = W$
b. $\psi_{prs} = \text{YES} \vee \text{NO}$,
(i) $\text{YES} = \{w |$ every atom went right in $w\}$
(ii) $\text{NO} = \{w |$ no atom went right in $w\}$

Following these observations, Magri suggests that the oddness of sentence ϕ in (33) follows from the mandatory computation of the implicature associated with ψ_{prs} which strengthens the presupposition of ϕ by adding to ϕ_{prs} the anti-homogeneity inference $\neg(\text{YES} \vee \text{NO})$ (or equivalently $\neg\text{YES} \wedge \neg\text{NO}$, i.e. not every atom went right but some atom(s) did). Crucially, Magri notes that the derivation of this mismatching implicature could not go through if the computation of the set of alternatives presupposition-excludable with respect to ϕ were not blind to the level of assertion: if we were to take into account in this calculation the assertion ϕ_{asr} of ϕ, then the homogeneity presupposition ψ_{prs} of ψ would no longer be excludable since ϕ_{asr} entails ψ_{prs}.

At first sight, these data support the hypothesis that meaning strengthening is performed at the level of presupposition and at the level of assertion separately. Yet Magri's account of contrasts of (33)-(34) runs into two problems. The first one is essentially conceptual. A common view on the mechanisms responsible for meaning strengthening such as the exhaustivity operator is that they should be devised in such a way that their application cannot output semantic representations that are logically inconsistent. However, I notice that, on Magri's proposal, the anti-homogeneity implicatures hypothesized to be responsible for the oddity effects in (33)-(34) result in logically inconsistent representations at the global level of the sentence. As it shown in (36), if the negation of the homogeneity presupposition of ψ is added to the presupposition of ϕ, then the strengthened presupposition of ϕ now logically contradicts ϕ's assertion. I will not emphasize this concern further, but we should keep in mind that this result is not standard in the landscape of implicatures.

The distributive operator DIST does two things. First, DIST introduces an homogeneity presupposition: the property $[\![\text{VP}]\!]^w$ is defined for a plurality x if and only if $[\![\text{VP}]\!]^w$ holds of all atomic parts of x or else does not hold of any atomic part of x. Next, whenever it is defined for a plurality x, $\text{DIST}([\![\text{VP}]\!]^w)$ is true of that plurality if and only if $[\![\text{VP}]\!]^w$ holds of all atomic parts of x.

[12] As Magri pointed out, this homogeneity presupposition can be easily detected by means of negation: the sentence 'the atoms didn't go right' conveys that none of the atoms went right and thus differs with this respect from the plain meaning of the sentence 'Not every atom went right', which leaves open the possibility that some atoms went right.

(36) a. $\text{EXH}_{\mathcal{R}}[_{\phi}$ every atom went right]

b. $\text{EXCL}_{prs}(\phi)=\{[_{\psi}$ the atoms went right]$\}$

Implicature:

$$\begin{aligned}\underline{\text{EXH}_{prs}(\phi)} &= \neg\psi_{prs} \\ &= \neg(\text{every atom went right} \vee \text{no atom went right}) \\ &= \neg(\text{every atom went right}) \wedge \neg(\text{no atom went right})\end{aligned}$$

FACT: ϕ's strengthened presupposition contradicts ϕ's assertion

The second problem is empirical. On Magri's account, we expect sentences containing a universal DP in subject position (as in (33)-(34)) to be odd whenever the homogeneity presupposition of their definite alternatives is common ground. Yet this prediction is not empirically borne out, as shown by the examples in (37) and (38).

(37) *The rule of the company is the following: every day, every worker gets the same amount of money. For instance, if one worker gets $20 bucks, then every worker gets $20 bucks.*
Today was a good day,

a. ϕ: Every worker got $50 bucks.
b. ψ: The workers got $50 bucks.

(38) *Context: John warned his children that there will a Thanksgiving dinner only if each of them comes and participates; if one of them does not come, then there will be no Thanksgiving dinner and thus they won't participate.*
In the end,

a. Every child of John participated.
b. John's children participated.

Consider for instance the example in (37). The context makes it common ground that every day, every worker gets the same amount of money. Hence, the context satisfies the homogeneity presupposition of ψ: either every worker got $50 bucks or else none of them did. If we extend Magri's account of (33)-(34) to this case, we predict the sentence ϕ to presuppose the negation of ψ's homogeneity presupposition and therefore to be perceived as odd. But this sentence sounds perfectly fine. Similar observations hold of the example in (38).

As an alternative to Magri's account, I would like to suggest that the competition between the (a) and the (b)-sentence in (33)-(34) could be rather rooted into the fact that plural subjects, unlike singular subjects, also allow collective readings (a.o. McCawley, 1968; Bartsch, 1973; Higginbotham and Schein, 1989; Schwarzschild, 1992; Lasersohn, 1998). For example, in run-of-the-mill contexts, a sentence like *The atoms went right* can mean either that each of the atoms went right (possibly separately), which is the distributive reading, or that the atoms went right all together (e.g., coordinated action), which is the collective reading. With the addition of words such as *each* or *together*, we can force just one reading to be available, as in (39).[13]

[13]The ambiguity between distributive and collective reading in (39) is perhaps easier to detect with sentences like *John and Mary ordered a pizza*. This sentence can mean either John and Mary each ordered a pizza (distributive) or that they ordered a pizza jointly (collective).

(39) The atoms went right.
   a. Distributive Reading: The atoms *each* went right.
   b. Collective Reading: The atoms went right *together*.

Crucially, note that such collective readings are not available with universal singular subjects. This point is established in (40) and (41). First, singular subjects such as *every atom* are incompatible with non-distributivity marker like *together*, (40). Second, we observe that a sentence like (41-a), unlike its definite plural counterpart (41-b), cannot mean that John's children ordered a single pizza all together.

(40) a. #Every atom went right together.
   b. The atoms went right together.

(41) a. Every child of John ordered a pizza. (*Collective; ✓Distributive)
   b. John's children ordered a pizza. (✓Collective; ✓Distributive)

It is beyond the scope of this chapter to discuss how collective readings obtain and the different pragmatic flavors they can have (e.g., temporal, spatial, coordinated action). I will simply observe for the time being that the definite competitors in the cases that Magri discussed could be re-analyzed as involving a covert collective operator (rather than the distributive operator). The semantics of this operator could be akin to the semantics of *together* offered in Lasersohn (1998) and informally stated in (42)[14].

(42) *Collectivizing Readings (Lasersohn, 1998)*
A group g together has property P in eventuality e iff (i) e has a part e' such that g has $\overline{P \text{ in } e'}$, and (ii) in any two parts e'', e''' of e' in which something has property P, the set of things which have P in e'' overlaps the set of things that have P in e'''.

If we analyze the definite competitor ψ of ϕ in (33) as having a 'collectivizing' reading, then ϕ is true in eventuality e if and only if (i) e has a part e' in which the relevant atoms went right and (ii) in any two parts e'' and e''' of e' in which some atom went right, the set of atoms which went right in e'' overlaps the set of atoms which went right in e'''. On this analysis, the oddness of the sentence ϕ could be understood as resulting from an anti-collective implicature corresponding to the negation of (ii): for some parts e'' and e''' of e', the set of atoms which went right in e'' does not overlap the set of atoms which went right in e'''. This implicature contradicts common knowledge: since it is assumed that the relevant atoms cannot be separated, it must be that (ii) holds. Crucially, note that, regardless of whether we treat the meaning component in (ii) as a presupposition of ϕ or as a part of ϕ's assertive content, ϕ's assertion do not entail (ii), and therefore the derivation of the relevant mismatching implicature no longer requires the set of excludable presuppositions and the set of excludable assertions to be computed separately.

[14]Lasersohn (1998)'s formulation assumes that predicate denotations are 'curied', so that rather than denoting relations between events and groups and/or individuals, they denote functions from events to sets of groups or individuals. As usual, we understand that two sets overlap if and only if they have a non-empty intersection.

Finally, I notice that, in cases like (37) or (38) where Magri's account was shown to make incorrect predictions, contextual equivalence obtains between the (a)-sentences and their (b)-alternatives on a distributive reading but not on a collective reading of these alternatives. The contrast in (43) offers further evidence that the kind of universal sentences we have been looking at are not perceived as odd as long as they are not contextually equivalent to the collective reading of their definite alternatives (note that homogeneity is presupposed in both (43-a) and (43-b)).

(43) a. *Context: John has three children, each of whom goes to a different a school at a different time of the day. Every day, they can go to school by bike, by car, by bus or by helicopter. There is only one restriction: every day, each of them must use the same means of transport.*
Today, every child of John went to school by helicopter.

b. *John has three children who are conjoined triplets. Every day, they can go to school by bike, by car, by bus or by helicopter.*
#Today, every child of John went to school by helicopter.

Counter-Arguments

I have argued that existing arguments in favor of the separation view suffer from certain weaknesses and that the phenomena that this hypothesis was intended to cover can be better captured by other means which do not require to postulate such a separation. I will now discuss a class of examples for which the separation view systematically leads to wrong predictions.[15] Consider the following examples:

(44) *Context: It is common ground that both John and Peter have exactly one car.*
Question: who parked his car in the yard?
John parked his car in the yard.
ALT: Peter parked his car in the yard
Implicature: ¬[Peter parked his car in the yard]

(45) *Context: It is common ground that John and Peter just had a burrito.*
Question: who wants another burrito?
John wants another burrito.
ALT: Peter wants another burrito
Implicature: ¬[Peter wants another burrito]

These examples share a common structure. In both cases, we are presented with a sentence that involves a presuppositional predicate that holds of a certain individual, and we derive the implicature that this predicate does not hold of another individual that is salient in context. Crucially, the relevant implicatures do not appear to affect at all the presupposition of the alternatives they are associated with. For instance, the strengthened meaning of (44) amounts to the following: (i) John has a car and he parked his car in the yard, and (ii) Peter has a car but he didn't park his car in the yard. In sum, the strengthened meaning of these sentences corresponds to the

[15] I would like to thank Danny Fox for suggesting these examples to me.

plain meaning that would be delivered by appending to these sentences the overt counterpart of the exhaustivity operator, namely *only*:

(46) *Context: It is common ground that both John and Peter have exactly one car.*
Question: who parked his car in the yard?
Only John parked his car in the yard.
⇒ [Peter has a car]∧¬[Peter parked his car in the yard]

(47) *Context: It is common ground that John and Peter just had a burrito.*
Question: who wants another burrito?
Only John wants another burrito.
⇒ [Peter had a burrito]∧¬[Peter wants another burrito]

Yet the implicatures generated by these sentences raise an issue for the separation view: how can meaning strengthening be performed at the level of assertion without being performed at the level of presupposition as well? This issue is probably best understood by working through an example. So suppose that the sentence (44) has the LF in (48) and that the presupposition and assertion of the prejacent and of its target alternative are as represented in (48-a) and (48-b), respectively.

(48) $\text{EXH}_{\mathcal{R}}[_{\phi}$ John parked his car (in the yard)]
a. ϕ: John parked his car (prejacent)
(i) ϕ_{prs}=$\{w|$ John has a car in $w\}$
(ii) ϕ_{asr}=$\{w|$ John parked a car of his in $w\}$
b. ψ: Peter parked his car (alternative)
(i) ψ_{prs}=$\{w|$ Peter has a car in $w\}$
(ii) ψ_{asr}=$\{w|$ Peter parked a car of his in $w\}$
FACTS: $\psi \in \text{EXCL}_{prs}(\phi)$ and $\psi \in \text{EXCL}_{asr}(\phi)$

First of all, the fact that the meaning of the prejacent ϕ can be strengthened by negating (a part of the meaning of) the alternative ψ teaches us that ψ is in the domain of quantification of $\text{EXH}_{\mathcal{R}}$. Second, we see in (48) that both the presupposition and the assertion of the alternative ψ are excludable: ψ_{prs} and ϕ_{prs} are logically independent, and so are ψ_{asr} and ϕ_{asr}. Hence, upon exhaustification of the meaning of ϕ, the negation of ψ_{prs} should be added to ϕ_{prs} just like the negation of ψ_{asr} should be added to ϕ_{asr} delivering the following result:

(49) *Context: It is common ground that both John and Peter have a car*
a. $\text{EXH}_{prs}(\phi) = \phi_{prs} \wedge \neg\psi_{prs}$
$= (\text{John has a car}) \wedge \neg(\text{Peter has a car})$
b. $\text{EXH}_{asr}(\phi) = \phi_{asr} \wedge \neg\psi_{asr}$
$= (\text{John parked his car}) \wedge \neg(\text{Peter parked his car})$
Therefore, a contextual contradiction should obtain: $[\![\text{EXH}_{\mathcal{R}}(\phi)]\!] \cap C = \emptyset$

On this analysis, it is predicted that the strengthened meaning of ϕ, the one delivering the inference that Peter didn't park his car in the yard, should also deliver the

anti-presupposition that John doesn't have a car.[16] Since this inference contradicts common knowledge (i.e., John is known to have exactly one car), it follows that the strengthened meaning of ϕ should be perceived as odd. But, clearly, this prediction is not empirically adequate.[17] Magri (2009) himself pointed out similar cases where performing meaning strengthening at the level of presupposition and assertion separately results in representations that are logically inconsistent at the global level. One such case involves sentences like (50):

(50) $\text{EXH}_{\mathcal{R}}[_{\phi}$ John saw a/some brother of Mary]
ψ: John saw every brother of Mary

a. Excludable Presupposition
   (i) $\phi_{prs} = W$
   (ii) $\psi_{prs} = \{w|$ Mary has at least one brother in $w\}$
   FACT: $\psi \in \text{EXCL}_{prs}(\phi)$

b. Excludable Assertion
   (i) $\phi_{asr} = \{w|$ John saw a/some brother of Mary in $w\}$
   (ii) $\psi_{asr} = \{w|$ John saw every brother of Mary in $w\}$
   FACT: $\psi \in \text{EXCL}_{asr}(\phi)$

c. Strengthened Meaning
   (i) $\text{EXH}_{prs}(\phi)$: Mary has no brother
   (ii) $\text{EXH}_{asr}(\phi)$: J. saw a brother of Mary but not every brother of Mary

Intuitively, in addition to the anti-uniqueness presupposition that Mary does not have a unique brother, we understand the sentence ϕ as implicating that John didn't see every brother of Mary, which corresponds to the negation of ψ_{asr}. Magri observed that the derivation of this implicature at the level of assertion has a side-effect at the level of presupposition. Following Magri, let us assume that the indefinites *a/some* are interpreted as generalized quantifiers with no existence presupposition, and that *every* carries an existence presupposition that its restrictor be not empty. Upon exhaustification of its meaning, the sentence ϕ would now come with the strengthened assertion that John didn't see every brother of Mary (as expected) but also with the anti-presupposition that the existence presupposition of ψ is false (!). In sum, this sentence would thus contradictorily presuppose that Mary has no brother and asserts that Mary has a brother.

[16] Or, alternatively, the anti-presupposition that John does not have a unique car, depending on whether uniqueness is or not presupposed here. The exact content of the presupposition triggered by the predicate *parked his car* doesn't matter much here: since it is common ground that John has a unique car, the derivation of either anti-presupposition would lead to a contradiction in context.

[17] One may wonder here whether it is possible to prune an alternative ψ from the domain of EXH_{prs} but to keep it in the domain EXH_{asr}. This possibility can be entertained for instance if we allow the exhaustivity operator at level of presupposition and at the level of assertion to quantify over different subsets of alternatives (although it is unclear how relevance considerations would apply on this view). Yet I notice that this strategy would not get us out of trouble for examples like (44): since ψ_{prs} is already common ground, ϕ_{prs} and ψ_{prs} are contextually equivalent and therefore, by Mandatoriness (21), ψ_{prs} could not be pruned from the domain of EXH_{prs}. Hence, the computation of the implicature $\neg\psi_{prs}$ would be predicted to be mandatory.

To summarize, the view that implicatures in the domain of presupposition and assertion are computed separately raises two issues:

(Issue 1) the strengthened presupposition of a sentence is never guaranteed to be logically consistent with the assertion of this sentence (see (50) and (36))

(Issue 2) in some cases, strengthening the assertion of a sentence comes at the cost of an unwarranted implicature at the level of presupposition (see (44) and (45))

In the next section, I propose a refinement of Magri's proposal that solves these two issues. In substance, I will propose that (i) the set of (innocently) excludable alternatives to a sentence ϕ is computed by considering all at once the contribution of the presuppositional and assertive content of ϕ and of its formal alternatives, and (ii) a given excludable alternative cannot contribute to strengthening both the presupposition and the assertion of the prejacent. Since the refinement I will offer does not require the richness and power of a two-dimensional theory of meaning, I will adopt in the following a more parsimonious theory of meaning that assumes a unidimensional representation of semantic content. The resulting theory will preserve the core of Magri's results. The last part of the section will address previous concerns regarding the possibility to reduce anti-presuppositions to the theory of implicatures.

2.3 A Partial Solution

2.3.1 Partial Semantics: Some Background

In the following, I will assume a partial semantics (see Beaver and Krahmer, 2001; Heim and Kratzer, 1998) on which a sentence ϕ expresses a partial proposition, which for worlds in which ϕ's presupposition is not satisfied fails to deliver a truth-value, as exemplified in (51). The notation '$\phi_{\langle\pi\rangle}$' is used to denote an atomic sentence which is lexically specified as presupposing some proposition π.

(51) $\phi_{\langle\pi\rangle}$ = the judge left

a. $\pi = \lambda w$. there is a unique judge in w (presupposition)

b. $\phi = \lambda w$. a judge left in w (assertion)

c. $[\![\phi_{\langle\pi\rangle}]\!](w) = \left\{ \begin{array}{l} 1 \text{ iff } [\![\pi]\!](w) = 1 \text{ and } [\![\phi]\!](w) = 1 \\ 0 \text{ iff } [\![\pi]\!](w) = 1 \text{ and } [\![\phi]\!](w) = 0 \end{array} \right\}$ (denotation)

On this approach, the presupposition of a sentence is the proposition that needs to be true in order for this sentence to have a truth-value. In case where the presupposition of a sentence is not true, the sentence as a whole does not make sense: it is neither true nor false (when needed, I will indicate these cases by means of the symbol '$\star$'). On this characterization, an arbitrary proposition ϕ presupposes π iff whenever π is not true, ϕ is neither true nor false, (52).[18]

[18]Note that a partial (or three-valued) semantics does not specify what the absence of truth-value (or the third truth-value) stands for. In order to relate the computation of truth-values to actual

(52) *Presupposition (Beaver and Krahmer, 2001, Definition (7))*
ϕ presupposes π iff whenever π is not true, ϕ is neither true nor false.

For the present purposes, I will assume a simple picture of presupposition projection according to which the set of presuppositions of a complex sentence consists of every single elementary presupposition belonging to any subsentence (i.e., the *cumulative hypothesis*).[19] Hence, if any argument of a connective in the formal language carries a presupposition π, then the formula as a whole has π as a presupposition. Assuming that for classically valued arguments the connectives behave classically, this yields the so-called *weak Kleene* or *internal Bochvar* connectives. For illustrative purposes, the truth-table for the negation $\neg$ is given in (52).

(53) *Presupposition via Negation*
ϕ presupposes π iff $\phi \models \pi$ and $\neg\phi \models \pi$

π	$\phi_{\langle\pi\rangle}$	$\neg\phi_{\langle\pi\rangle}$
1	1	0
1	0	1
0	$\star$	$\star$

In a nutshell, $\neg$ maps true to false and false to true, but preserves the absence of truth-value (i.e., the $\star$-cases). In other words, the presuppositions of a sentence $\phi_{\langle\pi\rangle}$ are the same as those of its negation $\neg\phi_{\langle\pi\rangle}$. As defined above, $\neg$ can be taken to model the meaning of *natural* negation 'not', i.e. $[\![\text{not } \phi]\!] \Leftrightarrow \neg[\![\phi]\!]$, which is commonly assumed to be a hole to presuppositions. For instance, under the negation test for presupposition of Keenan (1971), a sentence ϕ presupposes another sentence ψ just in case ψ follows from both ϕ and its *natural* negation. This is exemplified by the entailments in (54), which remain valid with or without negation of the premise, just like $\neg$ in (53).

(54) *Semantic Presuppositions Survive Embedding under Negation*
a. The judge rendered/did not render his decision.
⇒ there is a unique judge
b. The victim talked/didn't talk to both lawyers.
⇒ there are exactly two lawyers

language use, one needs to posit a further pragmatic principle like the assertability condition in (i) whereby a partial (or three-value) proposition ϕ is assertable given a context set C only if ϕ is either true or false in every world in C. This principle can be thought of as a consequence of a more basic principle of conversation demanding that an utterance be informative, that is update the common ground. This demand is met only if the relevant sentence is either true or false in each of the worlds of the context set, i.e. if the context set entails the presuppositions of this sentence.

(i) **Assertability Condition (Stalnaker, 1978)**
An utterance of ϕ is assertable given a context set C only if in every world $w \in C$, ϕ receives in w either the value 0 or the value 1.

[19]The choice of this hypothesis here is driven by considerations of illustrative simplicity. To the best of my knowledge, nothing substantial in my analysis hinges upon this choice, although it will impact my description of some results. In sum, the empirical question of whether presuppositions of each binary connective are definitely projected to become presuppositions of the whole (as I will assume) or may, in effect, be modified as they are projected should be considered as open.

c. The judge knows/doesn't know the accused lied.
⇒ the accused lied

In addition to the negation ¬, I will make use in the following of the *denial* operator (notated '♯' here) which has been used in partial and three-value semantics to account for presupposition canceling interpretations, e.g. cases where the presuppositions of a sentence embedded under natural negation are not projected. As shown in (55), the denial operator (i.e., the external Bochvar negation) acts like ¬ with respect to the 0- and 1-cases; however, when the presupposition of a proposition is false, this operator turns the ⋆-cases into 1-cases. In sum, the denial operator is a negation that prevents presuppositions from projecting: a formula $\sharp\phi_{\langle\pi\rangle}$ is true in case the proposition π defining its domain is false or the partial proposition $\phi_{\langle\pi\rangle}$ is false. As usual, ♯ is interdefinable in terms of Bochvar (1939)'s A(assertion)-operator commonly used to account for presupposition accommodation.[20]

(55) $\sharp\phi =_{\text{def}} \neg A(\phi)$
a. $A\phi \Leftrightarrow \phi$
b. $A\phi_{\langle\pi\rangle} \Leftrightarrow A\pi \wedge A\phi$
c. $A(\phi \wedge \psi) \Leftrightarrow A\phi \wedge A\psi$
d. $A(\phi \vee \psi) \Leftrightarrow A\phi \vee A\psi$

π	$\phi_{\langle\pi\rangle}$	$\neg\phi_{\langle\pi\rangle}$	$A(\phi_{\langle\pi\rangle})$	$\sharp\phi_{\langle\pi\rangle}$
1	1	0	1	0
1	0	1	0	1
0	⋆	⋆	0	1

2.3.2 The Exhaustivity Operator in $3^{1/2}$ Steps

I will now develop a partial version of the exhaustivity operator that fixes the issues previously encountered by Magri's proposal.

Step 1 - Excludable Alternatives

The set of excludable alternatives is defined as in (56). On this characterization, any alternative that is presuppositionally or assertively non-weaker than the prejacent qualifies as an excludable alternative. This characterization will be slightly amended in step $3^{1/2}$ to integrate Fox (2007)'s notion of innocently excludable alternatives.

(56) **Excludable Alternatives = Consistently Deniable Alternatives**
$\text{EXCL}(\phi) = \{\psi \in \text{ALT}(\phi) : \exists w \in W[[\![\phi]\!](w) = 1 \wedge \sharp[\![\psi]\!](w) = 1]\}$
Informally: excludable alternatives to a sentence ϕ are those alternatives ψ that can be denied consistently with ϕ, i.e. there is a possible world in which both ϕ and $\sharp\psi$ are true, where ♯ is the denial operator (see (55)).

[20] Since ♯ can be defined in terms of $\neg A(\phi)$ where A is a sort of truth-operator (Bochvar's *meta-assertion* mode), this operator has sometimes been taken to model constructions such as 'it is not true that ϕ' or 'it is not the case that ϕ'. Although these constructions can certainly be used to deny presuppositions (e.g., *It's not true that the King of France is bald, for there is no King of France*), they do not systematically block projection of embedded presuppositions (Beaver, 1995, p.42 fn.8). Hence, I will remain agnostic as to whether ♯ can be given an unambiguous paraphrase in English.

Step 2 - Presuppositional and Assertive Alternatives

I propose that, for each excludable alternative, the exhaustivity operator negates 'as much as possible' of this alternative in the following sense: if an excludable alternative can be negated consistently with the prejacent, then it will be; if an excludable alternative cannot be negated consistently with the prejacent, then its presupposition will be. The set of excludable alternatives is thus divided into two mutually exclusive subsets: the subset of *assertive* alternatives (EXCL_{asr}), whose falsity is logically consistent with the prejacent, and the subset of *presuppositional* alternatives (EXCL_{prs}), which can only be consistently denied.

(57) **Presuppositional and Assertive Alternatives**

a. *Assertive Alternatives (consistently deniable and negatable)*
$\text{EXCL}_{asr}(\phi) = \{\psi \in \text{EXCL}(\phi) : \exists w \in W[[\![\phi]\!](w) = 1 \wedge \neg[\![\psi]\!](w) = 1]\}$

b. *Presuppositional Alternatives (only consistently deniable)*
$\text{EXCL}_{prs}(\phi) = \{\psi \in \text{EXCL}(\phi) : \neg\exists w \in W[[\![\phi]\!](w) = 1 \wedge \neg[\![\psi]\!](w) = 1]\}$

The examples in (58)-(59) are provided to illustrate the natural divide between presuppositional and assertive alternatives that follows from these definitions. Note that, on this proposal, a given excludable alternative to a sentence ϕ can never be both a presuppositional and an assertive alternative to ϕ.

(58) *Examples of Assertive Alternatives*

a. ϕ = Some of the judges left the courtroom
$\text{EXCL}_{asr}(\phi)$={ALL the judges left the courtroom}
Test: ✓Some of the judges left the courtroom but not all of them did.

b. ψ = The accused left the courtroom
$\text{EXCL}_{asr}(\psi)$={The VICTIM left the courtroom}
Test: ✓The accused left the courtroom but the victim did not.

(59) *Examples of Presuppositional Alternatives*

a. ϕ = A judge left the courtroom
$\text{EXCL}_{prs}(\phi)$={THE judge left the courtroom}
Test: #A judge left the courtroom but the judge didn't.

b. ψ = John's tall brother left the courtroom
$\text{EXCL}_{prs}(\psi)$={JOHN'S BROTHER left the courtroom}
Test: #John's tall brother left the courtroom but John's brother didn't.

Since presuppositional alternatives cannot be negated consistently with the prejacent, the process whereby presuppositional alternatives are effectively excluded will only target their meaning component that can be negated consistently with the prejacent, namely their presupposition. To implement this idea, I will make use of a function called δom which is defined in (60): δom is a function that takes a proposition ϕ and a world w and returns the value 1 if and only if the world w is in the domain of ϕ, that is if and only if w is in the set of worlds in which ϕ is defined.

(60) *Domain of a Partial Proposition*
Let W be the set of possible world and ϕ be any partial function from worlds to truth-values. The domain of ϕ is a subset $W' \subseteq W$ such that for every $w \in W'$, ϕ receives in w either the value 0 or the value 1.
Notation: $domain([\![\phi]\!]) = \{w \in W : [\![\phi]\!](w) = 1\} \cup \{w \in W : [\![\phi]\!](w) = 0\}$

$$\delta om([\![\phi]\!])(w) = \left\{ \begin{array}{ll} 1 \text{ iff} & w \in domain([\![\phi]\!]) \\ 0 \text{ iff} & w \notin domain([\![\phi]\!]) \end{array} \right\}$$

Hence defined, the function δom can be used to determine whether a given proposition is defined at a given world and thus whether its presupposition is true or false in this world. The use of this function is illustrated in the following toy example:[21]

(61) *Using the function δom to probe for definedness: A toy example*
$\phi_{\langle\pi\rangle}$ = Mary talked to John's son.
where π = John has a unique son, and ϕ = Mary talked to a son of John
a. Suppose $[\![\phi_{\langle\pi\rangle}]\!](w_1) = 1$, $[\![\phi_{\langle\pi\rangle}]\!](w_2) = 0$ and $[\![\phi_{\langle\pi\rangle}]\!](w_3) \notin \{0, 1\}$
b. $domain([\![\phi_{\langle\pi\rangle}]\!]) = \{w_1, w_2\}$, i.e. the set of worlds that are π-worlds.
c. For any $w \in W$, $\delta om([\![\phi_{\langle\pi\rangle}]\!])(w) = 1$ iff $w \in \{w_1, w_2\}$ iff w is a π-world.
d. Hence: $\delta om([\![\phi_{\langle\pi\rangle}]\!])(w_1) = 1$, $\delta om([\![\phi_{\langle\pi\rangle}]\!])(w_2) = 1$, $\delta om([\![\phi_{\langle\pi\rangle}]\!])(w_3) = 0$

Step 3 - Presuppositional and Asserted Implicatures

I propose that the exhaustivity operator strengthens the meaning of a partial proposition ϕ by restricting both the set of possible worlds in which ϕ is defined and the set of possible worlds in which ϕ is true. Specifically, I propose that $\textsc{exh}(\phi)$ is a partial function from worlds to truth-values that is defined on a subset $W' \subseteq W$ corresponding to the complement set of the union of the domains on which ϕ's presuppositional alternatives are defined. Whenever $\textsc{exh}(\phi)$ is defined at a world w, $\textsc{exh}(\phi)$ is true in w if and only if ϕ is true in w and each of ϕ's assertive alternative is false in w. Putting all these pieces together gives us the final result in (62). As before, $\mathcal{R}$ stands for the contextually supplied relevance predicate $\mathcal{R}$ and can bring about contextual restrictions on the set of alternatives which $\textsc{exh}$ quantifies over.

[21] As the astute reader may have noted at this point, the definitions of assertive and presuppositional alternatives given in (57) can be reformulated using the denial operator and the δom-function, as shown in (i). Unlike assertive alternatives, presuppositional alternatives to a sentence ϕ are those excludable alternatives ψ that cannot be consistently denied together with ϕ and ψ's presupposition.

(i) a. *Assertive Alternatives*
$\textsc{excl}_{asr}(\phi) =$
$\{\psi \in \textsc{excl}(\phi) : \exists w \in W[[\![\phi]\!](w) = 1 \wedge \delta om([\![\psi]\!])(w) = 1 \wedge \sharp[\![\psi]\!](w) = 1]\}$
b. *Presuppositional Alternatives*
$\textsc{excl}_{prs}(\phi) =$
$\{\psi \in \textsc{excl}(\phi) : \neg\exists w \in W[[\![\phi]\!](w) = 1 \wedge \delta om([\![\psi]\!])(w) = 1 \wedge \sharp[\![\psi]\!](w) = 1]\}$

(62)

Exhaustivity Operator (Partial Semantics)

$$[\![\text{EXH}_{\mathcal{R}}\ \phi]\!](w) = \left\{ \begin{array}{ll} 1 \text{ iff} & \forall\psi \in (\mathcal{R} \cap \text{EXCL}_{prs}(\phi))[\delta om([\![\psi]\!])(w) = 0] \wedge \\ & [\![\phi]\!](w) = 1 \wedge \forall\psi \in (\mathcal{R} \cap \text{EXCL}_{asr}(\phi))[[\![\psi]\!](w) = 0]] \\ 0 \text{ iff} & \forall\psi \in (\mathcal{R} \cap \text{EXCL}_{prs}(\phi))[\delta om([\![\psi]\!])(w) = 0] \wedge \\ & [\![\phi]\!](w) = 0 \vee \exists\psi \in (\mathcal{R} \cap \text{EXCL}_{asr}(\phi))[[\![\psi]\!](w) = 1]] \end{array} \right\}$$

(a) EXH(ϕ) anti-presupposes whatever ϕ's presuppositional alternatives presuppose
(b) EXH(ϕ) presupposes whatever ϕ and ϕ's assertive alternatives presuppose
(c) EXH(ϕ) asserts ϕ and negates each of ϕ's assertive alternatives

The process whereby assertive alternatives are excluded is relatively transparent. Partial EXH takes a proposition ϕ and it asserts that ϕ is true and that each of ϕ's relevant assertive alternatives is false. Since the presuppositions of ϕ and of its assertive alternatives project, EXH(ϕ) ends up presupposing whatever ϕ and its assertive alternatives presuppose. Hence, as far as assertive alternatives are concerned, partial EXH delivers essentially the same results as its classical (bivalent, non-partial) version, with the exception that the present system allows to integrate the presuppositional contribution of the prejacent and of its assertive alternatives to the definedness conditions of the strengthened meaning, as shown in (63)-(64).

(63) Some of the judges left the courtroom.

a. EXCL_{asr}={ALL the judge left the courtroom}

b. $[\![\text{EXH}_{\mathcal{R}}\ (63)]\!](w) = \left\{ \begin{array}{ll} 1 \text{ iff} & [\![(63)]\!](w) = 1 \wedge [\![\text{ALL}]\!](w) = 0 \\ 0 \text{ iff} & [\![(63)]\!](w) = 0 \vee [\![\text{ALL}]\!](w) = 1 \end{array} \right\}$

c. *Strengthened Meaning*
EXH((63)) is defined in w iff (63) and ALL are defined in w. Whenever defined, EXH((68)) is true in w iff (63) is true but ALL is false in w.

(64) The accused left the courtroom.

a. EXCL_{asr}={the VICTIM left the courtroom}

b. $[\![\text{EXH}_{\mathcal{R}}\ (64)]\!](w) = \left\{ \begin{array}{ll} 1 \text{ iff} & [\![(64)]\!](w) = 1 \wedge [\![\text{VICTIM}]\!](w) = 0 \\ 0 \text{ iff} & [\![(64)]\!](w) = 0 \vee [\![\text{VICTIM}]\!](w) = 1 \end{array} \right\}$

c. *Strengthened Meaning*
EXH((64)) is defined iff (64) and VICTIM are defined in w. Whenever defined, EXH((64)) is true in w iff (64) is true but VICTIM is false in w.

Let me now turn to cases involving presuppositional alternatives. Our partial exhaustivity operator is now presuppositional: EXH(ϕ) is defined at a world w if and only if none of ϕ's presuppositional alternatives are defined in w. As a result, EXH(ϕ) presupposes the falsity of the presuppositions of ϕ's presuppositional alternatives — or, to put it differently, anti-presupposes its presuppositional alternatives. The presuppositional behavior of partial EXH thus accounts for the projective behavior of anti-presuppositions: anti-presuppositions project because they are themselves presuppositions of the exhaustivity operator. The examples in (65)-(67), echoing the examples discussed in the introduction of this chapter, shows the results delivered by

partial EXH for basic sentences. Crucially, note that the relevant anti-presuppositions are part of the definedness conditions of the strengthened meaning (rather than part of the asserted content).[22]

(65) John likes all his children.

a. EXCL_{prs}={John likes BOTH his children}

b. $[\![\text{EXH}_{\mathcal{R}}\ (65)]\!](w) = \left\{ \begin{array}{ll} 1 \text{ iff} & \delta om[\![\text{BOTH}]\!](w) = 0 \wedge [\![(65)]\!](w) = 1 \\ 0 \text{ iff} & \delta om[\![\text{BOTH}]\!](w) = 0 \wedge [\![(65)]\!](w) = 0 \end{array} \right\}$

c. *Strengthened Meaning*
EXH((65)) is defined iff (65) is defined in w but BOTH is not. Whenever defined, EXH((65)) is true in w iff (65) is true in w.

(66) John believes that I am German.

a. EXCL_{prs}={John KNOWS that I am German}

b. $[\![\text{EXH}_{\mathcal{R}}\ (66)]\!](w) = \left\{ \begin{array}{ll} 1 \text{ iff} & \delta om[\![\text{KNOW}]\!](w) = 0 \wedge [\![(66)]\!](w) = 1 \\ 0 \text{ iff} & \delta om[\![\text{KNOW}]\!](w) = 0 \wedge [\![(66)]\!](w) = 0 \end{array} \right\}$

c. *Strengthened Meaning*
EXH((66)) is defined in w iff (66) is defined in w but KNOW is not. Whenever defined, EXH((66)) is true in w iff (66) is true in w.

(67) John's brother that is tall just arrived.

a. EXCL_{prs}={JOHN'S BROTHER just arrived}

b. $[\![\text{EXH}_{\mathcal{R}}\ (67)]\!](w) = \left\{ \begin{array}{ll} 1 \text{ iff} & \delta om[\![\text{JOHN'S BROTHER}]\!](w) = 0 \wedge [\![(67)]\!](w) = 1 \\ 0 \text{ iff} & \delta om[\![\text{JOHN'S BROTHER}]\!](w) = 0 \wedge [\![(67)]\!](w) = 0 \end{array} \right\}$

c. *Strengthened Meaning*
EXH((67)) is defined in w iff (67) is defined in w but JOHN'S BROTHER is not. Whenever defined, EXH((67)) is true in w iff (67) is true in w.

Let me succinctly comment here on the example in (67) as I have argued earlier (Section 2.1, (16)) that this example supports the view that the derivation of presuppositional implicatures also relies on the notion of logically non-weaker alternatives. The critical observation here is that JOHN'S BROTHER is a presuppositional alternative to (67): JOHN'S BROTHER can be consistently denied with (67) (i.e., *John has more than one brother and his tall brother just arrived*) but yet cannot be consistently negated (i.e., #*John's brother didn't arrive but his tall brother just did*). Hence, on the present analysis, the strengthened meaning of (67) is predicted to anti-presuppose the uniqueness presupposition associated with JOHN'S BROTHER, which gives us the entailment that John has more than one brother, only one of which is tall. These cases are further discussed in Chapter 3 where I claim that the restrictiveness effects associated to the use of subsective modifiers can be accounted for in terms of implicatures.

[22] I assume in (66) that *to know* is factive in that it presupposes the truth of its complement. This assumption is certainly an over-simplification but it would lead us to far to develop a fully-fledged analysis of what *to know* is (and what it is *to know*). I also surmise that other competitors might be relevant in such cases. Typically, one could imagine that constructions like *x is certain/sure that* ϕ could compete too. In such a case, (66) would generate a weaker implicature along the lines of *x believes that* ϕ *but he is not certain that* ϕ, which does not (anti-)presupposes that ϕ is true.

To further illustrate how partial EXH works, consider now the example in (68). This case is interesting in that its implicatures involve both an assertive alternative and a presuppositional alternative. On our analysis, EXH((68)) is defined just in case its presuppositional *the*-alternative is neither true nor false. This domain strengthening delivers the anti-uniqueness presupposition that there isn't a unique judge which, together with the truth of the prejacent, gives us the entailment that there is more than one judge. If we now add the asserted implicature that not every judge left the courtroom, then EXH((68)) entails that there are at least two judges, that one of them left the courtroom but that not all of them did, which I take to be a good result in line with speakers' intuitions. Finally, note that this analysis predicts that, despite their apparent similarities, these two implicatures have nonetheless a distinct status: the falsity of the *every*-alternative is asserted and thus can be the object of a disagreement on the part of the hearer, whereas the falsity of the definite-alternative is presupposed and thus cannot be call into question by the same means.

(68) One judge left the courtroom.

a. EXCL_{asr}=$\{$EVERY judge left the courtroom$\}$

b. EXCL_{prs}=$\{$THE judge left the courtroom$\}$

c. $[\![\text{EXH}_{\mathcal{R}}\ (68)]\!](w) = \left\{ \begin{array}{ll} 1 \text{ iff} & \delta om([\![\text{THE}]\!])(w) = 0 \wedge [[\![(68)]\!](w) = 1 \wedge [\![\text{EVERY}]\!](w) = 0] \\ 0 \text{ iff} & \delta om([\![\text{THE}]\!])(w) = 0 \wedge [[\![(68)]\!](w) = 0 \vee [\![\text{EVERY}]\!](w) = 1] \end{array} \right\}$

d. *Strengthened Meaning*
EXH((68)) is defined in w iff (68) and EVERY are defined in w but THE is not. Whenever defined, EXH((68)) is true in w just in case (68) is true but EVERY is false in w.

e. *Rejecting Asserted vs. Presuppositional Implicatures*
(i) I disagree/that's not true; every judge left the courtroom.
(ii) #I disagree/that's not true; there is only one judge.

Step $3^{1/2}$ - Innocent Exclusion in Partial Semantics

It has been noted in the previous literature on asserted implicatures that a simple characterization of the set of excludable assertive alternatives as 'those alternatives that can be negated consistently with the prejacent' runs into problem in the case of disjunctive sentences like (69) (see for instance Sauerland, 2004): if we were to negate all the assertively stronger alternatives of this sentence, we would get a contradiction since not all asserted implicatures can be true together with the prejacent (e.g., #*John neither talked to Mary nor to Sue, but he talked to Mary or Sue.*)

(69) John talked to Mary or Sue.
EXCL_{asr} = {[John talked to MARY],
[John talked to SUE],
[John talked to MARY AND SUE]}

The simplified definition of excludable alternatives that I have proposed in (56) runs into the exact same problem. The observation that I would like to add is that the issue raised by the sentence in (69) is also found in the domain of presuppositional

implicatures. For instance, both definite alternatives in (70) are presuppositional alternatives to (70) that are logically stronger than (70). Here again, if we were to anti-presuppose them both, we would get a contradiction.[23]

(70) John borrowed the two or three books that Mary bought.
EXCL_{prs} = {[J. borrowed THE TWO BOOKS that M. bought],
[J. borrowed THE THREE BOOKS that M. bought]}

Negation Test for Presuppositional Alternatives:
John borrowed the two or three books that Mary bought but...

a. #he didn't borrow the two books that Mary bought.
b. #he didn't borrow the three books that Mary bought.

Several solutions have been offered in the literature to overcome this problem (see for instance Spector, 2006; Fox, 2007; Franke, 2011; Nickel, 2010). I will adopt here the notion of innocent exclusion offered in Fox (2007). The basic idea underlying Fox's definition of innocently excludable alternatives is that we want to exclude as many logically non-weaker alternatives as possible, (a) without creating a contradiction, and (b) without making an arbitrary choice between alternatives. Formally, the set of innocently excludable alternatives is defined as the set of alternatives in the intersection of all maximal subsets of consistently excludable subsets of alternatives. For our purposes, this definition can be formulated as in (71), where the consistently excludable subsets of alternatives to a sentence ϕ are taken to be subsets of alternatives that can be *denied* consistently with ϕ.

(71) **Innocently Excludable Alternatives (Partial Semantics)**

$$\text{EXCL}^{ie}(\phi) := \bigcap \left\{ \text{ALT'}(\phi) \;\middle|\; \begin{array}{l} \text{ALT'}(\phi) \subseteq \text{ALT}(\phi) \text{ and ALT'}(\phi) \text{ is a maximal subset of} \\ \text{ALT}(\phi) \text{ such that } \{\sharp\psi : \psi \in \text{ALT}(\phi)\} \cup \{\phi\} \text{ is consistent} \end{array} \right\}$$

To illustrate how this definition works, consider again the case in (69). The maximal subsets of consistently excludable subsets of alternatives for this sentence are {MARY, MARY AND SUE} and {SUE, MARY AND SUE}. The intersection of these subsets, i.e. the set of innocently excludable alternatives to (69), is {MARY AND SUE}. Hence, we correctly predict now that the only excludable alternative in (69) is MARY AND SUE.

[23] I will remain agnostic as to how exactly the disjunction *or* is to be analyzed in (70). I notice however that (a) this disjunction *cannot* be plausibly analyzed as a TP disjunction taking wide-scope for (70) would otherwise lead to presupposition failure, as in (i), and (b) there seems to exist strong restrictions on the range of numerals one can 'disjoin' that way, see (ii).

(i) #John took the two books that Mary bought or he took the three books that Mary bought.

(ii) a. John took the two or three books that Mary bought.
b. ??John took the two or four books that Mary bought.
c. #John took the two or five books that Mary bought.

(69) John talked to Mary or Sue.
EXCL$^{ie}_{asr}$={[John talked to MARY AND SUE]}
Asserted Implicature: John didn't talk to (both) Mary and Sue.

A similar reasoning holds in (70). The maximal subsets of consistently excludable subsets of alternatives for this sentence are {THE TWO BOOKS} and {THE THREE BOOKS}. Since the intersection of these subsets is empty, (69) has no innocently excludable presuppositional alternatives. Hence, we correctly predict now that (70) should not give rise to any presuppositional implicature.

(70) John took the two or three books that Mary bought.
EXCL$^{ie}_{prs}$=$\emptyset$
Presuppositional Implicature: $\emptyset$

The cases we will be looking at in the following will not involve a crucial use of the notion of innocently excludable alternatives and thus, for simplicity, I will stick to the simplified characterization in (56). Yet we should keep in mind that such a refinement is (i) available for partial EXH and (ii) is needed to provide a proper treatment of both asserted *and* presuppositional implicatures in cases like (69) and (70).

2.3.3 Results

Our conceptualization of the exhaustivity operator offers a solution to the issues previously encountered by the separation view. First, since the set of presuppositional alternatives and the set of assertive alternatives are mutually exclusive, it follows that an excludable alternative cannot contribute to strengthening both the presuppositional and the assertive content of the prejacent, thus avoiding the issues raised by the examples in (46)-(47). Second, since presuppositional implicatures are computed on the basis of presuppositional alternatives (those alternatives that can be denied but not negated consistently with the prejacent), it follows that the strengthened presupposition of a sentence cannot be logically inconsistent with the assertion of this sentence, thus avoiding the issues raised by the examples in (50) and (36).

2.3.4 Projective Behavior of Presuppositional Implicatures

Following Magri's proposal, I have suggested that anti-presuppositions reduce to the grammatical theory of implicatures. Specifically, anti-presuppositions are implicatures resulting from the exhaustification of the domain of a proposition: when the meaning of a proposition ϕ is applied to (an occurrence of) the exhaustivity operator, its definedness conditions are logically strengthened by negating the maximal presupposition of each of ϕ's excludable presuppositional alternatives. I will now explain how this characterization of anti-presuppositions as 'presuppositional implicatures' accounts for the following two previous observations from Sauerland (2008):

1. unlike asserted implicatures, anti-presuppositions project through negation;

2. unlike conventional presuppositions, anti-presuppositions do not project universally through a universal quantifier;

From these observations, Sauerland (2008) concluded that anti-presuppositions are neither implicatures, nor conventional presuppositions, but a separate class of phenomena relying on distinct derivational mechanisms. I will show that that these observations can be accounted for if anti-presuppositions are rather conceived as both implicatures and presuppositions, consistent with the present approach.

Implicatures, Negation and Presupposition Holes

Sauerland (2008) observed that asserted implicatures and anti-presuppositions behave differently in downward-entailing (DE) environments. Typically, in the scope of negation and other DE-operators, scalar implicatures are reversed. The pairs in (72) and (73) exemplify this well-known observation.

(72) a. John played all Beethoven symphonies. (no implicature)
b. John played one Beethoven symphony.
Implicature for (72-b): ¬[John played all Beethoven symphonies]

(73) a. John didn't play one Beethoven symphony. (no implicature)
b. John didn't play all Beethoven's symphonies.
Implicature for (73-b): ¬[John didn't play some Beethoven symphony]

The positive *all*-sentence in (72) has no implicature while its indefinite counterpart implicates the negation of its *all*-alternative. By contrast, we see in (73) that the negative indefinite sentence has no implicature while the negative *all*-sentence implicates the negation of its (negative) indefinite alternative; since the double negation cancels each other out, this gives us the implicature that John played some Beethoven symphony.

In contrast to asserted implicatures, anti-presuppositions do not seem to be affected by the monotonicity of the surrounding environment. This is illustrated by the three pairs in (74)-(76). For each pair, the positive (a)-sentence and its negative (b)-counterpart have the same anti-presupposition. In sum, anti-presuppositions appear to project through negation, just like conventional presuppositions.

(74) a. John met a brother of Mary.
b. John didn't meet a brother of Mary.
Same anti-presupposition: Mary hasn't a unique brother

(75) a. John has met Mary's children.
b. John hasn't met Mary's children.
Same anti-presupposition: Mary hasn't a unique child

(76) a. John believes that I am German.
b. John doesn't believe that I am German.
Same anti-presupposition: the speaker is not German

Sauerland suggested that such a divergence in DE-environments provides some reason for keeping the theory of anti-presuppositions and the theory of implicatures apart. Suppose that the inferences in (74)-(76) are to be analyzed as implicatures, then how do we account for the fact that, unlike genuine cases of implicatures (e.g., (73)), these implicatures show up in DE-environments?

Our analysis offers an explanation for these facts: the (a) and (b)-sentences in (74)-(76) give rise to the same presuppositional implicatures because the monotonicity of the environment affects neither their definedness conditions, nor those of their presuppositional alternatives. To illustrate, consider again the minimal pair in (74) and assume that natural negation is a presupposition hole that can be modeled in terms of the negation '¬'. On these assumptions, both (74-a) and its negation (74-b) have the same definedness conditions; they also both have definite presuppositional alternatives which have the same definedness conditions. Hence, upon exhaustification, the definedness conditions of both sentences will be subject to the same meaning strengthening and thus will give rise to the same anti-uniqueness presupposition:

(74-a) John met a brother of Mary.

a. EXCL_{prs}=\{[John met THE brother of Mary]\}

b. $[\![\text{EXH}_{\mathcal{R}}\ \text{(74-a)}]\!](w) = \left\{ \begin{array}{ll} 1 \text{ iff} & \delta om[\![\text{THE}]\!](w) = 0 \wedge [\![\text{(74-a)}]\!](w) = 1 \\ 0 \text{ iff} & \delta om[\![\text{THE}]\!](w) = 0 \wedge [\![\text{(74-a)}]\!](w) = 0 \end{array} \right\}$

(74-b) John didn't meet a brother of Mary.

a. EXCL_{prs}=\{[John didn't meet THE brother of Mary]\}

b. $[\![\text{EXH}_{\mathcal{R}}\ \text{(74-b)}]\!](w) = \left\{ \begin{array}{ll} 1 \text{ iff} & \delta om[\![\text{THE}]\!](w) = 0 \wedge [\![\text{(74-b)}]\!](w) = 1 \\ 0 \text{ iff} & \delta om[\![\text{THE}]\!](w) = 0 \wedge [\![\text{(74-b)}]\!](w) = 0 \end{array} \right\}$

The examples in (77)-(78) illustrate now the distinct behavior of presuppositional and asserted implicatures under negation. As we have seen in (68), the meaning of a positive sentence with an indefinite like *A judge has arrived* can be strengthened by excluding in effect both its definite and its *every*-alternative, (77). By contrast, we see in (78) that the natural negation of this sentence, i.e. *a judge hasn't arrived (yet)* (on the reading 'no judge has arrived'), can only be strengthened by excluding its negative definite alternative for the negative *every*-alternative is not excludable.

(77) A judge has arrived.

a. $\text{EXCL}_{asr} \supseteq$\{[EVERY judge has arrived]\}

b. $\text{EXCL}_{psr} \supseteq$\{[THE judge has arrived]\}

c. $[\![\text{EXH}_{\mathcal{R}}\ \text{(77)}]\!](w) = \left\{ \begin{array}{ll} 1 \text{ iff} & \delta om[\![\text{THE}]\!](w) = 0 \wedge [[\![\text{(77)}]\!](w) = 1 \wedge [\![\text{EVERY}]\!](w) = 1] \\ 0 \text{ iff} & \delta om[\![\text{THE}]\!](w) = 0 \wedge [[\![\text{(77)}]\!](w) = 0 \vee [\![\text{EVERY}]\!](w) = 0] \end{array} \right\}$

(78) A judge hasn't arrived yet.
LF: [¬[a judge has arrived yet]]

a. $\text{EXCL}_{asr} \not\supseteq$\{¬[EVERY judge has arrived]\}

b. $\text{EXCL}_{psr} \supseteq$\{¬[THE judge has arrived]\}

c. $[\![\text{EXH}_{\mathcal{R}}\ \text{(78)}]\!](w) = \left\{ \begin{array}{ll} 1 \text{ iff} & \delta om([\![\text{THE}]\!])(w) = 0 \wedge [\![\text{(78)}]\!](w) = 1 \\ 0 \text{ iff} & \delta om([\![\text{THE}]\!])(w) = 0 \wedge [\![\text{(78)}]\!](w) = 0 \end{array} \right\}$

To summarize, the monotonicity of the environment is expected on our analysis to affect the generation of asserted implicatures but not the generation of presuppositional implicatures. This result is a direct consequence of the fact that the strengthening of the domain of a proposition is computed on the basis of the conventional presuppositions of its presuppositional alternatives which remain the same in UE- and DE-environments. Our observations regarding the projective properties of anti-presuppositions under negation are synthesized in (79): for any sentence ϕ, the anti-presupposition delivered by applying ϕ to EXH is the same as the one obtained by applying its natural negation ϕ^- to EXH.

(79) **Presuppositional Implicatures under Negation**
Let ϕ be any sentence and ϕ^- be its natural negation.
a. $\delta om([\![\phi]\!])$ and $\delta om([\![\phi^-]\!])$ are semantically equivalent
b. $\psi \in \text{ALT}_{prs}(\phi)$ if and only if $\psi^- \in \text{ALT}_{prs}(\phi^-)$
c. $[\![\text{EXH}(\phi)]\!](w) \in \{0,1\}$ only if for all $\psi \in \text{ALT}_{prs}(\phi^-)$, $[\![\psi]\!](w) \notin \{0,1\}$
d. $[\![\text{EXH}(\phi^-)]\!](w) \in \{0,1\}$ only if for all $\psi \in \text{ALT}_{prs}(\phi)$, $[\![\psi]\!](w) \notin \{0,1\}$

Finally, let me point out another distinctive feature of our analysis in regard now to the derivation of embedded implicatures. The conceptualization of the exhaustivity operator I have offered is one on which presuppositional implicatures are to be thought as presuppositions of the exhaustivity operator. Since the presuppositions of the exhaustivity operator are themselves projected, we predict that, even when presuppositional implicatures are derived at some embedded level, they should always end up presuppositions of the whole sentence. By contrast, asserted implicatures are (still) predicted to be interpreted at the level where they are computed in the sentence. To illustrate this point, consider first the sentence in (80):[24]

(80) John thinks that some of the judges left the courtroom.
LF: $\text{EXH}_{\mathcal{R}}$ [$_\phi$ John thinks that $\text{EXH}_{\mathcal{R}}$ [$_\psi$ some of the judges left the room]]
a. Weaker Reading
John thinks that some of the judges left the courtroom and he does not think that all of them did.
$\approx$ John only thinks that SOME_F of the judges left the courtroom
b. Stronger Reading
John thinks that some but not all of the judges left the courtroom.
$\approx$ John thinks that only SOME_F of the judges left the courtroom

The sentence in (80) has two possible readings, each of which can be expressed unambiguously by using an overt instance of *only* together with some prosodic focus on the scalar item *some*. On the present approach, the sentence in (80) is hypothesized to be represented at LF with two occurrences of the exhaustivity operator — one at

[24] I assume for the following examples that the speaker is addressing a question of the form 'What does John think?' and therefore that the possible KNOW-alternatives to these sentences are contextually irrelevant here. In (80), these alternatives can also be ruled out for instance by setting up a context in which the speaker is explicitly known to be ignorant as to whether any judge left the room, i.e. contexts in which the presupposition of the KNOW-alternatives would be infelicitous.

the level of the matrix sentence ϕ and one at the level of the embedded clause ψ — and its two readings can be conceived as resulting from the computation of either a global implicature (via matrix EXH) or a local implicature (via embedded EXH), as illustrated in (81) and (82) respectively.

(81) Global Asserted Implicature: Weaker Reading

a. $\text{EXCL}_{asr}(\phi)$=\{[John thinks that $\text{EXH}_{\emptyset}$ [EVERY judge left the courtroom]]\}

b. $[\![(80)]\!](w) = \left\{ \begin{array}{ll} 1 \text{ iff} & [\![\phi]\!](w) = 1 \wedge [\![\text{EVERY}]\!](w) = 0 \\ 0 \text{ iff} & [\![\phi]\!](w) = 0 \vee [\![\text{EVERY}]\!](w) = 1 \end{array} \right\}$

c. *Strengthened Meaning*
Whenever defined, (80) is true just in case John thinks that some of the judges left the courtroom and doesn't think that all of them did.

(82) Local Asserted Implicature: Stronger Reading

a. $\text{EXCL}_{asr}(\psi)$=\{[EVERY judge left the courtroom]\}

b. $[\![(80)]\!](w) = \left\{ \begin{array}{ll} 1 \text{ iff} & \text{[John thinks SOME} \wedge \neg\text{EVERY] is true in } w \\ 0 \text{ iff} & \text{[John thinks SOME} \wedge \neg\text{EVERY] is false in } w \end{array} \right\}$

c. *Strengthened Meaning*
Whenever defined, (80) is true just in case John thinks that some but not all the judges left the courtroom.

Consider now the following sentence:

(83) John thinks that all the judges left the courtroom.
LF: $\text{EXH}_{\mathcal{R}}$ [$_{\phi}$ John thinks that $\text{EXH}_{\mathcal{R}}$ [$_{\psi}$ all the judges left the courtroom]]

The LF of this sentence is very similar to that of (80) in that it allows implicatures to be computed globally or locally. The excludable alternatives we are now interested in are presuppositional alternatives involving the presupposition-trigger *both*. Unlike what we observed for (80), the global and local implicatures associated with these alternatives deliver for (83) the same strengthened meaning, (84). It is so because the anti-presupposition generated locally is unmodified in the course of the derivation and ends up projecting at the level of the whole sentence.[25]

(84) Global & Local Presuppositional Implicature

a. $\text{EXCL}_{prs}(\phi)$=\{[John thinks that $\text{EXH}_{\emptyset}$ [BOTH judges left the courtroom]]\}

b. $\text{EXCL}_{prs}(\psi)$=\{[BOTH judges left the courtroom]\}

c. $[\![(83)]\!](w) = \left\{ \begin{array}{ll} 1 \text{ iff} & \delta om([\![\text{BOTH}]\!])(w) = 0 \wedge [\![\phi]\!](w) = 1 \\ 0 \text{ iff} & \delta om([\![\text{BOTH}]\!])(w) = 0 \vee [\![\phi]\!](w) = 0 \end{array} \right\}$

d. *Strengthened Meaning*
(83) is defined only if there are not exactly two judges. Whenever defined, (83) is true iff John thinks that all the judges left the courtroom.

[25] It is implicitly assumed here that *think* is a hole for presupposition projection.

To summarize, it is predicted on this analysis that the computation of presuppositional implicatures, either locally or globally, should always pertain to the definedness conditions of the whole sentence. Although the computation of local and global presuppositional implicatures may in some cases deliver the same output, as in (83), we will see in the following that this result only obtains when local presuppositional implicatures are unmodified in the course of the derivation.

Implicatures across Universals

Sauerland (2008)'s second observation is that conventional presuppositions and anti-presuppositions appear to project differently across universals. As illustrated by the examples in (85)-(86) (based on (30)-(31) from Sauerland (2008)), conventional presuppositions project universally across a universal: (85) presupposes that every student has exactly one sister, and (86) presupposes that every player's support was crucial for the team.

(85) Every student invited his sister.
   a. Presupposition: Every student has exactly one sister.
   b. Assertion: Every student invited a sister of his.
   Odd continuation: #And therefore, John invited both of his.

(86) Every player knows that his support was crucial for the team.
   a. Presupposition: Every player's support was crucial for the team
   b. Assertion: Every player believes that his support was crucial for the team
   Odd continuation: #But John's support wasn't crucial for the team.

Since a sentence like *John invited his sisters* can anti-presuppose that John doesn't have a unique sister, we could expect this anti-presupposition to project over a universal quantifier the same way as conventional presuppositions. Yet Sauerland points out that universal projection need not obtain with anti-presuppositions. For instance, the sentence in (87) can be understood as implicating that not every student has exactly one sister. This is evidenced by the fact that (87) can be felicitously used in a situation where some students have only one sister, others have more, and the interlocutors know exactly how many sisters every student has (compare the possible continuation for (85) vs. (87)). Similar observations hold of (88).

(87) Every student invited his sisters.
   Natural continuation: ✓And therefore, John invited his sister.

(88) Every player believes that his support was crucial for the team.
   Natural continuation: ✓But only John's support really was.

Sauerland concludes that, in the interaction with universals, anti-presuppositions behave very much like asserted implicatures. These similarities can be illustrated by the examples in (89)-(90): (89) can be understood as implicating that not every student wrote a paper and did a presentation, and (90) as implicating that not every professor talked to every student.

(89) Every student wrote a paper or did a presentation.
Possible continuation: ✓As usual, John did both.

(90) Every professor talked to some of the students.
Possible continuation: ✓As usual, David talked to all of them.

I agree with Sauerland that these environments teach us something about the similarities between anti-presuppositions and asserted implicatures. However, I believe that they do so for another reason which I will show to be compatible with the idea that anti-presuppositions behave just like conventional presuppositions. As Sauerland himself mentioned, it has been claimed in the literature that a scalar item in the scope of a universal can give rise to stronger asserted implicatures than those we have reported on so far. For instance, Chierchia (2004) has claimed that (89) can also give rise to the stronger implicature that no student both wrote a paper and did a presentation; similarly, (90) can give rise to the stronger implicature that every professor talked to some of the students but not all.

(89) Every student wrote a paper or did a presentation.
   a. Weaker Asserted Implicature:
   Not every student did both.
   b. Stronger Asserted Implicature:
   No student did both.

(90) Every professor talked to some of the students.
   a. Weaker Asserted Implicature:
   Not every professor talked to all students.
   b. Stronger Asserted Implicature:
   Every professor talked to some but not all students.

Since the publication of Chierchia (2004)'s and Sauerland (2008)'s works, the prevalence of these stronger implicatures have been investigated using quantitative methods and several experimental studies have provided evidence for their robustness: speakers do show a clear preference for these stronger readings (see in particular Chemla and Spector, 2011; Clifton Jr and Dube, 2010). According to my informants, the sentences in (87)-(88) can also give rise to stronger presuppositional implicatures than reported above: (87) can be understood as implicating that every student has more than one sister, and (88) as implicating that no player's support was really crucial for the team. Although I am not aware of similar experimental studies on anti-presuppositions, I surmise that speakers' preferences could also lean toward strengthening the presuppositions of embedded scalars.

(87) Every student invited his sisters.
   a. Weaker Presuppositional Implicature:
   Not every student has exactly one sister
   b. Stronger Presuppositional Implicature:
   Every student hasn't exactly one sister

(88) Every player believes that his support was crucial for the team.

a. Weaker Presuppositional Implicature:
Not every player's support was crucial for the team.

b. Stronger Presuppositional Implicature:
Every player's support was non-crucial for the team.

The generation of these stronger presuppositional implicatures can be accounted for on our analysis by relying on the assumptions that proponents of the grammatical view have relied on to account for the computation of the stronger asserted implicatures in (89)-(90): these stronger presuppositional or asserted implicatures are delivered by an embedded occurrence of the exhaustivity operator. We have already seen in (81)-(82) how this result can be achieved in the case of asserted implicatures. For completeness, the case of (89) is developed below.[26]

(89) Every student wrote a paper or did a presentation.
LF: $\text{EXH}_{\mathcal{R}}$ $[_{\phi}$ [every S.]$_1$ $\text{EXH}_{\mathcal{R}}$ $[_{\psi}$ t_1 wrote a paper OR did a presentation]]

a. **Weaker Asserted Implicature (matrix EXH)**
$\text{EXCL}_{asr}(\phi)$={[[every S.]$_1$ $\text{EXH}_{\emptyset}$ [t_1 wrote a paper AND did a presentation]]}

$$[\![(89)]\!](w) = \left\{ \begin{array}{ll} 1 \text{ iff} & [\![\phi]\!](w) = 1 \wedge [\![\text{AND}]\!](w) = 0 \\ 0 \text{ iff} & [\![\phi]\!](w) = 0 \vee [\![\text{AND}]\!](w) = 1 \end{array} \right\}$$

$\approx$ whenever defined, (89) is true iff every student wrote a paper or did a presentation but not every student did both.

b. **Stronger Asserted Implicature (embedded EXH)**
$\text{EXCL}_{asr}(\psi)$={[t_1 wrote a paper AND did a presentation]}

$$[\![(89)]\!](w) = \left\{ \begin{array}{ll} 1 \text{ iff} & \text{for every S. } x, [\![\psi]\!]^{g(1/x)}(w) = 1 \wedge [\![\text{AND}]\!]^{g(1/x)}(w) = 0 \\ 0 \text{ iff} & \text{for every S. } x, [\![\psi]\!]^{g(1/x)}(w) = 0 \vee [\![\text{AND}]\!]^{g(1/x)}(w) = 1 \end{array} \right\}$$

$\approx$ whenever defined, (89) is true iff every student wrote a paper or did a presentation and no student did both

The idea here is the same as before. The LF of (90) involves two occurrences of the exhaustivity operator. The weaker reading of (90) obtains by negating the *and*-alternative of ϕ via the occurrence of EXH at matrix scope, while its stronger reading obtains by negating the *and*-alternative of ψ via the embedded occurrence of EXH.

[26] Theories of implicatures remain silent as to how free variables (pronouns, traces, etc.) should be taken into consideration when computing excludable alternatives. This question is relevant in the present case because implicatures can be computed locally and therefore we have to compute the set of excludable alternatives for embedded propositions in which variables (indices) occur freely. As an attempt to clarify the picture, I propose to refine our definition of excludable alternatives in (56) as indicated below. On this characterization, a proposition ψ of the form *[$_{\psi}$ t_1 invited his$_1$ sister]* is an excludable alternative to the prejacent ϕ *[$_{\phi}$ t_1 invited his$_1$ sisterS]* because it is possible to find some assignment function g under which both ϕ and $\sharp\psi$ are true at some possible world w.

(56) **Excludable Alternatives (Extended Version)**
$\text{EXCL}(\phi) = \{\psi \in \text{ALT}(\phi) :$ there is an assignment function $g \in D_{\langle \text{i,e} \rangle}$ and a possible world $w \in W$ such that $[\![\phi]\!]^{g,w} = 1$ and $\sharp[\![\psi]\!]^{g,w} = 1\}$

The weaker and stronger presuppositional alternatives of (87) can be derived along the same lines, as shown below.

(87) Every student invited his sisters.
LF: $\text{EXH}_{\mathcal{R}}$ [$_{\phi}$ [every S.]$_1$ $\text{EXH}_{\mathcal{R}}$ [$_{\psi}$ t_1 invited his$_1$ sisters]]

a. **Weaker Presuppositional Implicature (matrix EXH)**
$\text{EXCL}_{prs}(\phi)$={[[every S.]$_1$ $\text{EXH}_{\emptyset}$ [t_1 invited HIS_1 SISTER]]}

$$[\![(87)]\!](w) = \left\{ \begin{array}{ll} 1 \text{ iff} & \delta om([\![\text{HIS}_1 \text{ SISTER}]\!])(w) = 0 \wedge [\![\phi]\!](w) = 1 \\ 0 \text{ iff} & \delta om([\![\text{HIS}_1 \text{ SISTER}]\!])(w) = 0 \wedge [\![\phi]\!](w) = 0 \end{array} \right\}$$

$\approx$ (87) is defined only if not every student has exactly one sister; whenever defined, (87) is true iff every student invited his sister(s).

b. **Stronger Presuppositional Implicature (embedded EXH)**
$\text{EXCL}_{prs}(\psi)$={[t_1 invited HIS_1 SISTER]}

$$[\![(87)]\!](w) = \left\{ \begin{array}{ll} 1 \text{ iff} & \text{for every S. } x, \delta om([\![\text{HIS}_1 \text{ SISTER}]\!]^{g(1/x)})(w) = 0 \wedge [\![\psi]\!]^{g(1/x)}(w) = 1 \\ 0 \text{ iff} & \text{for every S. } x, \delta om([\![\text{HIS}_1 \text{ SISTER}]\!]^{g(1/x)})(w) = 0 \wedge [\![\psi]\!]^{g(1/x)}(w) = 0 \end{array} \right\}$$

$\approx$ (87) is defined only if every student hasn't exactly one sister; whenever defined, (87) is true iff every student invited his sisters.

In (a), the presuppositional implicature is computed globally. The application of EXH delivers in this case the anti-presupposition that not every student has exactly one sister, which corresponds to the negation of the presupposition of ϕ's singular presuppositional alternative. In (b), on the other hand, the presuppositional implicature is computed locally, below the universal. The application of EXH delivers in this case the anti-presupposition that x hasn't exactly one sister, where x is bound in the course of the derivation by the universal, delivering the final result that for every student x, x hasn't exactly one sister.

2.4 Synthesis

Building upon Magri (2009)'s proposal, I have argued that anti-presuppositions do not constitute a class of phenomena distinct from implicatures and conventional presuppositions: rather, they are both implicatures and presuppositions. Just like asserted implicatures, these implicatures can be computed at different embedded levels in accordance with the syntactic distribution of the exhaustivity operator. However, unlike asserted implicatures, these implicatures *are* presuppositions. We have seen that once their status of implicatures is also acknowledged, the projective behavior of these implicatures reduces to that of conventional presuppositions: they project through negation and they (can) project universally across a universal. Finally, I have addressed in this chapter certain issues previously encountered by Magri (2009)'s proposal. The minimal theoretical move I have advocated for was shown to preserve Magri's core results while avoiding the drawbacks that follow from computing implicatures in the domain of presupposition and assertion separately.

THIS PAGE INTENTIONALLY LEFT BLANK

Chapter 3

NP modification and Restrictiveness

Summary This chapter is concerned with the semantics and pragmatics of subsective (i.e., subsective or intersective) modification in the NP domain (e.g., *the French president*, *the student from Paris*, *the guy who dates Sue*). Semantically, an NP N subsectively modified by a modifier M simply denotes a subset a what N denotes. It has been long observed however that that subsective NP modification gives rise to a stronger result: a modified NP is often interpreted as denoting a proper subset of the denotation of the unmodified NP. For example, upon hearing a sentence such as *John's brown-haired brother has arrived*, we spontaneously understand the addition of *brown-haired* as restricting the denotation of *John's brother(s)*, and infer that John has at least two brothers, only one of which is brown-haired. Sentences in which the use of such a modifier fails to be restrictive in this sense are perceived as odd, e.g. #*John's brown-haired father has arrived*. In this chapter, I defend the view that the restrictiveness of NP modification comes about as a result of an implicature, and propose an account of the oddity effects associated with subsective, yet non-restrictive, NP modifiers along the lines of Magri (2009, 2011, 2014). This implicature-based approach to NP modification will be shown to provide an adequate characterization of the semantic contribution of NP modifiers across DP environments, and to disentangle their true modifier use from their superficially similar appositive use.

Keywords: NP modification, restrictiveness, appositives, relevance, implicatures

3.1 The Restrictiveness Puzzle

This chapter is concerned with the semantics and pragmatics of subsective (i.e., subsective or intersective) modification in the NP domain. This phenomenon is exemplified by the nominal constructions in (1).

(1) *Examples of Subsective NP Modification*

a.	$[_{\text{NP}\langle\sigma\rangle}\ [_{\text{AP}}$ skillful$]\ [_{\text{NP}\langle\sigma\rangle}$ politician$]]$	$[\![\text{skillful politician}]\!] \subseteq [\![\text{politician}]\!]$
b.	$[_{\text{NP}\langle\sigma\rangle}\ [_{\text{PartP}}$ arrested$]\ [_{\text{NP}\langle\sigma\rangle}$ criminal$]]$	$[\![\text{arrested criminal}]\!] \subseteq [\![\text{criminal}]\!]$
c.	$[_{\text{NP}\langle\sigma\rangle}\ [_{\text{NP}\langle\sigma\rangle}$ student$]\ [_{\text{PP}}$ from Paris$]]$	$[\![\text{student from Paris}]\!] \subseteq [\![\text{student}]\!]$
d.	$[_{\text{NP}\langle\sigma\rangle}\ [_{\text{NP}\langle\sigma\rangle}$ man$]\ [_{\text{CP}}$ who loves Sue$]]$	$[\![\text{man who loves Sue}]\!] \subseteq [\![\text{man}]\!]$

Descriptively, *NP modification* is what we observe when an NP N (e.g., *politician*), denoting an unsaturated expression, composes with another expression M (e.g., *skillful*) to form another another NP of the same semantic type as N (e.g., *skillful politician*). We say that NP modification is *subsective* just in case the meaning delivered by the composition of M and N is a subset of the meaning of N (e.g., $[\![\text{skillful politician}]\!] \subseteq [\![\text{politician}]\!]$). This definition encompasses intersective NP modification which is a particular case of subsectivity where the meaning delivered by the composition of M and N is a subset of the meaning of N and a subset of the meaning of M (e.g., $[\![\text{French politician}]\!] \subseteq [\![\text{French}]\!]$). Following these clarifications, the notion of subsective NP modification can be formally defined as follows:

(2) *Subsective NP Modification (Subsectivity)*
An expression M subsectively modifies an NP N if and only if M composes with N and, for all tuples of parameters i, $[\![[M\ N]]\!]^i \subseteq [\![N]\!]^i$.

This definition captures the compositional characteristics of the relevant modifiers in the examples in (1). In particular, it distinguishes the modifier use of these phrases from other predicative (e.g., *the president is skillful*) and appositive (e.g., *the president, who is skillful*) uses that these phrases can have and which rely on distinct modes of composition.[1] It further distinguishes these modifiers from intrinsically non-subsective modifiers such as ordinary non-subsective adjectives (e.g., *alleged politician*) and privative adjectives (e.g., *fake gun*), whose lexical properties are incompatible with subsective interpretations.

The starting point of this chapter is the observation that the notion of subsectivity defined in (2) is insufficient to account for the interpretative effects usually associated with the use of subsective modifiers. Consider the following example:[2]

[1] One might claim that appositives (e.g., *The president, who is skillful, arrived*) are just instances of subsective modifiers in a context where common ground ensures that intersection leads to a meaning equivalent to that of the head noun. Counter-arguments to this claim will be presented in the next sections (see in particular Section 3.2.2). The syntax and semantics of appositives will be discussed in Section 3.3.3.

[2] Some of the data presented in this introductory section are modeled after Schlenker (2005a)'s examples. Schlenker's analysis of these data is discussed in Section 3.2.

(3) John's brown-haired brother has arrived.
Inference: John has at least two brothers

Following standard rules of composition, this sentence is true if and only if the unique individual who is a brother of John and who is brown-haired has arrived. On these truth-conditions, (3) is acceptable and true in a situation where John has a unique brother, who is brown-haired and who has arrived. In interpreting this sentence, however, speakers tend to rule out this logical possibility: they tend to interpret the modifier *brown-haired* as restricting in effect the denotation of the unmodified NP, and infer that John has at least two brothers, only one of which is brown-haired. The robustness of these effects is further exemplified by the minimal contrasts in (4).

(4) **Restrictiveness Effects**

a. (i) John's brown-haired brother has arrived.
(ii) #John's brown-haired father has arrived.

b. (i) John's best friend is Mary.
(ii) #John's best mother is Sue.

c. (i) The French President is a former banker.
(ii) #The tall French President is a former banker.

In each of these minimal pairs, the (a) and (b)-sentences give rise to comparable restrictiveness effects, which translate into anti-uniqueness inferences (e.g., John has at least two brothers); in the case of the (b)-sentences, the interpretation following from this inference conflicts with speakers' common assumptions about the world, hence their oddness. That is, sentences of (4-a-ii)/(4-b-ii) are perceived as odd unless one makes the less usual assumption that John has several fathers/mothers (e.g., John is an adopted child and has a natural and an adoptive father/mother). Taken at face value, the contrasts in (4) suggest that the interpretation of subsective modifiers yields a stronger result than that delivered by the standard rules of composition. Specifically, they suggest that subsective NP modifiers are interpreted as restricting in effect the denotation of the NP they modify. One way to capture these interpretative effects at this point could simply be to stipulate that the interpretation of subsective NP modification proceeds as indicated in (5).[3]

(5) *Interpretation of Subsective NP Modification (Proper Subsectivity)*
An expression M that subsectively modifies an NP N is interpreted as restricting the denotation of N, i.e. for all tuples of parameters i, $[\![[M\ N]]\!]^i \subset [\![N]\!]^i$.

Yet further observations from Schlenker (2005a) suggest that this conclusion might be too hasty. In some cases, the restrictiveness effects we observed in (4) disappear, as illustrated in (6). In particular, Schlenker observes that adjectives that have an ex-

[3]Note that (5) is not in itself a semantic rule: (5) does not determine the denotation of $[M\ N]$ given the denotations of M and N, it merely imposes a constraint on it. The actual rule could be formulated by modifying the rule for intersective modifiers, Predicate Modification, so that (5) in fact comes out true. This could be done for instance by imposing that the result of combining M and N via Predicate Modification be defined if and only if, for all tuples of parameters i, $[\![\mathrm{M}]\!]^i \cap [\![\mathrm{N}]\!]^i \neq [\![N]\!]^i$.

pressive component need not be interpreted as restrictive, (6-a)-(6-c). Standard cases of expressives involve epithets like *stupid* or *handsome*, which specify the speaker's negative or positive attitude towards an individual or a group of individuals. Crucially, as Schlenker himself pointed out, the obviation of these effects is not specific to expressives. Under the appropriate conditions (which remain to be determined), adjectives like *brown-haired* or *handicapped* can behave in the exact same way although their content is clearly descriptive, (6-d)-(6-f).[4]

(6) **Missing Restrictiveness Effects**

a. John's idiotic father has arrived.
b. The stupid French President made important mistakes.
c. Sue met Mary's handsome husband.
d. This shampoo isn't just for blond people: John's brown-haired father uses it everyday, and he said it's fine.
e. Sue didn't find appropriate accommodations for her handicapped father.
f. I know who Mary's conservative mother is gonna vote for.

The research question that I address in this chapter is the following: what is the source of the restrictiveness effects in (4), and why do these effects disappear in (6)? This twofold question, covering both the generation and the distribution of the relevant effects, is what I will henceforth call the restrictiveness puzzle. The solution to this puzzle that I offer comes in two parts. First of all, following recent suggestions from Leffel (2014) (see also Morzycki, 2008), I propose that pre-nominal 'modifiers' are structurally ambiguous in English between a truly modifier use and an appositive use, each of which relies on a distinct mode of composition and delivers distinct LF outputs, as exemplified in (7).

(7) **Modifier vs. Appositive Construal**
John's stupid brother arrived.

a. $[_{\text{DP}}\ [+def]\ [_{\text{NP}}\ [_{\text{AP}}$ stupid$]\ [_{\text{NP}}$ brother (of) John$]]]$ arrived (MODIFIER)
$\approx$ The brother of John that is stupid has arrived.
Reading: the individual who is a brother of John and stupid arrived

b. $[_{\text{DP}}\ [_{\text{AP}}$ stupid$]\ [_{\text{DP}}\ [+def]\ [_{\text{NP}}$ brother (of) John$]]]$ arrived (APPOSITIVE)
$\approx$ John's brother, who is stupid, arrived.
Reading: John's brother is stupid and John's brother arrived

The reading in (7-a) corresponds to the reading delivered by the standard rules of composition: the AP *stupid* composes with the NP *brother of John* by Predicate Modification, and then the whole subject DP composes with the VP by Functional Application. The reading in (7-b), on the other hand, requires another mode of composition allowing the definite DP to compose first with the AP and then with the VP via Functional Application. To illustrate how such a result could be achieved, I will

[4]The examples in (6-d) and (6-e) were suggested to me by D. Fox and D. Pesetsky, respectively.

simply posit for now another rule of composition, (8), coined Predicate Apposition.[5] By this rule, the whole DP *John's brother* (rather than the NP) can directly compose with the AP *stupid* to form a separate appositive clause (roughly, *John's brother is stupid*), while its assertive component is left unchanged and thus remains available for the rest of the derivation, which proceeds as usual. As far as the notation goes, the semantic representation of a proposition p (of semantic type $\langle \mathrm{w}, \mathrm{t} \rangle$) will be noted as '$\lambda w.\phi^p(w) : \underline{\psi^p(w)}.\chi^p(w)$' where ϕ^p is p's presuppositional content, $\underline{\phi^p}$ its appositive content and χ^p its assertive content.

(8) *Predicate Apposition (modeled after Leffel, 2014)*
Let α be of type $\langle \sigma, \mathrm{t} \rangle$, β be of type $\langle \sigma \rangle$ and assume XP is not a clausal syntactic category. For any possible world w: $[\![[_{\mathrm{XP}}\ \alpha\ \beta]]\!]^w = \ : \underline{[\![[\alpha\ \beta]]\!]^w}.\ [\![\beta]\!]^w$

Throughout this chapter, I will assume a unidimensional representation of semantic content that is rich enough to distinguish in a principled way the appositive content of an utterance from both its presupposed and its asserted content, as illustrated in (9). On this conceptualization, the separate 'appositive' clause formed by the compositional mechanisms at work in interpreting an appositive construal is stored in a dedicated 'appositive' tier of the semantic representation. The rationale for this formal separation will be made clear in the following when we discuss how relevance considerations apply to the presuppositional vs. appositive vs. asserted content of a semantic representation.[6]

(9) **Three-Tiered Structure of Semantic Content**
Context favoring an appositive construal: someone just claimed that every blond person at the party left; the speaker begs to disagree and says:
Mary's blond mother didn't leave.
SS: $[_{\mathrm{TP}}$ NEG $[_{\mathrm{TP}}\ [_{\mathrm{DP}}\ [_{\mathrm{AP}}$ blond$]\ [_{\mathrm{DP}}\ [+def]\ [_{\mathrm{NP}}$ mother (of) Mary$]]]$ leave$]]$
$[\![\mathrm{TP}]\!]^w = \exists!x[[\![\mathrm{mother}]\!]^w(m)(x)] : \underline{[\![\mathrm{blond}]\!]^w(\sigma x.\ [\![\mathrm{mother}]\!]^w(m)(x))}.\ \neg[\![\mathrm{leave}]\!]^w(\sigma x.\ [\![\mathrm{mother}]\!]^w(m)(x))$

a. Presupposition: $\exists!x[[\![\mathrm{mother}]\!]^w(m)(x)]$ $\approx$ M has only one mother in w
b. Appositive: $[\![\mathrm{blond}]\!]^w(\sigma x.\ [\![\mathrm{mother}]\!]^w(m)(x))$ $\approx$ M's mother is blond in w
c. Assertion: $\neg[\![\mathrm{leave}]\!]^w(\sigma x.\ [\![\mathrm{mother}]\!]^w(m)(x))$ $\approx$ M's mother didn't leave in w

[5] The rule (8) is modeled after Leffel (2014)'s Type Mismatch Adjustment Principle for non-restrictive adjectival modification (see Leffel, 2014, Chapter 3, Section 3.4). Section 3.3.3 will discuss a second analytical option for capturing the syntax and semantics of appositive construals directly based on Del Gobbo (2003)'s analysis of their overt counterparts, namely appositive relative clauses.

[6] Let me briefly clarify here my proposal regarding the semantic and pragmatic contribution of appositives. The core idea is that appositives share some features with conventional presuppositions but yet do not reduce to conventional presuppositions. Specifically, appositives resemble presuppositions in that they project in a way similar to presuppositions (e.g., appositives project past negation), as exemplified in (9); however, I suggest that, unlike presuppositions, appositives do not impose pre-conditions on the state of the common ground: their contribution to the truth-conditions of a sentence is treated on a par with the assertive content of this sentence, see (10). I will propose in Section 3.3.3 that the distinction between appositives and assertions is to be rooted in their distinct discourse-oriented purposes: the informative content of an appositive must be relevant to a side-question that relates to the asserted content in a discourse-coherent fashion.

For completeness, the truth-conditional contribution of appositives is stated in (10).[7] On this definition, the proposition delivered by the LF in (9) is defined at a context C only if its presupposed content, i.e., *Mary has only one mother*, is satisfied in C. Whenever defined, this proposition is true at a world w if and only if the propositions *Mary's mother is blond* and *Mary's mother didn't leave* are both true in w.[8]

(10) **Three-Tiered Semantic Content: Truth-Conditions**
Let ϕ be any partial proposition whose three-tiered semantic content is identified left-to-right at LF as $presuppose^{\phi}$, $appositive^{\phi}$ and $assert^{\phi}$.

$$[\![\phi]\!] = \lambda w. \left\{ \begin{array}{l} 1 \text{ if } presuppose^{\phi}(w) = 1 \wedge (appositive^{\phi}(w) = 1 \wedge assert^{\phi}(w) = 1) \\ 0 \text{ if } presuppose^{\phi}(w) = 1 \wedge (appositive^{\phi}(w) = 0 \vee assert^{\phi}(w) = 0) \end{array} \right\}$$

I argue that the availability of an appositive reading for the nominal constructions at hands plays a crucial role in explaining the distribution of the restrictiveness effects. Specifically, I argue that cases in which the restrictiveness effects appear to be missing, as in (6), are in fact cases where these effects are present but hidden by the availability of an appositive reading, (11). The presence of these effects can be truly revealed by the use of restrictive relative clauses which, unlike pre-nominal adjectives, can only be construed as NP modifiers. Crucially, in contrast to their appositive counterparts in (ii), the restrictive constructions in (i) are irremediably deviant.

(11) **Missing Restrictiveness Effects:** #MODIFIER, OKAPPOSITIVE

a. The stupid French President is a former banker.
   (i) #The French President that is stupid is a former banker.
   (ii) OKThe French President, who is stupid, is a former banker.

b. I know who Sue's conservative mother will vote for.
   (i) #I know who Sue's mother that is conservative will vote for.
   (ii) OKI know who Sue's mother, who is conservative, will vote for.

[7] The definition in (10) is framed in a partial approach to presupposition projection (see Chapter 2 for discussion). On this approach, the presuppositions of a sentence is to be thought of as the propositions that need to be true in order for this assertion to have a truth-value, i.e. to denote either 0 or 1. As usual, the computation of truth-values is related to actual language use by means of the pragmatic principle in (i) (Stalnaker's Bridge Principle) that requires an a proposition to be either true or false in each of the worlds of the current context set.

(i) **Assertability Condition**
An utterance of ϕ is felicitous at a context set C (i.e., a set of possible worlds) only if for all $w \in C$, ϕ receives either the value 0 or the value 1 in w.

[8] It is predicted on this approach that hearers cannot directly call into question the appositive content of a proposition by using a genuine expression of disagreement like *No!* or *I disagree!* since appositives project. With this respect, appositives behave very much like presuppositions and unlike assertions. However, it is hypothesized that a sentence can be judged as felicitous but false if its presuppositions are true but its appositive content is false (I am setting aside here the particular case of evaluative adjectives/epithets). For instance, a sentence like *John Smith, who lives in NYC, will be visiting Boston* is predicted to be defined but false if John Smith doesn't live in NYC.

On the other hand, we observe that the sentences in (4) are also deviant under their appositive reading, (12). Intuitively, the deviance of these sentences under their appositive construals comes from the fact that, in these cases, the appositive clause (e.g., *Sue's mother is brown-haired* vs. *Sue's mother is conservative*) provides some descriptive information that is hard to relate in a coherent fashion to the rest of the sentence (e.g., *I know who Sue's mother will vote for*) in the absence of further contextual indications.

(12) **Restrictiveness Effects:** #MODIFIER, #APPOSITIVE

a. #The tall French President is a former banker.
   (i) #The French President that is tall is a former banker.
   (ii) #The French President, who is tall, is a former banker.

b. #I know who Sue's brown-haired mother will vote for.
   (i) #I know who Sue's mother that is brown-haired will vote for.
   (ii) #I know who Sue's mother, who is brown-haired, will vote for.

In sum, I claim that the deviance of sentences like (12-a)-(12-b) is really twofold: (a) their modifier construal is perceived as odd because it gives rise to a restrictive interpretation that conflicts with common knowledge, and (b) their appositive construal is perceived as odd because it delivers a piece of information that is perceived as irrelevant. From this stage, the core of my analysis focuses on explaining the *raison-d'être* of these two phenomena. To begin with, I propose that the restrictiveness inference associated with the interpretation of subsective NP modifiers comes about as a result of an implicature, which is derived as shown in (13).[9]

(13) **Modifier Construal: Restrictiveness via Implicature**
John's stupid brother arrived.
SS: $\text{EXH}_{\mathcal{R}}$ $[_{\phi}$ $[_{\text{DP}}$ $[+def]$ $[_{\text{NP}}$ $[_{\text{AP}}$ stupid] $[_{\text{NP}}$ brother (of) John]]] arrived]
FACT: $[\![\phi]\!] \not\Rightarrow$ John's brother arrived

a. Excludable Alternative: John's brother arrived
$\text{EXCL}_{prs}(\phi) \supseteq \{[_{\psi}$ $[_{\text{DP}}$ $[+def]$ $[_{\text{NP}}$ brother of John]] arrived]$\}$

b. Sentence with its Presuppositional Implicature: Anti-Uniqueness

$$[\![\text{EXH}_{\mathcal{R}}\ \phi]\!](w) = \left\{ \begin{array}{ll} 1 \text{ iff} & \delta om([\![\psi]\!])(w) = 0 \wedge [\![\phi]\!](w) = 1 \\ 0 \text{ iff} & \delta om([\![\psi]\!])(w) = 0 \wedge [\![\phi]\!](w) = 0 \end{array} \right\}$$

   (i) $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!]$ presupposes that John has a brother but not exactly one
   (ii) $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!]$ entails that John has at least two brothers, only one of which is stupid, and that John's stupid brother arrived

On its modifier construal, a sentence like *John's stupid brother arrived*, i.e. the prejacent of the exhaustivity operator $\text{EXH}_{\mathcal{R}}$ in (13), has the sentence *John's brother arrived* as a presuppositional alternative. Upon exhaustification, the negation of the (maximal) presupposition of this alternative is added to the semantic representation of the prejacent of $\text{EXH}_{\mathcal{R}}$. The result of this strengthening is an anti-uniqueness en-

[9] I refer the reader to Chapter 2 for a description of the formal system used in this chapter.

tailment (i.e., John has at least two brothers), similar in essence to that resulting from the meaning strengthening of indefinite singular DPs (e.g., *A brother of John arrived*). Crucially, this implicature does not arise if the epithet *stupid* is rather construed as an appositive. On this construal, the sentence *John's brother arrived* is not an excludable alternative because it is logically entailed by the prejacent of $\text{EXH}_{\mathcal{R}}$:

(14) **Appositive Construal: No Implicature, No Restrictiveness**
John's stupid brother arrived.
SS: $\text{EXH}_{\mathcal{R}}[_{\phi}\ [_{\text{DP}}\ [_{\text{AP}}\ \text{stupid}]\ [_{\text{DP}}\ [+def]\ [_{\text{NP}}\ \text{brother (of) John}]]]\ \text{arrived}]$
FACT: $[\![\phi]\!] \Rightarrow$ John's brother arrived

I will propose that the oddness of sentences like $^{\#}$*John's brown-haired father arrived*, on their modifier construal, is to be accounted for along the lines of Magri (2009, 2011, 2014). Specifically, following Magri's proposal, I assume that the computation of excludable alternatives is blind to common knowledge, and that excludable alternatives that are contextually equivalent to the prejacent of an exhaustivity operator give rise to mandatory implicatures. On these assumptions, the oddness of these sentences can be accounted for by the fact that their strengthened meaning is contextually contradictory. The basic reasoning leading to this result is schematically described in (15).[10]

(15) $C \subseteq$ *John has exactly one father, who is brown-haired* $(\phi \Leftrightarrow_C \psi)$
$^{\#}$John's brown-haired father arrived

a. SS: $\text{EXH}_{\mathcal{R}}[_{\phi}\ [_{\text{DP}}\ [+def]\ [_{\text{NP}}\ [_{\text{AP}}\ \text{brown-haired}]\ [_{\text{NP}}\ \text{father (of) J.}]]]\ \text{arrived}]$
b. $\text{EXCL}_{prs}(\phi) \supseteq \{[_{\psi}\ [_{\text{DP}}\ [+def]\ [_{\text{NP}}\ \text{father (of) J.}]]\ \text{arrived}]\}$
c. $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!] \Rightarrow$ $^{\#}$John doesn't have exactly one father
Therefore, $C \cap [\![\text{EXH}_{\mathcal{R}}\ \phi]\!] = \emptyset$

Second, I propose that these sentences remain odd on their appositive construal because their appositive content is perceived as irrelevant. The notion of relevance that we will build on to characterize speakers' judgments for these sentences is relevance to a question. This notion is usually defined in the literature as in (16).[11]

(16) **Relevance (to a question)**
Let Q be a partition of the set of all possible worlds. A proposition p is Q-relevant iff for any cell $q \in Q$ and any two worlds $w, w' \in q$, $p(w) = p(w')$, i.e. p does not distinguish between two worlds within a cell of Q.

[10] This line of explanation is very similar to that I have developed in Chapter 2 to account for the oddness of sentences like $^{\#}$*A father of John arrived* whose strengthened meaning comes with an anti-presupposition (i.e., John does not have exactly one father) that contradicts common knowledge. In all these cases, the anti-presupposition delivered by the application of the exhaustivity operator cannot be satisfied in context and therefore the proposition suffers from presupposition failure.

[11] This definition assumes that a (root) question Q denotes or induces a partition of the set of possible worlds, which corresponds to the set of possible complete answers to this question. As usual, a partition π of some set P is a set of non-empty subsets of P s.t. (i) the union of those subsets equals P, and (ii) the intersection of any two (non-equivalent) subsets is empty.

This notion of relevance proves useful to capture certain contrasts like this in (17). Although both (17-a) and (17-b) provide a complete answer to Q, (17-a) sounds natural while (17-b) sounds odd. (16) allows us to account for this contrast: (17-b) unlike (17-a), is not Q-relevant; that is, (17-b) provides 'too much' information relative to Q, and it is this excess of information that is perceived as odd by speakers.

(17) Q: Did John arrive?

a. John arrived. (✓Relevance)

b. #John arrived and it is sunny. (✗Relevance)

My proposal is that sentences like #*John's brown-haired father arrived*, on their appositive construal this time, suffer from the same defect of relevance: they provide an additional information, e.g. John's father is brown-haired, that is perceived as irrelevant to the (implicit or explicit) question under discussion that the whole sentence aims at addressing (e.g., *What just happened?*, *Who arrived?*, *What did John's father do?*, *Did John's father arrive?*). On this proposal, the empirical question we will have to address concerns the dividing line between 'more' information and 'too much' information in the case of appositives and the like (e.g., parenthetical clauses, supplements). The dilemma is illustrated by the minimal contrasts in (18).

(18) Q: Who arrived?

a. (i) John's stupid father.
   (ii) #John's brown-haired father.

b. (i) John's father (he's so lame).
   (ii) #John's father (Mary's so lame).

c. (i) John's father arrived: he is wearing pyjamas.
   (ii) #John arrived: it is sunny outside.

On the one hand, if the appositive content of a semantic representation were just exempt from Relevance, all the sentences in (18) should be fine, i.e. adding the information *John's father is stupid* should be just as good as adding the information *John's father is brown-haired*. On the other hand, if the appositive content of a proposition were treated on a par with the asserted content with respect to Relevance, all the sentences in (18) should be odd, i.e. adding the information *John's father is stupid* is just as superfluous relative to Q as adding the information *John's father is brown-haired*. Building upon the definition of Relevance in (16), the solution that I offer is that the appositive content of a proposition ϕ, noted $appositive^{\phi}$, is perceived as relevant only if if for every proposition p in $appositive^{\phi}$, it is possible for the addressee(s) to accommodate a side-question Q' such that p is Q'-relevant and Q' is a coherent side-question to the asserted content of ϕ. The formulation of this requirement is given in (19) (see (90) for a complete characterization).

(19) **Relevance Requirement on Asserted and Appositive Content**
A proposition ϕ is relevant given a question Q iff $assertion^{\phi}$ is Q-relevant and, for every proposition p in $appositive^{\phi}$, there is a discourse-coherent follow-up question Q' to $assertion^{\phi}$ s.t. p is Q'-relevant.

It follows from (19) that, in cases where the addressee(s) cannot figure out what coherent side-question an appositive is intended to address, the additional information provided by the content of this appositive will always be deemed superfluous relative to the question under discussion, and therefore perceived as deviant by the addressee(s). This analysis, exemplified in (20), will be shown to capture the remaining contrasts like (11) vs. (12) (see also (4) vs. (6)) that we were interested in, and thus to provide us with the last piece we need to solve the restrictiveness puzzle.

(20) **Appositive Construal: Relevance Requirement**
Q: Who were you talking politics with?
A: I was talking politics with Mary's mother.

a. Discourse-coherent follow-up questions
Q': ^{OK}And what's her political orientation?
Q': ^{OK}And do you like her?/Is she interesting?

b. Discourse-incoherent follow-up questions
Q': #And what's her hair color?
Q': #And what's her height?

c. Relevance I was talking politics with...
(i) Mary's conservative/liberal mother.
Mary's mother, who is conservative/liberal. (✓Relevance)
(ii) Mary's stupid/awesome mother.
Mary's mother, who is stupid/awesome. (✓Relevance)
(iii) #Mary's brown-haired/blond mother.
#Mary's mother, who is brown-haired/blond. (✗Relevance)
(iv) #Mary's tall/short mother.
#Mary's mother, who is tall/short. (✗Relevance)

The rest of this chapter is organized as follows. In the next section, I start by discussing the solution to the restrictiveness puzzle previously offered in Schlenker (2005a). I will discuss the insights the present approach borrows from Schlenker (2005a)'s proposal, and the reasons why it departs from it. The core of my proposal is presented in Section 3.3. The first part will focus on explaining how the restrictiveness effects associated with subsective NP modification can be derived in grammar via exhaustivity; the second part will be mostly concerned with the linguistic signature of adjectival appositives. Section 3.4 offers a synthesis of the solution.

3.2 Schlenker (2005a)'s Solution: Scope and Limits

3.2.1 *Minimize Restrictors!*

A solution to the restrictiveness puzzle has been previously offered in Schlenker (2005a). In substance, Schlenker proposes to account for the basic contrasts in (4)-(6) by means of a single principle, called *Minimize Restrictors!*, that rules out the use

of redundant linguistic materials within the restrictor of definite descriptions.[12] By this minimization principle, an expression M that modifies an NP N within the restrictor of a definite description is deviant if M is superfluous, that is if M fails to be restrictive (i.e., if for all tuples of parameters i, $[\![[M\ N]]\!]^i = [\![N]\!]^i$) and serves no other purpose. This principle is given in (21), as originally stated in Schlenker (2005a).[13]

(21) ***Minimize Restrictors!*** (Schlenker, 2005a, (13)/(52))
A description *the A B* [where the order of A and B is irrelevant] is deviant if A is redundant, i.e. if (i) *the B* is grammatical and has the same reference as *the A B*, and (ii) A does not serve another purpose.

Although Schlenker's original formulation only applies to definite descriptions, it is my understanding that *Minimize Restrictors!* could in principle be reworded to generalize to all DPs. This is the goal of my reformulation in (22). This reformulation will prove useful when we consider additional nominal constructions involving other quantificational expressions. In the following, I will keep using the term coined by Schlenker, i.e. 'Minimize Restrictors!', to refer to either versions.

(22) ***Extended Minimize Restrictors!*** (modeled after Schlenker (2005a))
A DP of the form *Det A B* [where the order of A and B is irrelevant] is deviant if A is redundant, i.e. if (i) *Det B* is grammatical and have the same denotation as *Det A B*, and (ii) A does not serve another purpose.

To understand the explanatory scope of *Minimize Restrictors!*, consider the paradigms in (23)/(24), adapted from Schlenker (2005a, (12)/(7)), that synthesize our main observations so far:

(23) a. #John's brown-haired father has arrived.
b. John's brown-haired brother has arrived.
c. John's idiotic father has arrived.
d. This shampoo isn't just for blond people:
John's brown-haired father uses it everyday, and he said it's fine.

(24) a. #The small French President made important mistakes.
b. The small President made important mistakes.
c. The stupid French President made important mistakes.
d. Small politicians always make important mistakes:
the small French President makes big mistakes all the time.

[12] For completeness, I note here that Schlenker (2005a)'s primary goal is to show how *Minimize Restrictors!* can derive the standard cases of Condition C of Chomsky's Binding Theory and account for some notorious exceptions to it. The possibility to account for the restrictiveness puzzle by means of this principle is presented as an independent (i.e., binding-unrelated) evidence in support of this main claim. It is this part of Schlenker's proposal that is examined in this section.

[13] Schlenker (2005a) suggests that *Minimize Restrictors!* may result from a pragmatic principle along the lines of Levinson (1987)'s 'Maxim of Minimization' (see also Horn (1984)'s 'Minimization of Form'): *Produce the minimal linguistic clues sufficient to achieve your communicational ends.* For the time being, I will leave these considerations aside as my purpose here is simply to evaluate the explanatory power of Schlenker's principle for the puzzle at hands.

On Schlenker's proposal, the deviance of the (a)-sentences can be attributed to the redundancy of the (restrictor of the) description they involve. In (23-a), for instance, unless one assumes that John has several fathers, the modifier *brown-haired* can be dropped without affecting the denotation of the whole description. Furthermore, unless one assumes that the speaker has a specific interest in people's hair color, this modifier is unlikely to produce any significant pragmatic effect (compare with (23-d) for instance). As a result, the description *John's brown-haired father* is deemed deviant by *Minimize Restrictors!*; similar observations hold for the description *the small French President* in (24-a).

By contrast, each of the descriptions in the (b)-(d) sentences obeys *Minimize Restrictors!*. In the (b)-sentences, the modifiers *brown-haired*/*small* are naturally understood as having a restrictive contribution; e.g., in (23-b), it is understood that John has several brothers, exactly one of whom is brown-haired. Of course, if these modifiers fail to be restricting (e.g., it is known that John has a single brother), then the corresponding descriptions are predicted to become deviant, just like these in (23-a)/(24-a). Eventually, in the (c) and (d)-sentences, although the relevant modifiers are 'referentially irrelevant' in the sense of Schlenker, they can be understood as serving another purpose. For instance, the use of *idiotic* in (24-c) provides information about the speaker's negative attitude towards John's father; arguably, *brown-haired* is used in (24-d) to force the addressee to acknowledge the information that brown-haired people like John's father can also use the shampoo.

In sum, *Minimize Restrictors!* predicts that a definite description is deviant unless its informative content is maximally minimized. By this injunction, the definite descriptions in (23-a) and (24-a) are ruled out because of the availability of a more minimally restricted description, i.e. *John's father* and *the French President*, with (i) the same reference and (ii) the same pragmatic effect. As I mentioned above, although *Minimize Restrictors!*'s original formulation is specifically calibrated for definite descriptions, it can be slightly amended to extend to all DPs. This can be done without any loss of generality by reformulating the notion of 'same reference' (proper to referential expressions) in terms of denotational equivalence, as proposed in (22). Empirical motivations for this theoretical move come from the observation that the contrasts observed in (23)-(24) with definite descriptions replicate with non-referential DPs, as exemplified by the paradigm in (25).[14] The examples in (25-c)-(25-d) are observations from Leffel (2014, (5.40) and (5.41)).

(25) **Restrictiveness Effects with non-referential DPs**
Indication 1: As of 2017, all the French Presidents have been white people; yet only some of them have been left-wing. Indication 2: Chemicals may, but need not, damage our health; a toxin, however, is a poisonous substance.

a. #Every white French President has supported neoliberal practices.

b. Every left-wing French President has supported neoliberal practices.

[14] As we will later see, this observation does not hold *stricto sensu* of all DPs. In particular, we will see that subsectively modified NPs embedded within indefinite DPs appear to escape this generalization. The point for now is simply to observe that the contrasts in (23)-(24) replicate in (25), suggesting that a generalized version of Schlenker's principle is desirable.

c. Every harmful chemical will be eliminated by this product.
d. Every harmful toxin will be eliminated by this product.

Extended Minimize Restrictors! can account for these contrasts. In essence, the explanation for the deviance of (25-a) is the same as this offered for (23-a) and (24-a) above: the addition of *white* here has no denotational effect and does not seem to serve any other purpose. The sentences in (25-b) and (25-c), by contrast, are cases where the NP modifiers *left-wing*/*harmful* are understood as having a truth-conditional effect by narrowing down the denotation of the NP they modify. Finally, in (25-d), *harmful* need not be interpreted as restricting in effect the denotation of *toxin* (on the assumption that all toxins are harmful); in this case, it can be argued that its use is intentionally redundant: the speaker wants to remind the addressee that toxins are harmful, and thus that it is a good thing that the product can eliminate them all.[15]

3.2.2 Empirical Issues

On Schlenker's proposal, the restrictiveness effects are to be analyzed as redundancy effects: a modifier is deemed deviant whenever it can be dropped without changing the denotation and the pragmatic effect of the description (or DP) in which it occurs. While this proposal accounts for the basic contrasts that we have seen so far, I show in the following that it suffers from sub-generation and over-generation issues.

Relative Clauses vs. Adjectives The first issue concerns the obviation of the restrictiveness effects (e.g., (6), (23-c)-(23-d), (24-c)-(24-d), (25-d)). On Schlenker's analysis, the obviation of these effects in sentences like *The stupid French President has arrived* or *John's brown-haired father uses this shampoo everyday* is to be attributed to the fact that the modifiers, although referentially irrelevant, provide some other kind of pragmatic information. What we will now see is that this line of explanation leads to sub-generation issues: it fails to predict that relative clauses, unlike pre-nominal adjectives, systematically give rise to restrictiveness effects, regardless of their pragmatic contribution. Let us first observe that, in principle, the semantic contribution of an NP modifier like *brown-haired* can be explicitly paraphrased by

[15]The fact that the use of *harmful* in (25-d) can be intentionally redundant does not mean that it has to be, even on the assumption that toxins are harmful. As D. Fox pointed out to me, *harmful* can also be interpreted as restricting in effect the denotation of *toxin* here: since *harmful* is a degree expression, whether toxins are harmful ultimately depends on how vagueness is resolved. Another way to get the intuition that (25-d) aims to convey is to use evaluative terms. For instance, a sentence like *You must fire every back-stabbing communist immediately* (from D. Fox) is acceptable in a context where it is commonly accepted by the interlocutors that every communist is a backstabbing person. The examples below, from Larson and Marušič (2004, (31)-(32)) and Morzycki (2008, (6)), make the same point, allowing both a restrictive and a non-restrictive interpretation of the relevant modifiers. These examples will be discussed later in (73).

(i) a. Every unsuitable word was deleted.
b. Every blessed person was healed.
c. Every needless and thoroughly reprehensible war crime should be prosecuted.

means of a relative clause (henceforth, RC), i.e. *that is brown-haired*. Suppose that John has several brothers, only one of which is brown-haired. The thought that his brown-haired brother arrived is expressible by means of (26-a) or (26-b).

(26) **Semantic Contribution: RCs ≈ Adjectives**

a. John's brown-haired brother arrived.
SS: $[_{\text{DP}}\ [+def]\ [_{\text{NP}}\ [_{\text{AP}}$ brown-haired$]\ [_{\text{NP}}$ brother of J.$]]]$ arrived
(i) Presupposition: $\exists!x[[\![\text{brown-haired}]\!]^w(x) \wedge [\![\text{brother-of}]\!]^w(john)(x)]$
(ii) Assertion: $[\![\text{arrived}]\!]^w(\sigma x.\ [\![\text{brown-haired}]\!]^w(x) \wedge [\![\text{brother-of}]\!]^w(john)(x))$

b. John's brother that is brown-haired arrived.
SS: $[_{\text{DP}}\ [+def]\ [_{\text{NP}}\ [_{\text{NP}}$ brother of J.$][_{\text{CP}}\ \text{that}_1\ t_1$ is brown-haired$]]]$ arrived
(i) Presupposition: $\exists!x[[\![\text{brown-haired}]\!]^w(x) \wedge [\![\text{brother-of}]\!]^w(john)(x)]$
(ii) Assertion: $[\![\text{arrived}]\!]^w(\sigma x.\ [\![\text{brown-haired}]\!]^w(x) \wedge [\![\text{brother-of}]\!]^w(john)(x))$
Therefore, $[\![\text{(26-a)}]\!]^w \approx [\![\text{(26-b)}]\!]^w$

Next, we can verify that the 'pragmatic contribution' (in the sense of Schlenker) associated with the modifier use of an adjective is preserved when this adjective is embedded within a RC, i.e. when it is used predicatively. An easy way to do so, in line with Schlenker's assumptions, is to compare for instance the modifier vs. predicative use of expressives like *stupid*. Consistent with Geurts (2007)'s observations, the data in (27) show that the predicative use of these lexical items is not sharply distinct from their modifier use, and that their expressive component is preserved regardless of the way they compose (hence the contradictions we perceive in (27-c)-(27-d)). As this point, I will surmise that this observation generalizes to other adjectives.

(27) **Pragmatic Contribution: RCs ≈ Adjectives**
$C \subseteq$ *John has several brothers*

a. John's stupid brother has arrived.
≈ The brother of John that the speaker considers as stupid has arrived

b. John's brother who is stupid has arrived.
≈ The brother of John that the speaker considers as stupid has arrived

c. #John's stupid brother is not stupid.

d. #John's brother who is stupid is not stupid.

On Schlenker's proposal, RCs should thus pattern with adjectives with respect to the distribution of the restrictiveness effects. In particular, in cases of referential irrelevance, RCs should be able to comply with *Minimize Restrictors!* by serving some other discourse-oriented purpose, just like their adjectival counterparts, and thus obviate the restrictiveness effects. This prediction, however, is not borne out: the referential irrelevance of a RC cannot be compensated by its pragmatic contribution. This observation is exemplified by the minimal contrasts in (28). The whole paradigm is built up on the basis of the paradigm in (6); each minimal pair is construed by replacing the adjective in the (i)-sentences with a RC in the (ii)-sentences. The deviance of the (ii)-sentences is left unaccounted for by *Minimize Restrictors!* which predicts the RCs in these sentences to be licensed by their pragmatic contribution.

(28) **Restrictiveness Effects: RCs ≠ Adjectives**

a. (i) John's idiotic father has arrived.
   (ii) #John's father that is idiotic has arrived.
b. (i) The stupid French President made important mistakes.
   (ii) #The French President that is stupid made important mistakes.
c. (i) Sue met Mary's handsome husband.
   (ii) #Sue met Mary's husband that is handsome.
d. (i) John's brown-haired father uses this shampoo everyday.
   (ii) #John's father that is brown-haired uses this shampoo everyday.
e. (i) I know who Mary's conservative mother is gonna vote for.
   (ii) #I know who Mary's mother that is conservative is gonna vote for.

I notice that these observations are not peculiar to English. For instance, the contrasts in (28) are also found in French, (29). The (ii)-sentences, unlike the (i)-sentences, force a restrictive interpretation which is at odd with common knowledge. As in English, the oddness of the (ii)-sentences would disappear if we were to replace the (relational) nouns *father of/mother of/husband of* with other nouns like *brother of/friend of/colleague of* which make this restrictive interpretation unproblematic.

(29) **Restrictiveness Effects: RCs ≠ Adjectives (in French)**

a. (i) Le stupide père de Jean est arrivé.
   the stupid father of John has arrived
   (ii) #Le père de Jean qui est stupide est arrivé.
   the father of John that is stupid has arrived
b. (i) Marie a rencontré le superbe mari de Sue.
   Mary has met the handsome husband of Sue
   (ii) #Marie a rencontré le mari de Sue qui est superbe.
   Mary has met the husband of Sue that is handsome
c. (i) Le père blond de Jean utilise ce shampoing chaque jour.
   the father blond of John uses this shampoo every day
   (ii) #Le père de Jean qui est blond utilise ce shampoing chaque jour.
   the father of John that is blond uses this shampoo every day
d. (i) Je sais pour qui la mère conservatrice de Jean va voter.
   I know for whom the mother conservative of John will vote
   (ii) #Je sais pour qui la mère de Jean qui est conservatrice va voter.
   I know for whom the mother of John that is conservative will vote

I also notice that these contrasts are not restricted to the case of definite descriptions. Similar contrasts are also found with non-referential DPs. Leffel (2014) observes for instance that the sentence in (30-a) can easily receive a non-restrictive interpretation; on the other hand, the sentence in (30-b) can only receive a restrictive interpretation. This restrictive interpretation is once again at odd with the contextual assumption that all toxins are, by definition, harmful (see fn.15 for refinements).

(30) **Restrictiveness Effects: RCs ≠ Adjectives (non-referential DPs)**
Indication: A toxin is a poisonous substance.

a. Every harmful toxin will be eliminated by this product.
b. #Every toxin that is harmful will be eliminated by this product.

after Leffel (2014, (5.62))

To summarize, these data teach us that pragmatic relevance is a necessary but not a sufficient condition for licensing non-restrictive interpretations. Specifically, our observations suggest that the distribution of the restrictiveness effects is sensitive to specific structural considerations, e.g. the distinction in English between pre-nominal adjectives vs. 'restrictive' relative clauses. In line with Leffel (2014) and Morzycki (2008), I will latter argue that these observations cast doubt on the very idea that the restrictive and non-restrictive interpretations of pre-nominal adjectives follow from the same compositional mechanisms. As an alternative, I will propose that this interpretative difference is to be rooted into a syntactic distinction (see (7) for an example) between a truly modifier use (e.g., #*John's father that is stupid arrived*) and a superficially similar appositive use (e.g., OK*John's father, who is stupid, arrived*).

Superfluous Numeral Modifiers The second issue comes from the observation that there is a class of lexical items for which *Minimize Restrictors!* over-generates: cardinal numerals (e.g., *two, three, four, etc.*) can be felicitously used as NP modifiers even in cases where they are referentially and pragmatically irrelevant.

Before presenting the core data, two sanity checks are in order. To begin with, we need to make sure that cardinal numerals meet the subsectivity condition. This is easy to verify since the semantic contribution of numeral NP modifiers is essentially to specify the cardinality, i.e. the number of atomic parts, of the NP they modify. Hence, for any cardinal numeral M and any NP N, we have it that $[\![\text{[M N]}]\!] \subseteq [\![\text{N}]\!]$ (e.g., $[\![\text{four politicians}]\!] \subseteq [\![\text{politicians}]\!]$). Next, we need to verify that plural definite descriptions give rise to similar restrictiveness effects as singular definite descriptions. This fact is established by the minimal contrasts in (38).

(31) **Restrictiveness Effects with Plural Definite Descriptions**

a. (i) Sue has invited John's French friends.
   (ii) #Sue has invited John's French parents.
b. (i) The friends of John Smith that Mary talked to are from NYC.
   (ii) #The parents of John Smith that Mary talked to are from NYC.

The puzzling observation now is that descriptions involving cardinal numeral modifiers appear to be free of restrictiveness effects. This observation is illustrated by the sentences in (32).

(32) **Numeral NP Modifiers: No Restrictiveness Effects**

a. John is standing between his two parents.
b. John took a picture of his two parents.
c. John broke his two hands in a car accident.

To see how *Minimize Restrictors!* fares with respect to these examples, let us consider for instance the sentence in (32-a), i.e. *John is standing between his two parents*. Intuitively, what this sentence says is that John has exactly two parents and that he is standing between them. This non-restrictive interpretation corresponds to the one delivered by the standard rules of composition, and it is also the only interpretation available for this sentence. If *two* were interpreted as restricting the denotation of the NP *parents of John*, then the whole sentence would be logically inconsistent, entailing both that John has at least three parents and that John has exactly two parents. In sum, the use of *two* in (32-a) is referentially irrelevant. This observation generally holds of all the numeral NP modifiers in (32).

The next question we need to ask is thus the following: does the use of the modifiers in (32) bring about a particular pragmatic effect? It does not seem so. Clearly, in these cases, the speaker is not trying to force the addressee(s) to accommodate a new piece information for the information are (or at least could be) already part of the common ground (e.g., John has two parents, John has two hands). It is also clear that the speaker is not trying to remind the addressee(e) of a particularly relevant piece of information (e.g., because the addressee is missing the point of the speaker), for otherwise the relevant information could be felicitously emphasized. The deviance of the sentences in (33) suggests that neither of these discourse strategies would provide a satisfying explanation here.

(33) a. #John is standing between his parents; they are two.
b. #John has two parents: he took a picture of them.
c. #John broke his hands (he has two hands) in a car accident.
d. #Let me remind you that I have two parents. And my two parents will join us for dinner.

If these observations are on the right track, then the modifiers in (32) are redundant in Schlenker's sense, i.e. they can be dropped without changing the denotation or the pragmatic effect of the descriptions in which they occur. As a result, *Minimize Restrictors!* incorrectly predicts the sentences in (32) to be deviant. I conclude at this point that *Minimize Restrictors!* fails to capture the licensing conditions on the use of numeral NP modifiers and to provide an explanation as to why this class of items does not give rise to restrictiveness effects. I will show in the next section that the exceptional behavior of cardinal numerals is fully predictable on an implicature-based approach to restrictiveness effects.

DE vs. UE Environments The third and last issue that I will discuss concerns the application of *Minimize Restrictors!* across environments and, more specifically, in downward-entailing (DE) vs. upward-entailing (UE) environments.[16] Based on the observations in (25), I have suggested that a more generalized version of *Minimize Restrictors!*, i.e. (22), was called for. The examples in (34) provide additional support for this theoretical move.

(34) **Restrictiveness Effects in DE Environments**

a. Every/No associate of John who met the CEO signed the agreement.
   $\rightsquigarrow$ Not all of John's associates met the CEO (DE)

b. Every/No friend of John from NYC has moved to D.C.
   $\rightsquigarrow$ Not all of John's friends are from NYC (DE)

Intuitively, upon hearing a sentence like (34-a), we understand that not all of John's associates met the CEO. Another way to phrase this intuition is to observe that it would be odd for a speaker to utter (34-a) if this speaker actually believes that all of John's associates met the CEO and signed the agreement. These observations are immediately captured by *Extended Minimize Restrictors!*: the NP modifier *who met the CEO* in (39-a) is interpreted as restricting in effect the denotation of the NP *associate of John*; as a result, we have it that, in the world w relative to which this sentence is interpreted, $[\![\text{associate of John who met the CEO}]\!]^w \subset [\![\text{associate of John}]\!]^w$, which gives us the expected inference that not all of John's associates met the CEO.

As far as I can see, this line of explanation correctly accounts for the restrictiveness effects that we observe with quantificational DPs whose restrictor is downward-entailing (i.e., *every*, *no*). The question we shall now examine is the following: does this approach also capture the behavior of quantificational DPs whose restrictor is upward-entailing? To illustrate, consider the following variants of (34):

(35) **Missing Restrictiveness Effects in UE Environments**

a. Some associates of John who met the CEO signed the agreement.
   $\not\rightsquigarrow$ Not all of John's associates met the CEO (UE)

b. Some friends of John from NYC have moved to D.C.
   $\not\rightsquigarrow$ Not all of John's friends are from NYC (UE)

The judgments of my informants for these sentences contrast with their judgements to the previous sentences. Both sentences in (35) are naturally interpreted with their plain *not-all* implicature. Hence, in (35-a), we understand that *some but not all* of John's associates signed the agreement. However, according to my informants, (35-a) leaves it as open whether *all* or *only some* of John's associates met the CEO, and therefore this sentence can be uttered by a speaker who would believe that all

[16] In a nutshell, an upward entailing environment is one that licenses inferences from subsets to supersets. For instance, if it is true that *some associates of John who met the CEO* signed the agreement, it follows that *some associates of John* signed the agreement. Downward entailing environments invert the entailing pattern of upward entailing environments, i.e. they license inferences from supersets to subsets. Hence, if it is true that *every associate of John* signed the agreement, it follows that *every associate of John who met the CEO* signed the agreement.

of John's associates met the CEO but only some of them signed the agreement. While the contrasts between (34) and (35) remain subtle for some speakers, further evidence point towards a sharp difference in the distribution of the restrictiveness effects between DE vs. UE environments. Consider the following contrast:

(36) The truth is: every employee worked really hard on this new project.
   a. #Unfortunately, for financial reasons, no employee who worked hard on this project will get a bonus. (DE)
   b. #Since we can afford it, every employee who worked hard on this project will get a bonus. (DE)
   c. Unfortunately, for financial reasons, some employees who worked hard on this project won't get a bonus. (UE)
   d. ?Since we can afford it, some employees who worked hard on this project will get a bonus. (UE)

In this example, the information that every employee worked hard on the new project is made common ground. Hence, in all these sentences, the use of the relative clause *who worked hard on this project* is contextually redundant. Yet the use of this modifier is perceived as odd in (36-a)/(36-b), while it sounds okay in (36-c)/(36-d).[17] These contrasts, in line with these observed in (34) vs. (35), support the idea that the monotonicity of the environment plays a role in the distribution of the restrictiveness effects. Another way whereby we can assess the relevance of the distinction between DE vs. UE environments is by testing whether our perception of redundant modifiers within the restrictor of *every*/*no*/*all* improves when these quantifiers are themselves embedded in DE-contexts, i.e. when their entailing pattern gets reversed. Based on our previous observations, we expect the use of redundant modifiers to be licensed in these cases, just like in (36-c)/(36-d). This expectation is borne out. In (37), the relevant DPs occur within the antecedent of a conditional where the entailing pattern of their restrictors is reversed. In these examples, the RC *who worked on this project*, although redundant, is *not* perceived as deviant.

(37) The truth is: every employee worked really hard on this new project.
   a. So, if every employee who worked hard on this project gets a bonus, the company will be on the verge of closing down. (UE)
   b. So, if no employee who worked hard on this project gets a bonus, each of the employees will come after us. (UE)

The same point can be made using the negation as a DE-operator. Let us observe first that sentences of (38) are structurally ambiguous between a surface-scope reading, (38-a), and an inverse-scope reading, (38-b). On the surface-scope reading, the quan-

[17]Note that this contrast is not accounted for by *Minimize Restrictors!*. On the redundancy approach, the oddness of (36-a)/(36-b) can be attributed either to the redundant use of the target modifier, which violates *Minimize Restrictors!*, or alternatively to the fact that speakers try to obey *Minimize Restrictors!* by interpreting this modifier as restricting, which then gives rise to a contextual contradiction. Whichever way we go, the same reasoning should apply to (36-c)/(36-d), and therefore these sentences are incorrectly deemed deviant by *Minimize Restrictors!*.

tificational subject DP (i.e., *all the employees*/*every employee*) has scope over the negation, and its restrictor is monotone decreasing. By contrast, on the inverse-scope reading, the negation takes scope of the quantificational subject DP whose restrictor is now monotone increasing.

(38) { All the employees / Every employee } will not get a bonus.

a. *Surface-scope reading:* ✓*all* <NEG, ✓*every* <NEG (DE)
No employees will get a bonus.

b. *Inverse-scope reading:* ✓NEG<*all*, ✓NEG<*every* (UE)
Not all employees will get a bonus.

If our observations are on the right track, then this ambiguity should disappear if we place a redundant modifier within the restrictor of the subject DP. Specifically, if redundant modifiers are preferentially licensed in UE-environments, we expect the surface-scope reading to become unavailable in these cases. This requirement is met only if negation takes scope over the subject DP. Once again, this expectation is borne out: the sentences in (39) can only receive an inverse-scope reading.

(39) It is true that every employee worked really hard on this new project.
But, unfortunately, for financial reasons,...
{ All the employees who worked hard on this project / Every employee who worked hard on this project } won't get a bonus.

a. *Surface-scope reading:* ✗*all*<NEG, ✗*every*<NEG (DE)
No employees who worked hard on this project will get a bonus.

b. *Inverse-scope reading:* ✓NEG<*all*, ✓NEG<*every* (UE)
Not all employees who worked hard on this project will get a bonus.

Overall, the contrasts unveiled in this section support the view that the distribution of the restrictiveness effects is sensitive to some extent to the monotonicity (DE vs. UE) of the environments in which NP modification occurs. These observations do not follow from the general logic of *(Extended) Minimize Restrictors!* which requires the minimization injunction to apply everywhere, i.e. regardless of the monotonicity of the environment. It will be shown that an exhaustivity-based approach to the restrictiveness effects is better suited to capture these fine-grained differences.

3.3 Proposal: Exhaustivity and Relevance

3.3.1 Summarizing the Challenges and Looking Forward

The data gathered in the previous section provide us with a more complete picture of the restrictiveness puzzle. This picture allows us to better identify the challenges that any adequate solution to this puzzle will have to take up. The first challenge remains to explain why subsective NP modification gives rise to restrictive interpretations in the first place, and this across a wide range of DP environments, (40).

(40) **Generation of the Restrictiveness Effects**

a. John's brown-haired brother has arrived.
   $\rightsquigarrow$ John has at least two brothers
b. John's brown-haired brothers have arrived.
   $\rightsquigarrow$ Not all of John's brothers are brown-haired
c. Every brown-haired brother of John has arrived.
   $\rightsquigarrow$ Not all of John's brothers are brown-haired

The second challenge is to explain the peculiarities of the distribution of these effects: they may but need not occur with pre-nominal adjectives, (41-a), they robustly arise with 'restrictive' relative clauses, (41-b), they are generally missing with numeral NP modifiers, (41-c), and finally they are somewhat sensitive to the monotonicity of the environment in which NP modification occurs, (41-d).

(41) **Distribution of the Restrictiveness Effects**

a. Dual behavior of pre-nominal 'modifiers'
   (i) #John's *brown-haired* father has arrived.
   (ii) John's *stupid* father has arrived.
b. Restricting behavior of RCs
   (i) #John's father *that is stupid* has arrived.
   (ii) John's *stupid* father has arrived.
c. Non-restricting behavior of numeral NP modifiers
   (i) #John's *brown-haired* parents have arrived.
   (ii) John's *two* parents have arrived.
d. Restrictive interpretations in DE vs. UE environments
   (i) Every associate of John who met the CEO signed the agreement.
   $\rightsquigarrow$ Not all of John's associates met the CEO
   (ii) Some associates of John who met the CEO signed the agreement.
   $\not\rightsquigarrow$ Not all of John's associates met the CEO

My solution to the restrictiveness puzzle is based on the idea that restrictive interpretations of subsective NP modifiers come about as a result of an implicature. On this approach, the relevant inferences in (40) are to be analyzed as genuine anti-uniqueness and anti-maximality implicatures similar to those normally triggered by the use of indefinite DPs (e.g., *A brother of John arrived* or *Some students passed the exam*). The contrasts observed in (41-c)-(41-d) will be shown to immediately follow from this proposal. I will argue that the remaining contrasts exemplified in (41-a)-(41-b) are to be accounted for on different grounds. Following Leffel (2014), I will propose that, unlike RCs, pre-nominal adjectives in English have a dual behavior: they are syntactially ambiguous between a truly NP modifier use, whose interpretation can be strengthened by exhaustification, and a superficially similar appositive use, whose interpretation is already maximally strong. The discourse conditions licensing their appositive use will be argued to follow from usual relevance requirements: appositives are licensed as long as the additional information they provide are not perceived as decreasing the relevance of the proposition in which they occur.

3.3.2 Deriving the Restrictiveness Effects

Singular Definite Descriptions

To illustrate the logic of the proposal, consider again the sentence in (42) together with the restrictive interpretation it gives rise to.[18]

(42) John's brown-haired brother arrived.
Restrictive Interpretation: John has at least two brothers, only one of which is brown-haired, and John's brown-haired brother arrived.

As we have already seen, the puzzle here is that this restrictive interpretation, spontaneously accessed by speakers, is not the one delivered by the standard rules of composition. For our purposes, we can think of the nominal *brother of John* and of the modifier *brown-haired* as denoting properties of individuals, i.e. as semantic objects of type $\langle e, t\rangle$. The denotation of the modified noun *brown-haired brother of John* corresponds then to the intersection of the nominal's extension with the modifier's extension. This result can be achieved via Predicate Modification.

(43) **Predicate Modification** (modeled after Heim and Kratzer, 1998)
Let α and β be of type $\langle \sigma, t\rangle$. For any possible world w:
$[\![[\alpha\ \beta]]\!]^w = \lambda x \in D_\sigma.\ [\![\alpha]\!]^w(x) \wedge [\![\beta]\!]^w(x)$.

Combining *brown-haired* and *brother of John* via Predicate Modification in (42) forms a new property of individuals (also of type $\langle e, t\rangle$) which can combine via Functional Application with (a covert instance of) the definite determiner (noted $[+def]$ at LF). On this analysis, the LF of (42) can be represented as in (44).[19]

(44) ϕ: John's brown-haired brother arrived.
SS: $[_\phi\ [_{DP}\ [+def]\ [_{NP}\ [_{AP}$ brown-haired$]\ [_{NP}$ brother (of) John$]]]$ arrived$]$
a. Presupposition: $\exists!x[[\![\text{brown-haired}]\!]^w(x) \wedge [\![\text{brother-of}]\!]^w(j)(x)]$
b. Assertion: $[\![\text{arrived}]\!]^w(\sigma y.\ [\![\text{brown-haired}]\!]^w(y) \wedge [\![\text{brother-of}]\!]^w(j)(y))$

Crucially, the truth-conditions in (44) does not entail that John has at least two brothers; rather, it only requires that John has a unique brown-haired brother, a requirement which is met if for instance John has a unique brother and his brother is

[18] This section focuses on the restrictive interpretation of NP modifiers. Sentences involving prenominal adjectives like (42) are thus only considered under their modifier construal. The interpretation of these sentences on their alternative appositive construal is discussed in Section 3.3.3.

[19] For simplicity, I analyze definite descriptions here as referring expressions, à la Frege-Strawson, and assume that the existence and uniqueness inferences they give rise to are presuppositions of the sentence they appear in. That is, a definite description of the form *[+def] A B* (e.g., *the brown-haired President*) presupposes that there exists exactly one individual that satisfies both *A* and *B*. The contribution of the definite determiner can be seen as mapping any set, which may include plural individuals, onto the maximal individual in that set (i.e., that individual that all other individuals in the set are part of). It is this notion of maximality that is expressed with the σ-operator. Crucially, neither the puzzle at hand, nor the solution I advocate for hinges upon a particular analysis of definite descriptions; the main results presented here obtain whether we treat them as referential expressions (e.g., à la Frege) or as quantificational expression (e.g., à la Russell).

brown-haired. My proposal is that the restrictive interpretation of sentences of (42) comes about as a result of a presuppositional implicature. This implicature obtains by negating the presupposition of the following presuppositional alternative:

(45) ψ: John's brother arrived.
LF: $[_{\psi}\ [_{\text{DP}}\ [+def]\ [_{\text{NP}}$ brother (of) John]] arrived]
a. Presupposition: $\exists!x[[\![\text{brother-of}]\!]^w(j)(x)]$
b. Assertion: $[\![\text{arrived}]\!]^w(\sigma y.\ [\![\text{brother-of}]\!]^w(j)(y))$

It is easy to verify that ψ is an excludable formal alternative to ϕ. Adopting here a structural characterization of formal alternatives (Katzir, 2007, 2008; Fox and Katzir, 2009), we can verify that ψ is a formal alternative to ϕ since ψ is derivable from ϕ by substituting the modified NP with one of its subconstituents, the unmodified NP. We can also verify that ψ is an excludable alternative to ϕ since ψ can be denied consistently with ϕ: there is a possible world in which both ϕ and $\sharp\psi$ are true, i.e. a world in which it is true that John's unique brown-haired brother arrived (i.e., ϕ is true) but it is false that there is a unique individual that is a brother of John (i.e., $\sharp\psi$ is true because ψ's presupposition is false). Since $\phi \wedge \sharp\psi$ is logically consistent but $\phi \wedge \neg\psi$ is not, it follows on the present view (see Chapter 2 for the relevant definitions) that ψ is an excludable *presuppositional* alternative to ϕ.

Building on these observations, I propose that the restrictiveness effects associated with sentences of (44), i.e. the inference that *John has at least two brothers*, obtain due the presence of the exhaustivity operator $\text{EXH}_{\mathcal{R}}$ at matrix scope level. On this analysis, the LF of sentence (44) is thus as in (46), where the matrix prejacent (44) comes with (45) as an alternative, yielding for (44) a restrictive interpretation.

(46) **Singular Definite Descriptions: Anti-Uniqueness Implicatures**
John's brown-haired brother arrived.
LF: $\text{EXH}_{\mathcal{R}}[_{\phi}$ John's brown-haired brother arrived]
a. Excludable Alternative:
$\text{EXCL}_{prs}(\phi) \supseteq \{[_{\psi}\ \text{JOHN'S BROTHER arrived}]\}$
b. Strengthened Meaning:

$$[\![\text{EXH}_{\mathcal{R}}\ \phi]\!](w) = \left\{ \begin{array}{ll} 1 \text{ iff} & \delta om([\![\text{JOHN'S BROTHER}]\!])(w) = 0 \wedge [\![\phi]\!](w) = 1 \\ 0 \text{ iff} & \delta om([\![\text{JOHN'S BROTHER}]\!])(w) = 0 \wedge [\![\phi]\!](w) = 0 \end{array} \right\}$$

c. Resulting Output: Restrictive Interpretation
(i) Strengthened Presuppositional Content:
$\exists!x[[\![\text{brown-haired}]\!]^w(x) \wedge [\![\text{brother-of}]\!]^w(j)(x)] \wedge \neg\exists!z[[\![\text{brother-of}]\!]^w(j)(z)]$
(ii) Same Assertive Content:
$[\![\text{arrived}]\!]^w(\sigma y.\ [\![\text{brown-haired}]\!]^w(y) \wedge [\![\text{brother-of}]\!]^w(j)(y))$

As we can see in (46), the exhaustified meaning of (44) is defined if and only if John has exactly one brown-haired brother (ϕ's presupposition) and John doesn't have exactly one brother (negation of ψ's presupposition), that is if and only if John has at least two brothers, only one of which is brown-haired. In sum, this analysis derives the restrictive interpretation of (44). It is similar in essence to the analysis I have

put forward in Chapter 2 for the anti-uniqueness effects associated with the use of singular indefinites. The reason for this similarity is easy to see. Singular definites of the form [$_{DP}$ the A B] (e.g., *John's brown-haired brother*) and singular indefinites of the form [$_{DP}$ a(n) B] (e.g., *a brother of John*) have the presuppositional alternative [$_{DP}$ the B] in common (e.g., *John's brother*). In both cases, exhaustifying the meaning of the sentence in which they occur delivers an anti-presupposition corresponding to the negation of the uniqueness component of this definite alternative, (47).

(47) **Singular Definite Descriptions and Indefinites: Anti-Uniqueness**

a. ϕ: John's brown-haired brother arrived.
   (i) $\text{EXCL}_{prs}(\phi) \supseteq \{[_{\psi}$ JOHN'S BROTHER arrived$]\}$
   (ii) $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!] \Rightarrow \neg$(J has a unique brother)$\wedge$(J's b-h brother arrived)
   i.e., John has at least two brothers

b. ϕ: A brother of John arrived.
   (i) $\text{EXCL}_{prs}(\phi) \supseteq \{[_{\psi}$ JOHN'S BROTHER arrived$]\}$
   (ii) $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!] \Rightarrow \neg$(J has a unique brother)$\wedge$(A brother of J arrived)
   i.e., John has at least two brothers

On the present approach, the oddity effects associated with 'unrestricting' subsective modifiers follow from the proposal in Magri (2009, 2011, 2014) that excludable alternatives cannot be pruned form the domain of an exhaustivity operator if they are contextually equivalent to the prejacent of this operator. Following this proposal, we can attribute the oddness of sentences like $^{\#}$*John's brown-haired father arrived* (in run-of-the-mill contexts) to the fact that the computation of their anti-uniqueness implicatures is mandatory and results in restrictive interpretations that are inconsistent with speakers' common assumptions. This explanation is also similar to that previously offered for the oddity effects associated with sentences involving singular indefinites like $^{\#}$*A father of John arrived*, as shown in (48).

(48) **Singular Definite Descriptions and Indefinites: Oddity Effects**

a. Assume $C \subseteq$ *John has only one father, who is brown-haired*
   ϕ: $^{\#}$John's brown-haired father arrived.
   (i) $\text{EXCL}_{prs}(\phi) \supseteq \{[_{\psi}$ JOHN'S FATHER arrived$]\}$ $(\phi \Leftrightarrow_C \psi)$
   (ii) $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!] \Rightarrow \neg$(J has a unique father)$\wedge$(J's b-h father arrived)

b. Assume $C \subseteq$ *John has only one father*
   ϕ: $^{\#}$A father of John arrived. $(\phi \Leftrightarrow_C \psi)$
   (i) $\text{EXCL}_{prs}(\phi) \supseteq \{[_{\psi}$ JOHN'S FATHER arrived$]\}$
   (ii) $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!] \Rightarrow \neg$(J has a unique father)$\wedge$(A father of J arrived)
   Conclusion: in both cases, the exhaustified meaning of ϕ (anti-)presupposes that John has at least two fathers and therefore, $C \cap [\![\text{EXH}_{\mathcal{R}}\ \phi]\!] = \emptyset$.

Since singular definite descriptions involving an NP modifier (i.e., [$_{DP}$ the A B]) all have the same simpler definite alternative (i.e., [$_{DP}$ the B]) in common, the logic exemplified in (48-a) is predicted on our analysis to extend to all singular definite descriptions, regardless of the syntactic category of the subsective NP modifier they involve. The

examples in (49) provide empirical support in favor of this generalization.

(49) **Singular Definite Descriptions: Oddity Effects Across-the-Board**
For each of the ϕ-sentences, assume that the context relative to which ϕ is evaluated entails that John has only one wife as well as ϕ's presuppositions.

a. ϕ: #John's French wife arrived. **(AP)**
   (i) $\text{EXCL}_{prs}(\phi) \supseteq \{[_\psi$ JOHN'S WIFE arrived$]\}$
   (ii) $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!] \Rightarrow \neg$(J has a unique wife)$\wedge$(J's French wife arrived)

b. ϕ: #John's best wife arrived. **(Superlatives)**
   (i) $\text{EXCL}_{prs}(\phi) \supseteq \{[_\psi$ JOHN'S WIFE arrived$]\}$
   (ii) $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!] \Rightarrow \neg$(J has a unique wife)$\wedge$(J's best wife arrived)

c. ϕ: #John's wife from France arrived. **(PP)**
   (i) $\text{EXCL}_{prs}(\phi) \supseteq \{[_\psi$ JOHN'S WIFE arrived$]\}$
   (ii) $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!] \Rightarrow \neg$(J has a unique wife)$\wedge$(J's wife from France arrived)

d. ϕ: #John's wife who is French arrived. **(CP)**
   (i) $\text{EXCL}_{prs}(\phi) \supseteq \{[_\psi$ JOHN'S WIFE arrived$]\}$
   (ii) $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!] \Rightarrow \neg$(J has a unique wife)$\wedge$(J's French wife arrived)

Conclusion: in each case, the exhaustified meaning of ϕ (anti-)presupposes that John has at least two wives and therefore, $C \cap [\![\text{EXH}_{\mathcal{R}}\ \phi]\!] = \emptyset$

If this analysis is on the right track, then the oddity effects observed above shall be obligatory only when the computation of the anti-uniqueness implicature they follow from is mandatory, that is only when the relevant alternative associated with this implicature is contextually equivalent to the prejacent of the exhaustivity operator. There is an aspect of this prediction that is trivial to verify. Suppose for instance that $C \not\subseteq$ *John has only one brother*. Then, an utterance of *John's brother who just arrived is brown-haired* in C should not trigger any oddity effect. If C entails that John has several brothers, then the restrictive interpretation of this sentence will follow as a contextual entailment upon updating C with the presupposition of this sentence, i.e. there is a unique individual who is a brother of John and just arrived. If C does not already entail that John has several brothers, then this information can be added to C by updating C with the exhaustified meaning of this sentence.

There is however a second aspect of this prediction that is much less trivial. Suppose now a context C in which the interlocutors commonly accept that John has one or two brothers but are all explicitly ignorant as to whether John has only one or rather two brothers. Since the interlocutors are known to be ignorant about the number of brothers that John has, the information that John has several brothers cannot be consistently added to C by an interlocutor in C. The present analysis predicts that sentences like *John's brother who just arrived is brown-haired* can be uttered in this context without any oddity arising. Since this sentence is not contextually equivalent in C to its simpler definite alternative *John's brother is brown-haired*, this alternative can be pruned from the domain of the exhaustivity operator normally generating the anti-uniqueness implicature associated with this alternative. Since this implicature is no longer obligatory, no oddity effects are expected to arise. This result is consistent with speakers' intuitions. Its correctness is further evidenced by the contrasts in (50).

(50) **Opinionated vs. Uncertain Speaker**
A: How many brothers does John have?

a. **Opinionated Speaker: Oddity Effects** $(i) \Leftrightarrow_C (ii)$
B: He has only one brother ...
(i) #John's brother that I talked to is that guy over there.
(ii) John's brother is that guy over there.

b. **Uncertain Speaker: No Oddity Effects** $(i) \not\Leftrightarrow_C (ii)$
B: I don't know whether he has one or two brothers ...
(i) John's brother that I talked to is that guy over there.
(ii) #John's brother is that guy over there.

In the rest of this section, I deploy the logic of the approach presented above in its full generality by examining how it applies across different DP environments. It will be shown that this approach can handle (some of) the empirical issues previously encountered by Schlenker's proposal.

Plural Definite Descriptions

Based on our previous observations, the case of plural definite descriptions raises three empirical challenges. The first two challenges, (51-a) and (51-b), are roughly the same as in the case of singular definite descriptions: plural definite descriptions involving modified NPs give rise to restrictive interpretations which may result in oddity effects. The third challenge, (51-c), is to account for the seemingly exceptional behavior of cardinal numeral modifiers, which appear to lack restrictiveness effects.

(51) a. RESTRICTIVENESS: John's American friends arrived.
Restrictive Interpretation: John's has several friends, only some of them are American, and his American friends arrived.
b. ODDNESS: #John's American parents arrived.
c. CARDINAL NUMERALS: OKJohn's two parents arrived.

To address these challenges, we need to make explicit our assumptions about the interpretation of plural definite descriptions and about distributive predication with definite subjects. First, following the long-standing view originating in Link's works, we can assume for our purposes that plural count nouns refer to sets that include atomic and plural individuals (Krifka, 1986; Sauerland, 2003; Sauerland et al., 2005; Chierchia, 2010). On this view, the plural form of a count noun N means the same as *one or more N*, and the semantic contribution of the plural feature (noted [PL] here) amounts to a sum-closure operation on sets of atomic individual which can be expressed using Link's *-operator for sets of one-place predicates, (21). Suppose for instance that John has three friends, say a, b and c, (52-a). Then, the plural noun *friends of John* will denote the set of individuals delivered by applying the *-operator to the set of atomic individuals $\{a, b, c\}$, (52-b), and the plural definite description *John's friends* will end up denoting the maximal entity $a \oplus b \oplus c$ that corresponds to the collection of all of John's friends, (52-c).

(52) *Sum-closure *-operator (from Link, 1983)*
$^*X$ is the smallest set such that $^*X \supseteq X$ and $\forall x, y \in {}^*X : x \oplus y \in {}^*X$

a. $[\![\text{friend of J}]\!]^w = \{a, b, c\}$
b. $[\![[\text{PL}] \text{ friends of J}]\!]^w = {}^*[\![\text{friend of J}]\!]^w = \{a, b, c, a{\oplus}b, b{\oplus}c, a{\oplus}c, a{\oplus}b{\oplus}c\}$
c. $[\![[+def]\ [[\text{PL}] \text{ friends of J}]]\!]^w = \sigma x.\ {}^*[\![\text{friend of J}]\!]^w(x) = a \oplus b \oplus c$

Second, distributive predication with definite subjects like *John's American friends* in (51-a) requires the VP predicate to be operated upon by the distributivity operator, which we will notate DIST. Following much of the previous literature (Link, 1983; Löbner, 1985; von Fintel, 1997; Gajewski, 2005; Magri, 2009), we will take the semantics of the distributive operator DIST to be that in (53).

(53) $\text{DIST}([\![\text{VP}]\!]^w) = \lambda x_e.\ \text{YES}^w(x) \vee \text{NO}^w(x) :\ \text{YES}^w(x)$

a. $\text{YES}^w(x) = 1$ iff for every $y \leq_{\text{atom}} x$, $[\![\text{VP}]\!]^w(y) = 1$
b. $\text{NO}^w(x) = 1$ iff for every $y \leq_{\text{atom}} x$, $[\![\text{VP}]\!]^w(y) = 0$

In a nutshell, DIST does two things. First of all, DIST introduces an homogeneity presupposition: the property $[\![\text{VP}]\!]^w$ is defined for a plurality x if and only if $[\![\text{VP}]\!]^w$ holds of all atomic parts of x or else does not hold of any atomic part of x. Next, whenever it is defined for a plurality x, $\text{DIST}([\![\text{VP}]\!]^w)$ is true of that plurality if and only if $[\![\text{VP}]\!]^w$ holds of all atomic parts of x.[20] On these assumptions, a sentence like *John's American friends arrived* receives the semantic representation in (54). For clarity, I will omit the uniqueness presuppositions triggered by the use of the definite determiner since these presuppositions play no role in the derivation of the restrictive interpretations of plural descriptions and thus are irrelevant to the present discussion.

(54) ϕ: John's american friends arrived.
SS: $[_\phi\ [_{\text{DP}}\ [+def]\ [_{\text{NP}}\ [_{\text{AP}}\ [\text{PL}]\ \text{american}]\ [_{\text{NP}}\ [\text{PL}]\ \text{friend (of) John}]]]\ \text{DIST arrived}]$

a. Homogeneity Presupposition: $\text{YES}^w_\phi \vee \text{NO}^w_\phi$
(i) $\forall y \leq_{\text{atom}} (\sigma x.\ {}^*[\![\text{american}]\!]^w(x) \wedge {}^*[\![\text{friend-of}]\!]^w(j)(x))[[\![\text{arrived}]\!]^w(y)] \vee$
(ii) $\forall y \leq_{\text{atom}} (\sigma x.\ {}^*[\![\text{american}]\!]^w(x) \wedge {}^*[\![\text{friend-of}]\!]^w(j)(x))[\neg[\![\text{arrived}]\!]^w(y)]$
i.e., each of John's American friends arrived or none of them did.
b. Assertion: $[\text{DIST}([\![\text{arrived}]\!]^w)](\sigma y.\ {}^*[\![\text{american}]\!]^w(y) \wedge^* [\![\text{friend-of}]\!]^w(j)(y))$
i.e., each of John's American friends arrived.

This representation does not deliver yet the restrictive interpretation we are trying to explain since it predicts this sentence to be acceptable and true in a situation where all of John's friends are American and arrived. However, this sentence has the sentence ψ in (55) as an excludable formal alternative. The derivation of this alternative proceeds as before by replacing the modified NP *American friends of John* with its NP subconstituent *friends of John*. We can further verify that ψ is logically non-weaker

[20] The homogeneity presupposition introduced by DIST is easy to detect using negation. For instance, the sentence *John's American friends don't smoke* clearly conveys that none of John's American friends smoke, ruling out the logical possibility that some but not all of John's American friends smoke. This meaning follows from the assertive meaning of this sentence together with the homogeneity presupposition, i.e. either all of John's American friends smoke or none of them do.

than ϕ. Suppose for instance that, for some possible world w, $[\![\text{friend of John}]\!]^w = \{a, b, c\}$, $[\![\text{american}]\!]^w = \{a, b, d\}$ and $[\![\text{arrive}]\!]^w = \{a, b\}$, i.e. all of John's American friends but not all of John's friends arrived. Then, $\textsc{Dist}([\![\text{arrived}]\!]^w)$ is true of the plurality denoted by *John's American friends* since each of John's American friends arrived; hence, ϕ is true in w. However, $\textsc{Dist}([\![\text{arrived}]\!]^w)$ is undefined for the plurality denoted by *John's friends* since some but not all of John's friends arrived; hence, $\sharp\psi$ is true. As a result, $\phi \wedge \sharp\psi$ is logically consistent, and therefore ψ is excludable. Since $\phi \wedge \sharp\psi$ is logically consistent but $\phi \wedge \neg\psi$ is not, we conclude that ψ is an excludable, presuppositional alternative to ϕ.[21]

(55) ψ: John's friends arrived.
LF: $[_\psi\ [_{\text{DP}}\ [+def]\ [_{\text{NP}}\ [\text{PL}]\ \text{friend (of) John}]]\ \textsc{dist}\ \text{arrived}]$
a. Homogeneity Presupposition: $\text{YES}^w_\psi \vee \text{NO}^w_\psi$
(i) $\forall y \leq_{\text{atom}} (\sigma x.\ {}^*[\![\text{friend-of}]\!]^w(j)(x))[[\![\text{arrived}]\!]^w(y)] \vee$
(ii) $\forall y \leq_{\text{atom}} (\sigma x.\ {}^*[\![\text{friend-of}]\!]^w(j)(x))[\neg[\![\text{arrived}]\!]^w(y)]$
i.e., each of John's friends arrived or none of them did.
b. Assertion: $[\textsc{Dist}([\![\text{arrived}]\!]^w)](\sigma y.\ {}^*[\![\text{friend-of}]\!]^w(j)(y))$
i.e., each of John's friends arrived.

What is the result of strengthening the definedness conditions of ϕ by adding to its presuppositional content the negation of the homogeneity presupposition of its alternative ψ? Suppose that ϕ is true, i.e. each of John's American friends arrived. Suppose now that we strengthen ϕ's meaning by adding to its presuppositional content the following anti-presupposition: it is not the case that either each of John's friends arrived or that none of John's friends did. Note that this anti-presupposition can be equivalently formulated as follows: not all of John's friends arrived but some of them did. Then, the strengthened meaning of ϕ will now entail that each of John's American friends arrived but that not all of John's friends did and, subsequently, that not all of John's friends are American. This result gives us the restrictive interpretation of (54) that we were interested in. It corresponds to the LF output delivered for (54) upon exhaustification of the meaning of this sentence:

(56) **Plural Definite Descriptions: Anti-Maximality Implicatures**
John's American friends arrived.
LF: $\text{EXH}_{\mathcal{R}}[_\phi\ [_{\text{DP}}\ \text{John's american friends}]\ \textsc{dist}\ \text{arrived}]$
a. <u>Excludable Alternative:</u>
$\text{EXCL}_{prs}(\phi) \supseteq \{[_\psi\ [_{\text{DP}}\ \text{John's friends}]\ \textsc{dist}\ \text{arrived}]\}$

[21] Just to clarify, $\phi \wedge \neg\psi$ is a logical contradiction because the homogeneity presupposition of ψ projects under negation $\neg$ (while it does not project under the denial operator $\sharp$). Hence, $\neg\psi$ entails that none of John's friends arrived, while ϕ entails that each of John's American friends arrived. A contradiction naturally follows from their conjunction. We can get a clear sense of this contradiction is we try to express the formula $\phi \wedge \neg\psi$ in natural languages, e.g. $^{\#}$*John's American friends arrived but John's friends did not.*

b. Strengthened Meaning:

$$[\![\text{EXH}_{\mathcal{R}}\ \phi]\!](w) = \left\{ \begin{array}{ll} 1 \text{ iff} & \text{YES}_{\psi}^{w} \vee \text{NO}_{\psi}^{w} = 0 \wedge [\![\phi]\!](w) = 1 \\ 0 \text{ iff} & \text{YES}_{\psi}^{w} \vee \text{NO}_{\psi}^{w} = 0 \wedge [\![\phi]\!](w) = 0 \end{array} \right\}$$

c. Resulting Output: Restrictive Interpretation

(i) Strengthened Presuppositional Content:
$(\text{YES}_{\phi}^{w} \vee \text{NO}_{\phi}^{w}) \wedge \neg(\text{YES}_{\psi}^{w} \vee \text{NO}_{\psi}^{w}) \leftrightarrow (\text{YES}_{\phi}^{w} \vee \text{NO}_{\phi}^{w}) \wedge \neg\text{YES}_{\psi}^{w} \wedge \neg\text{NO}_{\psi}^{w}$

(ii) Same Assertive Content:
$[\text{DIST}([\![\text{arrived}]\!]^{w})](\sigma y.\ {}^{*}[\![\text{american}]\!]^{w}(y) \wedge^{*} [\![\text{friend-of}]\!]^{w}(j)(y))$
i.e., each of John's American friends arrived.

As it is shown in (56), the exhaustified meaning of (54) presupposes that not every friend of John arrived ($\neg\text{YES}_{\psi}^{w}$) but that some of them did ($\neg\text{NO}_{\psi}^{w}$), i.e. the negation of ψ's homogeneity presupposition. Since (54) asserts that each of John's American friends arrived, the sentence as a whole now entails that not all of John's friends are American. For completeness, note that it follows from this analysis that the same anti-maximality inference obtains for the negative counterpart of (54), say *John's American friends have not arrived*: upon exhaustification, this sentence will now entail that none of John's American friends have arrived but that some of John's friends have, and therefore that not all of John's friends are American.

It should be noted here that, on an inclusive analysis of the plural, the truth-conditions delivered for (54) in (56) only require that John have at least two friends and that at least one of them be American. These truth-conditions are obviously too weak to fully capture our intuitions about the meaning of this sentence. Intuitively, we understand (54) as meaning that at least two (American) friends of John arrived; in other words, we interpret the plural here as excluding atomic individuals from the possible denotation of the description. So, how does this exclusive interpretation of the plural come about? Several solutions have been offered in the previous literature. For space reasons, I cannot do justice to all of them. For the time being, I will simply mention two of them which are compatible with the present approach.

On Krifka (1986)'s view, the exclusive interpretation of the plural is due to a pragmatic principle that forces the choice of a more specific form over a less specific one when the two forms are equally complex (e.g., [SG] vs. [PL] features). On the assumption that singular forms are more specific than their plural counterparts, only the use of a singular form is pragmatically appropriate when atomic reference is intended, thus excluding the possibility of an atomic interpretation for plural forms.[22] Another perspective on this question is offered in de Swart and Farkas (2010). They propose that plural forms are in fact polysemous between a weak inclusive sense (i.e., *one or more N*) and a stronger exclusive sense (i.e., *two or more N*), and that the exclusive interpretation of plural forms comes about as a result of a pragmatic principle that favors stronger over weaker senses in context. On this view, the use of a plural form is pragmatically appropriate only when sum values are among the intended referents.

[22]The view originally sketched in Krifka (1986) has been since then discussed and worked out in detail in Sauerland (2003) and Sauerland et al. (2005).

For the time being, we need not commit ourselves to a particular view. It shall be clear that the proposal defended in this chapter can be supplemented with any of these solutions. There is however another possibility that I would like to point out. The present view offers a variant of the proposal in Sauerland (2003) and Sauerland et al. (2005), a variant on which the effects attributed to *Maximize Presupposition* are now conceived as resulting from the application of the exhaustivity operator. Specifically, it appears that the exclusive reading of plural definite descriptions can be derived as a form of entailment resulting from an anti-uniqueness implicature similar to those previously observed with singular indefinites and singular definite descriptions. The gist of this variant is exemplified in (57).

(57) **Anti-Uniqueness and Exclusive Plural**
John's brothers arrived.
LF: $\text{EXH}_{\mathcal{R}}[_{\phi}$ John's brothers DIST arrived]
a. $\text{EXCL}_{prs}(\phi) \supseteq \{[_{\psi}$ John's brother (DIST) arrived]$\}$
b. $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!] \Rightarrow \neg$(J has a unique brother)$\wedge$(each of J's brothers arrived)
(i) *Primary Entailment: Anti-Uniqueness*
$\Rightarrow$ John has at least two brothers
(ii) *Secondary Entailment: Exclusive Plural*
$\Rightarrow$ At least two brothers of John arrived

To explain how the exclusive interpretation of the plural obtains here, let us take a closer look at the exhaustified meaning of this sentence. The primary entailment follows from its genuine anti-uniqueness implicature: if *Each of John's brothers arrived* is true (and therefore John has one or more brothers) but *John has a unique brother* is false, then it must be that John has at least two brothers. The secondary entailment, which delivers a non-atomic interpretation for the plural definite description, can be shown to follow from this primary entailment together with the truth of the prejacent *Each of John's brothers arrived*. By semantic composition, *Each of John's brothers arrived* is true if and only if each atomic part of the maximal individual made up of atomic brother(s) of John arrived. If we now add the previous entailment that John has at least two brothers, then the maximal individual denoted by *John's brothers* must have at least two atomic parts, thus excluding an atomic interpretation (i.e., John has at least two brothers and each of them arrived).

Interestingly, the very same logic applies to the sentence in (54). In addition to (55), (54) also has the sentence *John's American friend arrived* as a presuppositional alternative. This second alternative obtains from (54) by deleting all the plural forms present in its syntactic structure. Crucially, these two presuppositional alternatives are innocently excludable. In particular, the negation of their (maximal) presupposition can be added consistently to the presuppositions of (54). The strengthened meaning of (54), synthesized in (58), has now three main inferential components: (1) each of John's American friends arrived (truth of the prejacent), (2) not all of John's friends arrived (anti-maximality), and (3) there isn't a unique individual who is a friend of John and American (anti-uniqueness). As we have already seen, (1) and (2) entails that not all friends of John are American, and (1) and (3) entails that

John has at least two American friends. It follows from these entailments that the individual denoted by the plural description *John's American friends* in (54) must have at least two atomic parts; as a result, the strengthened meaning of (54) entails that at least two American friends of John arrived and, subsequently that John has at least three friends, one of which is not American.

(58) **Anti-Uniqueness, Anti-Maximality and Exclusive Plural**
John's American friends arrived.
LF: $\text{EXH}_{\mathcal{R}}[_{\phi}$ J's american friends DIST arrived]

a. $\text{EXCL}_{prs}(\phi) \supseteq \{[_{\psi}$ J's friends DIST arrived], $[_{\chi}$ J's american friend arrived]$\}$

b. $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!] \Rightarrow \neg$(J has a unique american friend)$\wedge\neg$(every friend of John arrived)$\wedge$(each of J's american friends arrived)

c. *Primary Entailments: Anti-Uniqueness and Anti-Maximality*
(i) $\Rightarrow$ John has at least two American friends
(ii) $\Rightarrow$ Not all friends of John are American

d. *Secondary Entailment: Exclusive Plural*
$\Rightarrow$ At least two American friends of John arrived

$\approx$ John has at least three friends, at least two but not all of them are American, and John's American friends arrived but not all of John's friends arrived

I will set aside this possible research avenue for now. My goal here was simply to point out some interesting results regarding the interpretation of plural definite descriptions that naturally fall out from the general approach to implicatures pursued in this chapter. As I have said, this line of explanation is essentially a variant of the *Maximize Presupposition*-based account worked out in details in Sauerland (2003) and Sauerland et al. (2005). Nonetheless, it should be emphasized that the present analysis does not automatically extend to existentials: at this point, the non-atomic interpretation of the plural count noun *friends* in a sentence like *Some friends of John arrived* would be left unaccounted for. In the following, I will take for granted that plural definite descriptions tend to be interpreted as denoting sum individuals, and that several solutions offer themselves to achieve this result.

With this in mind, let us now turn to the oddity effects triggered by plural definite descriptions involving 'unrestricting' restrictive NP modifiers as in (59).

(59) #John's French parents arrived.

Suppose that this sentence is uttered in a context in which it is commonly accepted by the interlocutors that John has exactly two parents, e.g. because it is a rule of thumb that someone who has more than one parent has exactly two parents, and that his parents are French. In this context, on the assumption that (59)'s presuppositions are satisfied, (59) is contextually equivalent to its simpler definite alternative *John's parents arrived*, and therefore the computation of the anti-maximality implicature associated with this alternative is mandatory. This implicature (i.e., not all of John's parents arrived) together with an exclusive interpretation of the plural (i.e., at least two parents of John arrived) entail that John has at least three parents, at least two

of them are French. This entailment contradicts the contextual assumption that John has exactly two parents, hence the oddness of (59). This line of explanation fruitfully extends to other kinds of subsective NP modifiers, as exemplified in (60).

(60) **Plural Definite Descriptions: Oddity Effects Across-the-Board**
For each ϕ-sentence, assume that the context relative to which ϕ is evaluated entails that John has exactly two parents as well as ϕ's presuppositions.

a. ϕ: #John's French parents DIST arrived. **(AP)**
   (i) $\text{EXCL}_{prs}(\phi) \supseteq \{[_{\psi}$ John's parents DIST arrived$]\}$
   (ii) $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!] \Rightarrow \neg$(all parents of J arrived)$\wedge$(J's Fr. parents arrived)

b. ϕ: #John's best parents arrived. **(Superlatives)**
   (i) $\text{EXCL}_{prs}(\phi) \supseteq \{[_{\psi}$ John's parents DIST arrived$]\}$
   (ii) $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!] \Rightarrow \neg$(all parents of J arrived)$\wedge$(J's best parents arrived)

c. ϕ: #John's parents from France arrived. **(PP)**
   (i) $\text{EXCL}_{prs}(\phi) \supseteq \{[_{\psi}$ John's parents DIST arrived$]\}$
   (ii) $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!] \Rightarrow \neg$(all parents of J arrived)$\wedge$(J's parents from Fr. arrived)

d. ϕ: #John's parents who are French arrived. **(CP)**
   (i) $\text{EXCL}_{prs}(\phi) \supseteq \{[_{\psi}$ John's parents DIST arrived$]\}$
   (ii) $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!] \Rightarrow \neg$(all parents of J arrived)$\wedge$(J's Fr. parents arrived)

Conclusion: in each case, the exhaustified meaning of ϕ (anti-)presupposes that John has at least three parents and therefore, $C \cap [\![\text{EXH}_{\mathcal{R}}\ \phi]\!] = \emptyset$.

Yet we have seen that there is a class of lexical items that does fit with this overall picture, namely cardinal numerals, e.g. (32). Consider the following telling contrast:

(61) a. John's brothers are American and John's sister is French.
#His <u>American</u> brothers (just) arrived.

b. John has four brothers and one sister.
OKHis <u>four</u> brothers (just) arrived.

The contrast is clear-cut: the continuation in (61-a) sounds odd while the continuation in (61-b) sounds perfectly natural. So where does this contrast come from? On the present approach, the oddness of (61-a) is accounted for by the mandatory computation of an anti-maximality implicature which results in an interpretation that conflicts with the previous discourse (i.e., not all of John's brothers are American). We may have expected the same kind of conflict to arise in (61-b). Specifically, we may have expected this continuation to give rise to the inference that not all of John's brothers arrived, entailing then that John has at least five brothers, contra what is established by the previous discourse. But that's not what we find. Why?

There is a simple answer to this question. The formal alternative associated with the anti-maximality implicature in (61-a), i.e. *John's brothers arrived*, is not an excludable alternative to *John's four brothers arrived* because it is logically weaker: whenever the sentence *John's four brothers arrived* is true, so is the sentence *John's brothers arrived*. To establish this on formal grounds, let me introduce some basic semantics for cardinal numerals. For our purposes, we can assume that simplex cardinal numerals are lexical heads (nouns or adjectives) of semantic type $\langle \text{e}, \text{t} \rangle$, which

require the NP they combine with to be a set of individuals (divisible into and) containing a certain number of atomic parts. On this simple view, the lexical entry for a cardinal numeral like *four* is as follows: $[\![\text{four}]\!] = \lambda x \in D_e.\ \#x = 4$. The critical part of the solution now lies in the interaction between the semantics of cardinal numerals and that of the definite determiner. Consider the following sentence:

(62) John's four brothers arrived.
SS: [[$_{\text{DP}}$ [+*def*] [$_{\text{NP}}$ [$_{\text{AP/NP}}$ four] [$_{\text{NP}}$ [PL] brother (of) J]]] DIST arrived]
a. Presuppositions: $\exists!x[\#x = 4 \wedge\ ^*[\![\text{brother-of}]\!]^w(j)(x)]$ + HOMOGENEITY
b. Assertion: $[\text{DIST}([\![\text{arrived}]\!]^w)](\sigma y.\ \#y = 4 \wedge\ ^*[\![\text{brother-of}]\!]^w(j)(y))$
$\approx$ there is a unique plurality made up of four atomic individuals who are brothers of John and each atomic part of this plural individual arrived
$\Rightarrow$ John has only four brothers and each of John's brothers arrived

The uniqueness component of (62) says that there is a unique plural individual made up of four atomic individuals who are brothers of John. The key here is to observe that this meaning component entails that John has exactly four brothers. This can be shown by contraposition. Suppose that John has in fact more than four brothers, say $[\![\text{brother of John}]\!] = \{a, b, c, d, e\}$. Then, there exist several plural individuals made up of four atomic individuals that are brothers of John, for instance $a \oplus b \oplus c \oplus d$, $a \oplus b \oplus c \oplus e$ and $a \oplus b \oplus d \oplus e$. Therefore, there isn't a unique plural individual made up of four atomic individuals who are brothers of John. Hence, by contraposition, we conclude that (62) entails that John has exactly four brothers. Since John has exactly four brothers, it follows from (62) that all of John's brothers arrived. We can observe that, in this case, the plural definite description *John's brothers* and its numeral variant *John's four brothers* will have the same denotation, (63).

(63) Suppose $[\![\text{brother of John}]\!]^w = \{a, b, c, d\}$
a. $[\![\text{John's brothers}]\!]^w = \{a \oplus b \oplus c \oplus d\}$
b. $[\![\text{John's brother}]\!]^w$ is undefined
c. $[\![\text{John's two brothers}]\!]^w$ is undefined
d. $[\![\text{John's three brothers}]\!]^w$ is undefined
e. $[\![\text{John's four brothers}]\!]^w = \{a \oplus b \oplus c \oplus d\}$

Since the sentence *John's four brothers arrived* entails its alternative *John's brothers arrived*, it follows that this alternative is not excludable, hence the absence of anti-maximality implicatures for these sentences. These observations account for the contrast in (61) and, more generally, for the fact that plural descriptions involving numeral NP modifiers do not receive restrictive interpretations.

DE vs. UE Environments and Refinements

We have previously observed that the distribution of the restrictiveness effects is sensitive to some extent to the monotonicity of the environment in which NP modification occurs, (64). In essence, we have seen that, when NP modification occurs in a DE-environment (e.g., within the restrictor of *every*/*no*), the NP modifier is

spontaneously interpreted as restricting the denotation of the NP it modifies, in a way similar to what we have observed for definite descriptions. On the other hand, when NP modification occurs in an UE-environment (e.g., in the restrictor of *some*), we have seen that these restrictive interpretations are weakened and may disappear.

(64) **NP modification in UE vs. DE-Environments**
What happened at the office?

a. Every associate of John who met the CEO signed the agreement.
$\rightsquigarrow$ Not all associates of John met the CEO (DE)

b. No associate of John who met the CEO signed the agreement.
$\rightsquigarrow$ Not all associates of John met the CEO (DE)

c. Some associates of John who met the CEO signed the agreement.
$\not\rightsquigarrow$ Not all associates of John met the CEO (UE)

d. Two associates of John who met the CEO signed the agreement.
$\not\rightsquigarrow$ Not all associates of John met the CEO (UE)

The starting point to understand these contrasts is to observe that each of the sentences in (64) gives rise to some form of implicatures. For instance, both (64-a) and (64-c) give rise to a similar *not-all* (i.e., anti-maximality) implicature which can be paraphrased as *Not all associates of John signed the agreement.* The critical part now is to observe that adding this implicature to the semantic representation of these sentences will result in a restrictive interpretation of the relevant modifier only if this modifier does not occur in the first place in an UE-environment, i.e. in an environment that licenses inferences from subsets to supersets. An easy way to verify this is to examine further the exhaustified meanings of (64-a)-(64-b) vs. (64-c)-(64-d), and compare the logical entailments they are associated with. The exhaustified meanings of the sentences in (64-a)/(64-b) is given in (65-a)/(65-b).

(65) **NP Modification in DE-Environments**
Assume that $[\![\text{associate of John who met the CEO}]\!]^w$ is non-empty

a. $\text{EXH}_{\mathcal{R}}[_{\phi}$ every associate of John who met the CEO signed the agreement]
(i) $\text{EXCL}_{asr}(\phi) \supseteq \{[_{\psi}$ every associate of John signed the agreement$]\}$
(ii) $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!]^w \Rightarrow \phi(w) \wedge \neg(\text{EVERY ASSOCIATE OF JOHN})(w)$
$\Rightarrow$ Some associate of John didn't meet the CEO in w

b. $\text{EXH}_{\mathcal{R}}[_{\phi}$ no associate of John who met the CEO signed the agreement]
(i) $\text{EXCL}_{asr}(\phi) \supseteq \{[_{\psi}$ no associate of John signed the agreement$]\}$
(ii) $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!]^w \Rightarrow \phi(w) \wedge \neg(\text{NO ASSOCIATE OF JOHN})(w)$
$\Rightarrow$ Some associate of John didn't meet the CEO in w

The ψ-alternatives above are derived as before by substituting in the ϕ-sentences (i.e., the prejacent of the exhaustivity operator) the modified NP *associate of John who met the CEO* with its nominal subconstituent, the unmodified NP *associate of John.* Since these alternatives are logically stronger than the sentences they are derived from, they are excludable. Upon exhaustification of the meaning of the ϕ-sentences, the negation of these assertive alternatives delivers for (64-a) the implicature that

Not every associate of John signed the agreement, and for (64-b) the implicature that *Some associate of John signed the agreement.* Whenever the restrictor of *every* and *no* in the ϕ-sentences is presupposed to be non-empty, adding these implicatures to the plain semantic representation of the ϕ-sentences will now entail that there is at least one associate of John who didn't meet the CEO.[23] This entailment corresponds to a restrictive interpretation of the NP modifier, e.g. if every associate of John who met the CEO signed the agreement but not all did, then some associate of John didn't meet the CEO. Consider now the exhaustified meaning of (64-c) and (64-d):

(66) **NP Modification in UE-Environments**

a. $\text{EXH}_{\mathcal{R}}[_{\phi}$ Some associates of John who met the CEO signed the agreement]
   (i) $\text{EXCL}_{asr}(\phi) \supseteq \{[_{\psi}$ Every associate of John signed the agreement]$\}$
   (ii) $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!]^w \Rightarrow \phi(w) \wedge \neg(\text{EVERY ASSOCIATE OF JOHN})(w)$
   $\Rightarrow$ Only some associates of John signed the agreement in w

b. $\text{EXH}_{\mathcal{R}}[_{\phi}$ Two associates of John who met the CEO signed the agreement]
   (i) $\text{EXCL}_{asr}(\phi) \supseteq \{[_{\psi}$ Every associate of John signed the agreement]$\}$
   (ii) $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!]^w \Rightarrow \phi(w) \wedge \neg(\text{EVERY ASSOCIATE OF JOHN})(w)$
   $\Rightarrow$ Only some associates of John signed the agreement in w

For our purposes, we can assume that the relevant alternatives for these sentences are the same as in the case of the *every*-sentence above.[24] Observe now that adding the negation of these alternatives to the semantic representation of these sentences delivers a meaning that is compatible with, but does not force a restrictive interpretation of the NP modifiers. Specifically, the strengthened meaning of these sentences entails that some but not all of John's associates signed the agreement, which leaves it as open whether some or all of them met the CEO. These results are in line with the judgments of my informants for these sentences and, together with our previous observations, account for the basic contrasts in (64). These results are further supported by the observation that the *only*-variants of sentences like (64-c)/(64-d) are accepted by speakers in contexts that rule out a restrictive interpretation of the modified NPs:

(67) *Context: It is common ground that each client of the company met the new CEO to talk about the development and future of the company. Some employee wonders whether the new CEO is gonna keep his job. Another employee says:* I seriously doubt it...

a. Only SOME_F clients that he met were convinced by his speech.
b. Only TWO_F clients that he met were convinced by his speech.

[23] The question of how this presupposition of non-emptiness comes about is orthogonal to the present discussion. I will therefore leave it as open whether the entailments in (65) are purely logical or appeal to additional contextual assumptions.

[24] There are of course other possibilities. For instance, both sentences in (66) also have the sentence *Every associate of John who met the CEO signed the agreement* as an excludable formal alternative. Together with the prejacent, the implicature associated with this alternative delivers the entailment that some but not all associates of John who met the CEO signed the agreement. This strengthened meaning is logically stronger than the one we are considering, but its availability is orthogonal to the core of the present discussion.

On the present approach, the distribution of the oddity effects associated with the use of non-restricting NP modifiers in DE vs. UE-environments can be shown to match the distribution of the implicatures responsible for the restrictive interpretations of NP modifiers. Some of these effects are illustrated in (68) (these examples are adapted from (37) and (38) above).

(68) **NP modification in UE vs. DE-Environments: Oddity Effects**
The truth is: every employee worked really hard on this new project.
a. Since we can afford it,
#every employee who worked hard on this project will get a bonus. (DE)
b. Unfortunately, for financial reasons,
#no employee who worked hard on this project will get a bonus. (DE)
c. So, if every employee who worked hard on this project gets a bonus, the company will close down. (UE)
d. So, if no employee who worked hard on this project gets a bonus, each of the employees will come after us. (UE)

Since the sentence in (68-a) is contextually equivalent to its excludable alternative *every employee will get a bonus*, the computation of the scalar implicature associated with this alternative becomes mandatory. The interpretation resulting from this implicature (i.e., not all employees will get a bonus) conflicts with the contextual entailment that every employee will get a bonus, and thus the sentence is perceived as odd. Similar observations hold for the sentence in (68-b). By contrast, in (68-c)/(68-d), this scalar reasoning cannot go through. Although the sentence in (68-c) is contextually equivalent to *if every employee gets a bonus, the company will close down*, this formal alternative is not an excludable alternative to (68-c): it is logically entailed by (68-c) and therefore cannot be consistently negated. As a result, (68-c) lacks the implicature at work in (68-a), and therefore no oddity arises. Similar observations hold for the sentence in (68-d).

Finally, let me point out a limit of this overview. The present study does not take into account the possible interpretative effects generated by focusing NP modifiers. Yet it appears that focus can force restrictive interpretations regardless of the monotonicity of the environment (Umbach, 2006). Consider for instance the following sentence in which the relevant NP modifier bears focus:

(69) Some FRENCH$_F$ students of this university complained about the food.
Inference: there are other students in this university than the French students; it is left as open whether those students complained or not about the food.

Narrow or contrastive focus on *French* leads to the expectation that the relevant university has French and non-French students, and thus to interpret the NP modifier in this environment as restricting in effect the denotation of the NP. This restrictive interpretation is not delivered by the exhaustified meaning of this sentence, at least not on our assumptions. Nonetheless, it seems plausible to attribute this restrictive interpretation to the fact that focus evokes alternatives in the sense of Rooth (1985, 1992): it must be compatible with what the speakers believe that there are (or that

there could be) in this university other students than the French students. It is beyond the scope of this chapter to give a detailed analysis of this grammatical phenomenon, but let us briefly clarify how focus could impact on speakers' interpretation of (69).

The core intuition is that, in a sentence like (69), the semantic effect of focus consists in contrasting the set of FRENCH students with a set of contextually determined alternatives (e.g., the AMERICAN students, the BRITISH students, etc.), as exemplified below. Specifically, contrastive focus evokes alternatives, (69-b), and impacts on the felicity conditions of (69) by imposing a contrastiveness condition, (69-c). By this condition, (69) is felicitous only if the property *French* is contrasted with another contextually relevant property, i.e. only if the set of French students contrasts in context with another set of students from a different country. In order for this felicity condition to be satisfied, it seems plausible to assume that the context must entail that some students are not French. If these assumptions are on the right track, then the contrastiveness condition associated with narrow focus paves the way for a restrictive interpretation of the NP modifier, despite the absence of an implicature.

(69) Some FRENCH_F students complained (about the food).

a. Ordinary Meaning:
$[\![(69)]\!]^o = 1$ if and only if some french students complained

b. Focus Meaning:
$[\![(69)]\!]^f = \{\text{some } A \text{ students complained} \mid A \in D_{\langle e,t\rangle} \;\&\; A \in C\}$

c. Contrastiveness Condition:
$\exists p[(p \in [\![(69)]\!]^f) \wedge (p \not\leftrightarrow [\![(69)]\!]^o)]$

3.3.3 Apparent Exceptions: Appositives

The remainder of this chapter is concerned with some apparent exceptions to the analysis I have put forward in the previous section. To illustrate the puzzle we are left with, consider the following minimal contrasts (see also (16)):

(70) a. (i) The stupid French President has arrived.
(ii) #The French President that is stupid has arrived.

b. (i) I know who Mary's conservative mother is gonna vote for.
(ii) #I know who Mary's mother that is conservative is gonna vote for.

The oddness of the (ii)-sentences is predicted by the present analysis. If (70-a-ii) is uttered in a context in which it is assumed that there is a unique French President, this sentence will give rise to an anti-uniqueness implicature (i.e., there isn't a unique French President), which will ultimately result in a contextual contradiction. This result corresponds to the general result delivered by our analysis for definite descriptions involving subsective NP modifiers. Suppose now that the semantic composition of the (i)-sentences is parallel to this of the (ii)-sentences. In particular, suppose that the adjectives in (i) are analyzed as NP modifiers just like the RCs in (ii). Then, the same reasoning should hold for these sentences and similar oddity effects should obtain. Yet this is not what we find.

Capitalizing on Morzycki (2008) and Leffel (2014), I propose that the reason for this discrepancy lies in the dual behavior of pre-nominal adjectives in English which, unlike RCs, can be ambiguous between a truly modifier use and a superficially undistinguishable appositive use. On their modifier construal, these adjectives directly compose with the NP they modify in a way parallel to RCs, (71-a). On this parse, the sentence in (70-a-i) behaves just like this in (70-a-ii). On their appositive construal, however, these adjectives do not compose with the NP they appear at first sight to modify; rather, in a way parallel to what we see with appositive relative clauses (ARCs), these adjectives are used predicatively to form separate sentences which serve to make side-remarks of some kind. On this second parse, the sentence in (70-a-i) now logically entails that the French President has arrived, and therefore no anti-uniqueness implicature is generated in the first place.

(71) **Restrictive (R) vs. Non-Restrictive (NR) Interpretation**
$C \subseteq$ *There is only one French President*
The stupid French President has arrived.

a. **Modifier Construal = Restrictive** ($\approx$ RCs)
ϕ_1: #The French [President that is stupid] has arrived.
(i) Presupposition: There is exactly one stupid French President.
(ii) Appositive: $\emptyset$
(iii) Assertion: The stupid French President has arrived.
$\text{ALT}(\phi_1) \supseteq \{[_\psi$ the French President has arrived$]\}$
(i) $\phi_1 \not\Rightarrow \psi$ and therefore $\psi \in \text{EXCL}(\phi_1)$
(ii) $\text{EXH}_{\mathcal{R}}(\phi_1) \Rightarrow \neg$(there is a unique French President)
(iii) Therefore, $C \cap [\![\text{EXH}_{\mathcal{R}}\ \phi_1]\!] = \emptyset$

b. **Appositive Construal = Non-Restrictive** ($\approx$ ARCs)
ϕ_2: The French President, [who is stupid], has arrived.
(i) Presupposition: There is exactly one French President
(ii) Appositive: The French President is stupid
(iii) Assertion: The French President has arrived.
$\text{ALT}(\phi_2) \supseteq \{[_\psi$ the French President has arrived$]\}$
(i) $\phi_2 \Rightarrow \psi$ and therefore $\psi \notin \text{EXCL}(\phi_2)$
(ii) $\text{EXH}_{\mathcal{R}}(\phi_2) \Rightarrow$(there is a unique french president)
(iii) Therefore, $C \cap [\![\text{EXH}_{\mathcal{R}}\ \phi_2]\!] \neq \emptyset$

It is beyond the scope of this chapter to develop a fully-fledged analysis of the appositive use of attributive adjectives. Such an analysis would require to carefully examine the availability of these construals across-languages and compare them in a systematic way to other appositive construals like ARCs. My goal here will be much less ambitious. I will only seek to describe the licensing conditions on these appositive construals in enough detail to draw a connection between their distribution and the distribution of the oddity effects associated with non-restrictive 'modifiers'.[25]

[25] I put quotation mark around the word 'modifier' here to mean any syntactic phrase that superficially looks like a modifier. On the present analysis, non-restrictive 'modifiers' like the ones we find in (70) are not NP modifiers, but rather adjectives used predicatively in an appositive construal.

Licensing Conditions

The non-restrictive (NR) interpretations of 'modifiers' is limited to particular syntactic positions and subject to specific discourse conditions. On the syntactic side, the generalization that emerges from the previous literature is that these interpretations are licensed in English only when the relevant 'modifier' appears in pre-nominal position (a.o., Larson and Marušič, 2004; Leffel, 2014). The contrasts we have observed between pre-nominal adjectives and post-nominal RCs obey this generalization, (72); these contrasts are found with definite descriptions and replicate with other quantifiers (Leffel, 2014). We observe that the unavailability of non-restrictive interpretations for the (ii)-sentences correlates with the presence of oddity effects.

(72) **Pre-Nominal APs vs. Post-Nominal RCs**

a. (i) The stupid French President has arrived. (✓R, ✓NR)
(ii) #The French President that is stupid has arrived. (✓R, ✗NR)

b. (i) Every harmful toxin was eliminated by this product. (✓R, ✓NR)
(ii) #Every toxin that is harmful was by this product. (✓R, ✗NR)

The examples in (73) illustrate further how the relative position of noun and adjective in English determines whether a non-restrictive interpretation of the adjective is possible. The (i)-sentences allow both a restrictive (e.g., 'every word that was unsuitable was deleted') and a non-restrictive interpretation (e.g., 'every word was deleted; they were unsuitable'). By contrast, the (ii)-sentences only have the restrictive one. The minimal pair in (73-c), from Morzycki (2008, (6)), provides further evidence that the unavailability of non-restrictive interpretations for post-nominal modifiers patterns with the presence of oddity effects. Morzycki (2008) explicitly points out for this example that the post-nominal position is odd because '[it] gives rise to the feeling that the speaker does not regard all war crimes as needless and reprehensible'.[26]

[26]This privileged relationship between pre-nominal position and non-restrictive interpretations is also found in Romance, although the generalization takes a different form. In languages like French, Spanish and Italian, pre-nominal adjectives can only be interpreted as non-restrictive.

(i) *Pre-Nominal vs. Post-Nominal APs in Romance*

a. *French*
1) le stupide frère de Jean
the stupid brother of John has arrived (✗R, ✓NR)
2) le frère stupide de Jean
the brother stupid of John has arrived (✓R, ✓NR)

b. *Spanish* (after Mackenzie, 2004)
1) los sofisticados amigos de María
the sophisticated friends of Mary (✗R, ✓NR)
2) los amigos sofisticados de María
the friends sophisticated of Mary (✓R, ✓NR)

c. *Italian* (after Cinque, 2003)
1) le noiose lezioni di Ferri
the boring lectures of Ferri (✗R, ✓NR)
2) le lezione noiose di Ferri
the lectures boring (✓R, ✓NR)

(73) **Pre-Nominal vs. Post-Nominal APs**
from Larson and Marušič (2004, (31)-(32)) and Morzycki (2008, (6))

a. (i) Every unsuitable word was deleted. (✓R, ✓NR)
(ii) Every word unsuitable was deleted. (✓R, ✗NR)

b. (i) Every blessed person was healed. (✓R, ✓NR)
(ii) Every person blessed was healed. (✓R, ✗NR)

c. (i) Every needless and thoroughly reprehensible war crime should be prosecuted. (✓R, ✓NR)
(ii) #Every war crime needless and thoroughly reprehensible should be prosecuted. (✓R, ✗NR)

In sum, adjectives in post-nominal position are unambiguously interpreted in English as NP modifiers, just like RCs; by contrast, the pre-nominal position offers an additional interpretative option which allows non-restrictive interpretations. This syntactic condition, however, is not sufficient in itself to fully license this interpretative option. As we have already seen, the non-restrictive interpretations of pre-nominal adjectives are subject to further contextual pressures:

(74) a. I was talking about politics with Mary's republican father.
b. #I was talking about cats with Mary's republican father.
c. #I was talking about politics with Mary's strong father.

(75) a. I am worried because my handicapped father is waiting at the airport.
b. #Next week, my handicapped father is coming to Boston.
c. #I am worried because my tall father is waiting at the airport.

In these sentences, the target adjectives all appear in pre-nominal position, where a non-restrictive interpretation can syntactially be licensed. Yet the (a)-sentences sound natural, while the (b)-sentences (same adjective, different environment) and the (c)-sentences (same environment, different adjective) are deviant. To account for such contrasts, Leffel (2014) proposes that the non-restrictive interpretation of adjectives is subject to the following felicity condition:

(76) *Relevance Requirement for Non-Restrictive Adjectives* (Leffel, 2014, (3.21))
A non-restrictive adjective is felicitous only if it provides a relevant link between the implication that it introduces and another implication of the sentence or discourse in which it occurs.

By this requirement, the non-restrictive interpretation of a given adjective is felicitous only when it contributes content that is relevant to the discourses it occurs in. Leffel's proposal proves insightful to understand the contrasts above. In (74), we can think of the contribution of *republican* as elaborating on Mary's father political opinions. This elaboration seems coherent with the rest of the assertion since the speaker and Mary's father discussed politics. By changing the topic of their discussion from politics to cats, this very same elaboration becomes incoherent, (74-b); the same incoherence

arises if we change instead the content of the elaboration from Mary's father's political opinions to Mary's father's muscular strength, (74-c). The contrasts in (75) can receive an explanation along the same lines. Intuitively, knowing that the speaker's father is handicapped allows us to understand why the speaker is worried about his father waiting at the airport, (75-a). However, knowing that the speaker's father is tall does not enlighten us at all about the speaker's psychological state, (75-c).

Let me bring two useful points of comparison to Leffel (2014)'s proposal. First of all, it is worth noting that the relevance requirement on the non-restrictive interpretations of adjectives does not apply to their restrictive interpretations. Arguably, the choice of a particular modifier is always driven by certain pragmatic considerations. For instance, it might be slightly odd in run-of-the-mill contexts to refer to one of your brothers as your *tall/small* brother (as opposed to your *younger/older* brother), even if it is true that you have two brothers, only one of which is tall/small. Yet the restrictive interpretation of an adjective need not relate in a particularly relevant way to the rest of the sentence in which it occurs, as evidenced by the contrasts in (77).

(77) *Restricting vs. Non-Restricting APs: Relevance*

a. #I was talking about cats with Mary's brown-haired father. (NR)
b. I was talking about cats with Mary's brown-haired brother. (R)
c. I was talking about cats with Mary's brother that is brown-haired. (R)
d. #Next week, my handicapped father is coming to Boston. (NR)
e. Next week, my handicapped brother is coming to Boston. (R)
f. Next week, my brother that is handicapped is coming to Boston. (R)

Next, I would like to point out that Leffel (2014)'s relevance requirement in (76) might not be peculiar to the non-restrictive interpretations of adjectives. I note for instance that the contrasts observed in (74)/(75) replicate when the information contributed by the non-restrictive interpretation of the target adjectives is expressed instead by means of an ARC, (78), or a parenthetical, (79). I interpret these data as indicating that some (extended) version of the condition in (76) might also be involved in speakers' evaluation of the informative content expressed by supplements.

(78) *Paraphrases of (74)/(75) using ARCs*

a. I was talking about politics with Mary's father, who is republican.
b. #I was talking about politics with Mary's father, who is strong.
c. I'm worried b/c my father, who is handicapped, is waiting at the airport.
d. #I'm worried b/c my father, who is tall, is waiting at the airport.

(79) *Paraphrases of (74)/(75) using Parentheticals*

a. I was talking about politics with Mary's father (he is republican).
b. #I was talking about politics with Mary's father (he is strong).
c. I'm worried b/c my father is waiting at the airport (he is handicapped).
d. #I'm worried b/c my father is waiting at the airport (he is tall).

Taken together, these observations establish that the linguistic signature of non-restrictive 'modifiers' (i) differ in substantial ways from that of genuine NP modifiers,

but (ii) closely resembles this of ARCs and other supplements. I take these observations to support an analysis of non-restrictive adjectives as true appositives. This is the line of analysis that I will pursue in the following.

Syntax and Semantics

My goal now is to offer some plausible compositional mechanisms for the appositive construals of adjectives. Ultimately, these mechanisms will have to explain the pattern of logical entailments associated with these construals, (80). There are several ways to achieve this result. For space reason, I will limit myself to consider two of them.

(80) *Entailment Patterns (to be accounted for)*
John's brown-haired father arrived.
a. *Modifier Use* ≈ John's father that is brown-haired arrived.
$\not\Rightarrow$ John's father is brown-haired
$\not\Rightarrow$ John's father arrived
b. *Appositive Use* ≈ John's father (who is brown-haired) arrived.
⇒ John's father is brown-haired
⇒ John's father arrived

The first avenue is to exploit the similarity between these appositive construals and their overt counterparts, ARCs. Transposing for instance the analysis of ARCs developed in Del Gobbo (2003) (see also McCawley (1988); for latter developments see Schlenker (2010)) to the case of adjectives would deliver for (80) the following LF:

(81) **Appositive Construal: ARC-Type Analysis (to be revised)**
John's brown-haired father arrived.
SS: $[_{\text{TP}}\ [_{\text{ARC}}\ \text{pro}_1\ \text{brown-haired}][_{\text{TP}}\ [_{\text{DP}}\ [+def]\ \_\ [_{\text{NP}}\ \text{father of John}]]\ \text{arrived}]]$

On this analysis, the adjectival phrase *brown-haired* is base-generated with a silent internal subject, a referential or E-type pronoun. The adjective composes with this subject via Functional Application to form a small clause. Then, this clause undergoes movement at LF to be interpreted (i.e., to avoid type-mismatch). We can assume here that ARC-type clauses can raise to any node of propositional type that dominates the LF position of the DP in which they originate (for refinements see Nouwen, 2010). Once raised, the relevant clause can combine with its sister node via the rule in (82). By this rule, the ARC-clause is directly stored into the appositive tier of the semantic representation (underlined) while the proposition it composes with remains accessible to further operations in the assertion tier.[27] On the three-tiered approach

[27]Recall from Section 3.1 that the content of a semantic representation is assumed to be structured in a way that distinguishes presuppositions, appositives and assertions, (10).

(10) Let ϕ be any partial proposition whose three-tiered semantic content is identified left-to-right at LF as $presuppose^{\phi}$, $appositive^{\phi}$ and $assert^{\phi}$.

$$[\![\phi]\!]= \lambda w. \left\{ \begin{array}{l} 1 \text{ if } presuppose^{\phi}(w) = 1 \land (appositive^{\phi}(w) = 1 \land assert^{\phi}(w) = 1) \\ 0 \text{ if } presuppose^{\phi}(w) = 1 \land (appositive^{\phi}(w) = 0 \lor assert^{\phi}(w) = 0) \end{array} \right\}$$

to semantic content pursued in this chapter (see Section 3.1), the truth-conditional effect resulting from the application of this rule in the example above amounts to a conjunctive interpretation of the appositive (i.e., *John's father is brown-haired*) and asserted (i.e., *John's father arrive*) content.

(82) **Clausal Apposition**
Let α be an ARC and β be any proposition: $[\![[_{\text{ARC}}\ \alpha]\ [\beta]]\!] = \ :\ \underline{[\![\alpha]\!]}.\ [\![\beta]\!]$

In principle, the interpretation of the pronoun in (81), i.e. the subject of the adjectival appositive, can follow from standard assumptions about the interpretation of referential pronouns. An utterance context is appropriate for an utterance of (81) only if this context determines an assignment function g such that $1 \in dom(g)$. In the present case, the intended reading obtains if the assignment function assigns to 1 the value *john's father*. Note though that nothing in the logical form of this sentence forces this specific valuation at this point, and therefore another value could in principle be assigned to this index. We would like to capture the fact that the interpretation of the subject of an adjectival appositive always amounts to some definite description whose restrictor is identical to this of the DP this appositive relates to, as in (83).

(83) a. The unsuitable words were deleted.
≈ the words were deleted; they (=the words) were unsuitable
b. Every unsuitable word was deleted.
≈ every word were deleted; they (=the words) were unsuitable

One way to do so is to assume that the subject of an adjectival appositive is a genuine definite DP whose NP-restrictor is a copy of the NP-restrictor of the DP this appositive relates to, as shown in (84). In the case of distributive quantifier like *every*, plural features need to be added to the composition of the appositive clause, consistent with the observation that these quantifiers only license plural discourse anaphora. This D-type analysis is consistent with Del Gobbo (2003)'s E-type analysis for ARCs. It seems also unproblematic in terms of 'spell-out' since, given identity, we can plausibly assume that the NP shall undergo deletion at PF.

(84) **Appositive Construal: ARC-Type Analysis (final)**
a. John's brown-haired father arrived.
≈ John's father arrived; he is brown-haired
SS: $[_{\text{TP}}\ [_{\text{ARC}}\ [_{\text{DP}}\ [+def]\ \text{NP}_i]$ brown-haired$][_{\text{TP}}\ [_{\text{DP}}\ [+def]\ _\ [_{\text{NP}_i}$ F of J$]]$ arrived$]]$
b. Every unsuitable word was deleted.
≈ every word was deleted; they were unsuitable
SS: $[_{\text{TP}}\ [_{\text{ARC}}\ [_{\text{DP}}\ [+def]\ \text{PL}\ \text{NP}_i]\ \text{PL}$ unsuitable$]\ [_{\text{TP}}\ [_{\text{DP}}$ every $\_\ [_{\text{NP}_i}$ W$]]$ was deleted$]]$

This analysis delivers for (84-a) the final semantic representation in (85). This representation captures our intuitions about the truth-conditions of this sentence on its appositive construal: it is true just in case John has only one father (presupposition), John's father is brown-haired (appositive) and John's father arrived (assertion).

(85) **Semantic Representation for (84-a)**

a. Presupposition: $\exists!x[[\![\text{father}]\!]^w(j)(x)]$
i.e., John has only one father

b. Appositive: $[\![\text{brown-haired}]\!]^w(\sigma x.\ [\![\text{father}]\!]^w(j)(x))$
i.e., John's father is brown-haired

c. Assertion: $[\![\text{arrive}]\!]^w(\sigma x.\ [\![\text{father}]\!]^w(j)(x))$
i.e., John's father arrived

$[\![(84\text{-a})]\!]^w$ is defined iff John has only one father in w; whenever defined,
$[\![(84\text{-a})]\!]^w = 1$ iff John's father is brown-haired in w and John's father arrived in w.

Another plausible analysis for these construals is offered in Leffel (2014). The main difference with the analysis we have just sketched is that, on Leffel (2014)'s analysis, the AP remains 'in-situ', at the edge of the DP it occurs in, while the determiner of this DP overtly raises up, right above the AP, as shown in (86).

(86) **Leffel (2014)'s Analysis**
John's brown-haired father arrived.
SS: $[_{\text{TP}}\ [_{\text{DP}}\ \cancel{[+def]}\ [_{\text{DP}}\ [_{\text{AP}}\ \text{brown-haired}]\ [_{\text{DP}}\ [+def]\ \text{father of John}]]]\ \text{arrived}]$

On this analysis, the AP in (86) does not form in itself a syntactic clause for it lacks a subject; however, on the assumption that the definite determiner is interpreted in its lower position, this AP can combine with its sister DP (i.e., the subject DP of the whole clause) to form a semantic object of propositional type. In order for this to be possible, we have to positive another rule of composition:[28]

(8) **Predicate Apposition** (modeled after Leffel, 2014)
Let α be of type $\langle\sigma, \text{t}\rangle$, β be of type $\langle\sigma\rangle$ and assume XP is not a clausal syntactic category. For any possible world w: $[\![[_{\text{XP}}\ \alpha\ \beta]]\!]^w = \ :\ \underline{[\![[\alpha\ \beta]]\!]^w}.\ [\![\beta]\!]^w$

By this rule, the subject DP *John's father* in (86) is applied to the AP *brown-haired* via Functional Application, forming a separate appositive clause, but remains available for the rest of the derivation, which proceeds as usual. The semantic representation delivered for (84-a) on this analysis is similar to the one we obtain on the previous analysis, (85). An advantage of this analysis is that it immediately captures the fact that the 'subject' of the adjectival appositive always coincides with the DP in which the AP occurs. Some minor adjustments are necessary however in the case of quantificational DPs which cannot directly compose with the AP by Predicate Apposition (e.g. *every unsuitable word was deleted*). One possibility to account for these cases is to assume that these DPs are analyzed at LF as instances of partitives, as proposed in (87). On this assumption, the derivation proceeds as previously described.

(87) Every unsuitable word was deleted.
LF: $[_{\text{TP}}\ [_{\text{DP}}\ \text{every}\ <\text{of}_{\text{PART}}>\ [_{\text{DP}}\ [_{\text{AP}}\ \text{unsuitable}]\ [_{\text{DP}}\ <[+def]>\ \text{words}]]]\ \text{was deleted}]$

[28] The underlined part in (8) is treated as a presupposition in Leffel (2014), in line with Schlenker (2010). For us, this part belongs to the appositive tier of the semantic representation.

We have presented two ways to analyze the appositive construals of pre-nominal adjectives. Whether one of these analyses should be favored over the other remains an open empirical question that I shall leave at this point for future investigations. Crucially, both analyses capture the patterns of entailments associated with adjectival appositives that we were trying to account for, (80). For the present approach, this result has two immediate consequences. First, it allows us to understand why restrictiveness effects are absent with pre-nominal adjectives (e.g., *The stupid French President arrived*): whenever an adjective is construed as an appositive, the sentence in which it occurs lacks the kind of excludable alternative based on which the restrictiveness effects normally obtain (e.g., *The French President arrived*). Second, the syntactic restrictions on the availability of these construals accounts for the different contrasts previously observed between pre-nominal adjectives vs. RCs/post-nominal adjectives (e.g., # *The French President that is stupid arrived*): RCs/post-nominal adjectives, unlike pre-nominal adjectives, can only be construed as NP modifiers. In the next section, I turn to the relevance requirement that the appositive use of adjectives appears to be subject to.

Extending Relevance to Appositive Content

The final puzzle we will address is exemplified by the following contrasts:

(88) a. #Sue's mother that is republican will vote for Trump. (✓R, ✗NR)
b. Sue's republican mother will vote for Trump. (✓R, ✓NR)
c. #Sue's tall mother will vote for Trump. (✓R, ✓NR)

(89) a. #Sue needs to take care of her father that is handicapped. (✓R, ✗NR)
b. Sue needs to take care of her handicapped father. (✓R, ✓NR)
c. #Sue needs to take care of her brown-haired father. (✓R, ✓NR)

We have already explained the oddness of the (a)-sentences. These sentences involve a RC which can only be construed as an NP modifier. Upon exhaustification, the meaning of these sentences delivers a restrictive interpretation that conflicts with speakers' contextual assumptions. We have also explained why the (b)-sentences can escape this fate. In addition to their modifier use, the adjectives in these sentences can be construed as appositives. Adjectival appositives are essentially predicative; they deliver a non-restrictive interpretation which blocks the implicature reasoning at work in the (a)-sentences. What we need to explain now is why the (c)-sentences remain deviant despite the syntactic licensing of a non-restrictive/appositive interpretation.

Following Leffel (2014), I propose that the oddness of the (c)-sentences (on their appositive construal) lies in the irrelevance of their appositive content: these sentences are deviant because their appositive content cannot be related in a discourse-coherent fashion to their asserted content; in the absence of such a link, the contribution of their appositive content is perceived as superfluous for the purpose of the conversation, hence the oddness of these sentences. To formalize this idea, I propose to make use of the familiar notion of relevance to a question (henceforth Q-Relevance). The principle I offer is given in (90). The formulation of this principle assumes that questions

denotes or induced a partition of the logical space (a.o. Heim, 1994; Groenendijk, 1984; Groenendijk and Stokhof, 1985; Belnap, 1982; Bennett, 1979). For simplicity, I will often use the term 'question' in the following to refer to the partition of the logical space denoted or induced by this question.

(90)

Q-Relevance
Let Q be a partition of W, the set of all possible worlds.
Definition: A proposition ϕ is Q-relevant if and only if
a. $assertion^{\phi}$ is Q-relevant, that is for any cell $q \in Q$ and any two worlds $w, w' \in q$, $assertion^{\phi}(w) = assertion^{\phi}(w')$, and
b. for every proposition p in $appositive^{\phi}$, there is a discourse-coherent follow-up question Q' to $assertion^{\phi}$ s.t. p is Q'-relevant.
Condition: An utterance of ϕ is odd given Q if ϕ is not Q-relevant.

The first part of the definition, (90-a), corresponds to the standard notion of Q-Relevance. It says that a proposition ϕ is relevant to a question Q only if the asserted content of this proposition, noted $assertion^{\phi}$, does not distinguish between two worlds within a cell of Q. To illustrate, consider the contrasts in (91)-(92). For the sake of simplicity, let us assume for these toy examples that our domain of individuals includes only two individuals, say John (j) and John's father (f).

(91) Q: Did John arrive? $Q = \{\{\lambda w.\ arrived(j)(w)\}, \{\lambda w.\ \neg arrived(j)(w)\}\}$
a. John arrived. (✓Q-relevant)
b. #John arrived and it is sunny. (✗Q-relevant)

(92) Q: Who arrived?
$Q = \{\{\lambda w.\ arrived(j)(w) \wedge arrived(f)(w)\}, \{\lambda w.\ \neg arrived(j)(w) \wedge arrived(f)(w)\},$
$\{\lambda w.\ arrived(j)(w) \wedge \neg arrived(f)(w)\}, \{\lambda w.\ \neg arrived(j)(w) \wedge \neg arrived(f)(w)\}\}$
a. John arrived. (✓Q-relevant)
b. #John arrived and it is sunny. (✗Q-relevant)

The questions Q in (91)-(92) induce a partition of the logical space which corresponds to their set of possible complete answers. Each of these possible complete answers corresponds to a cell of the partition. For instance, for the 'yes-no' question in (91), this partition counts two cells: the cell corresponding to the set of worlds w in which the proposition *John arrived* is true, and this corresponding to the set of worlds w in which this proposition *John didn't arrive* is true. The contrast between the (a) and the (b)-sentences above can be accounted for in terms of Q-Relevance. The (b)-sentences, unlike the (a)-sentences, provide some additional information (i.e., it is sunny) that is superfluous to Q. This excess of information results in a decrease of relevance which is responsible for the oddness of these sentences.

The second part of the definition, (90-b), corresponds to the core of my proposal. It says that the appositive content of a proposition ϕ, noted $appositive^{\phi}$, is relevant only if if for every proposition p in $appositive^{\phi}$, it is possible for the addressee(s) to accommodate a side-question Q' such that p is Q'-relevant and Q' is a discourse-coherent follow-up question given $assertion^{\phi}$. Whenever this accommodation process

fails, the information that *appositive*$^{\phi}$ contributes to will systematically be perceived as superfluous relative the main question that *assertion*$^{\phi}$ aims at addressing. To illustrate, consider the following contrasts:

(93) Q: Did John's father arrived?/Who arrived?
  a. John's father arrived.
  b. John's stupid/awesome father arrived.
    (i) Assertion: John's father arrived
    (ii) Appositive: John's father is stupid/awesome
  c. #John's brow-haired/tall father arrived.
    (i) Assertion: John's father arrived
    (ii) Appositive: John's father is brown-haired/tall

On their intended readings, all these sentences have the same asserted content, i.e. John's father arrived. In addition to this asserted content, the sentences in (93-b) and (93-c) also have an appositive content which corresponds to the proposition expressed by their adjectival appositives. By our principle, (93-b) and (93-c) are Q-relevant only if it is possible for the interlocutors to accommodate a discourse-coherent follow-up question Q' such that the appositive content of these sentences is Q'-relevant. Different attempts to verify this condition are illustrated in (94). The results suggest that this accommodation process can be easily undergone for (93-b). By contrast, this process seems quite difficult in run-of-the-mill contexts for (93-c). Hence, the sentences are predicted by Q-Relevance to be perceived as odd.

(94) Q: Did John's father arrived?/Who arrived?
A: John's father arrived. (✓Q-relevant)
  a. Discourse-coherent follow-up questions
  Q': OKAnd what do you think of him?
  Q': OKAnd do you like him?
  b. Discourse-incoherent follow-up questions
  Q': #And what's his hair color/height?
  Q': #And is he brown-haired/tall?
  c. Q-Relevance
  A': OKJohn's stupid/awesome father arrived. (✓Q-relevant)
  A': #John's brown-haired/tall father arrived. (✗Q-relevant)

On this analysis, it is hypothesized that, when presented with a sentence, speakers interpret this sentence and evaluate its relevance. In order to do so, speakers have to figure out what questions the asserted and appositive content of this sentence are intended to address in context. In the case of the adjectival appositives *brown-haired* and *tall* above, this process fails because the information provided by these appositives do not connect in a coherent fashion to the rest of the discourse. A prediction that directly follows from this analysis is that the oddity effects generated by the use of irrelevant appositives does not depend *per se* on their semantic contribution, but rather on whether their semantic contribution can be understood at a given context

as addressing a plausible side-question at this context. We expect for instance the oddness generated by the appositive use of *brown-haired* to disappear in the right circumstances, e.g. if a question like *What color is John's father's hair?* becomes in context a plausible follow-up question. This prediction is borne out, (95).

(95) Are only blond people coming tonight? - No! Look! ...
John's brown-haired father just arrived. (✓Q-relevant)

$$\left\{ \begin{array}{l} \text{Q: Who just arrived?} \\ \text{Q': } {}^{\text{OK}}\text{And what's his hair color?/Is he blond?} \end{array} \right\}$$

For the same reasons, we expect the appositive use of *awesome* to become superfluous if it is used instead in a context in which speakers' attitude towards other people are not of interest to the addressee(s). It is so for instance in more formal social contexts where speakers are not expected to express their feelings towards other people, and therefore where a question like *What do you think of that person?* is not of interest. This prediction is also borne out, as shown in (96).

(96) Q: What's the purpose of your trip in the US?
A: I am visiting my father. (✓Q-relevant)

a. *Context: a dialogue between two friends.*
Q': $^{\text{OK}}$And what do you think of him?
A': $^{\text{OK}}$I am visiting my awesome father. (✓Q-relevant)

b. *Context: a dialogue between a traveler and a Border Protection Officer*
Q': $^{\#}$And what do you think of him?
A': $^{\#}$I am visiting my awesome father. (✗Q-relevant)

Another example of such contextual variations is provided in (97). The first observation here is that the appositive use of a color adjective like *blue* is perceived as relevant when the information it provides us with increases our likelihood to find a particular object among many others, (97-a). However, this very same information becomes superfluous if the discrimination process whereby this object can be identified is unproblematic, (97-b).

(97) Q: What object should I point to?
A: Point to the circle.

a. *Context: there are plenty of objects of various colors and shapes displayed in front of you. Few of them are blue. There is only one circle total.*
Q': $^{\text{OK}}$What color is it?
A': Point to the blue circle. (✓Q-relevant)

b. *Context: there is a couple of objects displayed in front of you, a red square and a blue circle.*
Q': $^{\#}$What color is it?
A': $^{\#}$Point to the blue circle. (✗Q-relevant)

I have only considered so far cases involving adjectival appositives. Yet the formulation of Q-Relevance hypothesizes that this principle applies in full generality to any (propositional) appositive content, regardless of how this content comes about in the derivation. Empirical support in favor of this general application comes from the observation that the contrasts observed above for adjectival appositives, e.g. (88)-(89), replicate when their appositive content is expressed by means of other appositive construals like appositive relative clauses (ARCs) and parenthetical clauses, as illustrated in (98)-(99). These similarities are accounted for if we assume that (i) both the asserted and the appositive content of a sentence is taken into account in evaluating the relevance of a semantic representation in context, and (ii) the process whereby speakers evaluate the pragmatic contribution of these different appositive construals obeys the same guiding principle. This is what Q-Relevance offers.

(98) Q: Who will vote for Trump?
A: Sue's mother will vote for Trump.
a. Q': $^{\text{OK}}$Is she republican? (✓Q-relevant)
(i) Sue's republican mother will vote for Trump.
(ii) Sue's mother, who is republican, will vote for Trump.
(iii) Sue's mother will vote for Trump (she is republican).
b. Q': #Is she tall? (✗Q-relevant)
(i) #Sue's tall mother will vote for Trump.
(ii) #Sue's mother, who is tall, will vote for Trump.
(iii) #Sue's mother will vote for Trump (she is tall).

(99) Q: What does Sue need to do?
A: Sue needs to take care of her father.
a. Q': $^{\text{OK}}$Why does she need to? (✓Q-relevant)
(i) Sue needs to take care of her handicapped father.
(ii) Sue needs to take care of her father, who is handicapped.
(iii) Sue needs to take care of her father (he is handicapped).
b. Q': #Is he brown-haired? (✗Q-relevant)
(i) #Sue needs to take care of her brown-haired father.
(ii) #Sue needs to take care of her father, who is brown-haired.
(iii) #Sue needs to take care of her father (he is brown-haired).

As a follow-up to these observations, let me finally point out that the present approach captures certain characteristic features of ARCs previously discussed in Potts (2005) and Schlenker (2010). First of all, Potts (2005) observes that the contribution of an ARC is not 'at issue' in the sense that it cannot easily be targeted by a negation in discourse. With this respect, ARCs behave like presuppositions and unlike mere conjuncts, (100). This feature is captured on the present approach by the formal distinction between appositive and asserted content at the level of the semantic representation: just like presuppositions, appositives project out of various operators.

(100) *The contribution of an ARC is not at issue (Potts, 2005)*

a. Lance, who is a cancer survivor, won the Tour de France. - No!
   $\Rightarrow$ Lance survived cancer.

b. Mary knows that Lance survived cancer. - No!
   $\Rightarrow$ Lance survived cancer.

c. Lance survived cancer and won the Tour de France. - No!
   $\not\Rightarrow$ Lance survived cancer.

Second, Potts (2005) argues that, unlike the content of presupposition, the content of an ARC must be non-trivial, (101). This feature is captured by Q-Relevance. By Q-Relevance, every proposition in the appositive tier of a semantic representation must pertain to a follow-up question. Since follow-up questions are by definition questions which have not been answered yet, it follows that the content of an appositive should be informative.

(101) *The contribution of an ARC is non-trivial (Potts, 2005)*
Armstrong survived cancer. ...

a. #Lance, who survived cancer, won the Tour de France.

b. Mary knows he did

Finally, Schlenker (2010) argues that the content of an ARC must be non-controversial and suggests that the contrast in (102) establishes this point: the information that Sarkozy is the commander in chief is not controversial whereas the information that he murdered his wife should be quite surprising (unless, of course, it is already known).

(102) *The contribution of an ARC is non-controversial (Schlenker, 2010)*

a. Sarkozy, who is the commander in chief, has just murdered his wife.

b. #Sarkozy, who has just murdered his wife, is the commander in chief.

This observation can also be accounted for in terms of Q-Relevance, although the analysis takes a slightly different form. By Q-Relevance, the content of an appositive must pertain to a side-question that relates to the asserted content in a discourse-coherent fashion. On this view, the content of an appositive should anticipate the communicative needs of the addressee that could arise based on the asserted content. This rules out in principle any information that could surprise the hearer given the asserted content. I suggest therefore that the contrast in (102) does not directly follow from the fact that the informative content of the ARC is in itself surprising but rather from the fact that it is surprising given the question that the asserted content seems to be addressing. This line of explanation is supported by the following contrast:

(103) a. Sarkozy, who has just won $20 million at the lottery, wants to buy a $10 million yacht and go on a trip around the world.

b. #Sarkozy, who has just won $20 million at the lottery, is the former President of France.

Overall, the present data support the view that speakers' evaluation of the pragmatic contribution of appositives is driven by specific relevance considerations. I have proposed to capture the variations observed in acceptability judgments (good vs. odd) via the principle in (90), *Q*-Relevance, which owes a great deal to Leffel (2014)'s generalization, (76). By this principle, a speaker who intends to be relevant should make his main contribution *and* his side contributions appropriate to immediate communicative needs. I have provided some empirical evidence in favor of the general application of *Q*-Relevance across different kinds of appositive construals. A more detailed comparative analysis will be needed before reaching a firm conclusion.

3.4 Synthesis

It is common practice to attribute to subsective NP modifiers the property of being 'restrictive'. And indeed upon hearing a sentence like *John's brown-haired brother arrived* or *John's brother that you met arrived*, we interpret the contribution of the NP modifiers as restricting the denotation of the noun they modify, and infer that John has at least two brothers. The observation we started with is that these interpretative effects do not logically follow from the semantic representation of subsectively modified NP: an NP N subsectively modified by a modifier M simply denotes a subset of what N denotes. This gap between, on the one hand, the logical inferences licensed by subsective NP modification and, on the other hand, the restrictive interpretations speakers spontaneously access is the crux of the restrictiveness puzzle. The solution I have put forward can be synthesized in three steps.

First, I have proposed that genuine restrictiveness effects associated with NP modification come about as a result of an implicature, (104). I have suggested though that, in some cases, similar effects could obtain via different grammatical mechanisms such as those involved in interpreting narrow or contrastive focus. Yet my observations regarding the role of focus in generating restrictiveness effects were only preliminary and this research topic would deserve further attention.

(104) **Restrictiveness Effects via Implicatures**

a. ϕ: John's blond brother arrived
   (i) $\text{EXCL}_{prs}(\phi) \supseteq \{\lfloor_{\psi}$ John's brother arrived$\rfloor\}$
   (ii) $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!] \Rightarrow \neg$(J has a unique brother)$\wedge$(J's blond brother arrived)
   Restrictiveness: John has at least two brothers, only one of them is blond

b. ϕ: John's French associates arrived
   (i) $\text{EXCL}_{prs}(\phi) \supseteq \{\lfloor_{\psi}$ John's associates DIST arrived$\rfloor\}$
   (ii) $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!] \Rightarrow \neg$(each of J's associates arrived)$\wedge$(each of J's French associates arrived)
   Restrictiveness: John has at least three associates, not all of them are French

c. ϕ: Every chemical that is harmful was eliminated
   (i) $\text{EXCL}_{asr}(\phi) \supseteq \{\lfloor_{\psi}$ Every chemical was eliminated$\rfloor\}$
   (ii) $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!] \Rightarrow$(every chemical that is harmful was eliminated)$\wedge\neg$(every chemical was eliminated)
   Restrictiveness: not all chemicals are harmful

Second, I have explained how the oddity effects associated with the use of non-restricting subsective NP modifiers can be accounted for along the lines of Magri (2009, 2011, 2014, and subsequent works): whenever an excludable alternative is contextually equivalent to the prejacent of (an occurrence of) the exhaustivity operator, the implicature associated with this alternative is mandatory, resulting in a strengthened meaning that conflicts with common knowledge, (105).

(105) **Oddity Effects as Contextual Contradictions**

a. $C \subseteq$ *John has only one father* and $C \subseteq \delta om(\llbracket \phi \rrbracket)$
   ϕ: #John's blond father arrived. $(\phi \Leftrightarrow_C \psi)$
   (i) $\text{EXCL}_{prs}(\phi) \supseteq \{\lfloor_\psi$ John's father arrived$\rfloor\}$
   (ii) $\llbracket \text{EXH}_{\mathcal{R}}\ \phi \rrbracket \Rightarrow$ #John has at least two fathers

b. $C \subseteq$ *John has only two parents* and $C \subseteq \delta om(\llbracket \phi \rrbracket)$
   ϕ: #John's French parents arrived. $(\phi \Leftrightarrow_C \psi)$
   (i) $\text{EXCL}_{prs}(\phi) \supseteq \{\lfloor_\psi$ John's parents arrived$\rfloor\}$
   (ii) $\llbracket \text{EXH}_{\mathcal{R}}\ \phi \rrbracket \Rightarrow$ #John has at least three parents

c. $C \subseteq$ *Toxins are harmful* and $C \subseteq \delta om(\llbracket \phi \rrbracket)$
   ϕ: #Every toxin that is harmful was eliminated. $(\phi \Leftrightarrow_C \psi)$
   (i) $\text{EXCL}_{asr}(\phi) \supseteq \{\lfloor_\psi$ Every toxin was eliminated$\rfloor\}$
   (ii) $\llbracket \text{EXH}_{\mathcal{R}}\ \phi \rrbracket \Rightarrow$ #Not all toxins are harmful

Third, I have proposed that non-restricting adjectives in pre-nominal position may escape the logic illustrated in (105) because of their dual behavior in English. On their appositive construal, the contribution of these adjectives parallels that of ARCs: they are used predicatively to form separate sentences which serve to make side-remarks of some kind. I have suggested that this appositive use of pre-nominal adjectives is subject to specific relevance considerations similar to those ARCs and parentheticals are subject to: the appositive content of a sentence should only address side-questions that are related in a discourse-coherent fashion to the asserted content of this sentence, thus anticipating the communicative needs of the addressee that could arise based on what is asserted. When an appositive fails to do, its content is perceived as irrelevant, and the sentences in which it occurs is then perceived as odd, (106).

(106) **Modifier vs. Appositive Construal**

a. #John's tall father uses this shampoo.
   (i) #Modifier Construal
   John's father that is tall uses this shampoo
   Restrictiveness: #John has at least two fathers (Exhaustivity)
   (ii) #Appositive Construal
   John's father, who is tall, uses this shampoo
   Appositive: #John's father is tall (✗Q-relevant)

b. John's brown-haired father uses this shampoo.
   (i) #Modifier Construal
   John's father that is brown-haired uses this shampoo
   Restrictiveness: #John has at least two fathers (Exhaustivity)
   (ii) ✓Appositive Construal
   John's father, who is brown-haired, uses this shampoo
   Appositive: John's father is brown-haired (✓Q-relevant)

Chapter 4

Partitives and Proper Partitivity

Summary This chapter is concerned with the syntax, semantics and pragmatics of partitive nominal constructions involving count nouns (e.g., *three of the children*). These constructions are well-known to give rise to inferences of proper partitivity: the partitive DP (e.g., *three of the children*) is interpreted as denoting a proper subset of the denotation of the DP within the *of*-phrase (e.g., *the children*). Hence, upon hearing a sentence such as *Mary saw three of John's children*, we spontaneously understand that John has more than three children. Contra Barker (1998)'s classical analysis, I defend here the view that partitive constructions semantically encode the reflexive 'part-of' relation, and that proper partitivity (i.e., the irreflexive 'proper-part' inference) comes about as a result of an implicature (e.g., *John does not have exactly three children*). I argue that the anti-uniqueness effects exhibited by partitives, previously thought of as a consequence of their inherent 'proper-part' meaning, are to be attributed to an independent constraint related to structural economy: definite partitives are perceived as deviant (e.g., **the three of the children*) whenever their logical meaning is expressible by means of a structurally simpler alternative (e.g., *the three children*).

Keywords: partitives, proper partitivity, anti-uniqueness, economy, implicatures

4.1 The Partitivity Puzzle

This chapter is concerned with nominal constructions such as *three of the children*, where the preposition *of* is the exponent of a partitive relation between the extended NP before the preposition (henceforth, xNP_1) and the extended NP within the *of*-phrase (henceforth, xNP_2). Descriptively, it is possible to identify several kinds of partitives depending on whether we emphasize the nature of xNP_1 or rather the nature of xNP_2, as exemplified in (1) and (2) respectively. In the following, I explore the syntax, semantics and pragmatics of the part-whole relationships at work in these constructions focusing on the case of cardinal partitives involving count nouns.

(1) a. two of these five girls/two of some girls I met (cardinal partitives)
b. two liters of water/five feet of snow (measure partitives)
c. three quarters of the cake/my friends (fraction partitives)

(2) a. two of these five girls/two of some girls I met (count partitives)
b. half of the cheese/all of the cheese (mass partitives)

Let me start by stating the platitude, namely the reason why these constructions are called *partitives*. Setting aside for now the properties of the part-whole relation these constructions involve (i.e., partitivity vs. proper partitivity), the basic observation is that the interpretation of these constructions exhibits a partitivity requirement: they are sensical only if it is possible two build up the denotation of xNP_1 as a 'part' of the denotation of xNP_2. This semantic restriction is exemplified in (3).

(3) *Partitivity Requirement*
a. #Mary met four of John's three children.
cf. Mary met two of John's three children.
b. #Mary talked to two of every person that John met.
cf. Mary talked to two of every seven people that John met.

Intuitively, the sentences in (3) are odd because the entity denoted by the complement of the *of*-PP, i.e. xNP_2 or the trace left by QR-ing xNP_2, does not have enough atomic parts for each of the atomic parts of xNP_1 to be part of it. The sentence in (3-a), for instance, presupposes that John has three children but asserts that Mary met four of them, an assertion that can never be true given our common understanding of the part-whole relation. Similarly, the LF output delivered for (3-b), after xNP_2 has undergone QR, gives us inconsistent truth-conditions: (3-b) is true if and only if, for every person that John met, Mary met two atomic parts of this person. By contrast, note that the minimally different sentence *Mary talked to two of every seven people that John met* is unproblematic since, in this case, the plural individual that xNP_2 universally quantifies over has enough atomic parts for the partitivity requirement to be met (i.e., for every seven people John met, Mary talked to two of these people). One simple way to encode this semantic restriction is to assume that the partitivity requirement is contributed by the preposition *of*, that is partitive *of* (henceforth of_{PART}) relates two individuals by the 'part-of' relation ($\leq$) as proposed in (4). I will henceforth refer to this approach as the partitivity view.

(4) $[\![\text{of}_{\text{PART}}]\!](y)(x) = 1$ if and only if $x \leq y$ (partitivity)

The part-of relation in (4) is interdefinable in terms of the join operation: $x \leq y$ if and only if the mereological sum of x and y is identical to y. This definition captures on logical grounds the impossibility that a plural individual made up of n atomic elements be part of another individual made up of less than n atomic elements, and therefore accounts for the contrasts observed above (i.e., given partitivity, (3-a) and (3-b) are false in every model). This simple view, however, faces a serious empirical challenge which is at the core of the puzzle explored in this chapter: partitive constructions exhibit proper partitivity and anti-uniqueness effects, (5).

(5) **The Puzzle: Proper Partitivity and Anti-Uniqueness**

a. #Mary met (the) one of John's father.
   cf. Mary met John's father.

b. #Mary met (the) two of John's parents.
   cf. Mary met John's two parents/one of John's parents.

c. #Mary met (the) three of John's three children.
   cf. Mary met John's three children/two of John's three children.

d. #Mary met (the) one of every child.
   cf. Mary met every child.

The puzzle raised by the sentences in (5) is as follows. As it is standardly defined, the part-of relation is a reflexive relation: everything is part of itself. As a result, cases of identity qualify as cases of partitivity, and therefore each of the partitive constructions in (5), with or without the definite determiner, should be acceptable. In (5-a), for instance, it is possible to conceptualize an (atomic) individual that would be part of John's father; there is in fact only one logical possibility, namely John's father himself. Similar observations hold of the sentences in (5-b)-(5-d). But if of_{PART} simply expresses partitivity, then why are these sentences deviant?

Taken at face value, the sentences in (5) teach us that partitivity is not enough by itself to capture the restrictions at work in nominal partitives. Specifically, these partitives seem to be acceptable only if it possible to build up the denotation of xNP_1 as a 'proper part' of the denotation of xNP_2. An alternative approach to partitives along these lines is Barker (1998)'s. Following Barker's proposal, the lexical entry for of_{PART} is to be rewritten as in (6) so as to exclude the problematic cases of identity we have just encountered. I will refer to this approach as the proper partitivity view.

(6) $[\![\text{of}_{\text{PART}}]\!](y)(x) = 1$ if and only if $x \leq y$ and $x \neq y$ (proper partitivity)

On this view, a sentence such as *Mary met two of John's children* is true if and only if there exists a plural individual made up of two atomic individuals that Mary met and that is a proper part of John's children, which logically entails that John has more than two children. One can then explain the deviance of the sentences in (5) simply by observing that, in these cases, the proper partitivity component grounded into the lexical meaning of of_{PART} leads to inconsistency. For instance, given (6), a sentence such as #*Mary met two of John's parents* is true only if John has at least three parents,

a requirement that conflicts with common knowledge (i.e., people have at most two parents). This proposal further accounts for the long-standing observation that a partitive may not appear with a definite determiner unless modified (a.o. Jackendoff, 1968): given (6), the definite variants of the partitives in (5) lead to a presupposition failure because any countable entity, atoms or pluralities, has either no proper part (e.g., *John's father*) or more than one proper part (e.g., *John's parents*).

This view offers at first sight a simple solution to the proper partitivity puzzle, accounting all at once for the proper partitivity inferences associated with partitives and for the anti-uniqueness constraint they are subject to. Yet researchers have pointed out that its appeal is undermined by various over-generation issues (a.o., Ionin et al. 2006; Le Bruyn 2007; Shin 2007). To illustrate, I will mention here a couple of them. First of all, it has been observed in Sauerland and Yatsushiro (2004, footnote 6) that encoding proper partitivity into the semantics of of_{PART} predicts certain inferences that are stronger than empirically attested, as shown by the interpretative contrast between (7-a) and (7-b). Consistent with (6), the sentence in (7-a) requires that John has more than three sisters. However, the sentence in (7-b) has a reading on which only some of the relevant students are required to have more than three sisters. Such contrasts are problematic for the proper partitivity view which predicts here that every student should be required to have more than three sisters.

(7) *Bound Partitives in Quantificational Sentences*

a. John invited three of his sisters.
   $\rightsquigarrow$ John has more than three sisters

b. Every student invited three of his sisters.
   $\rightsquigarrow$ At least one student has more than three sisters

As a follow-up to Sauerland and Yatsushiro (2004)'s observations, let me point out a related, yet more worrisome issue for the proper partitivity view: proper partitivity inferences can be suspended. For instance, a sentence such as *Mary met three of John's sisters* can be felicitously uttered in a context where the interlocutors are known to be ignorant as to whether John has exactly three or more than three sisters. The paradigm in (8) establishes this point. The case in (8-c) is problematic for the proper partitivity view which incorrectly predicts that we should attribute to the speaker the belief that John has more than three sisters.

(8) *Suspended Proper Partitivity: Opinionated vs. Uncertain Speaker*
Did Mary meet all of John's sisters?

a. #Yes, she met three of them/John's sisters. (opinionated, $n = 3$)

b. ^{ok}No, she met three of them/John's sisters. (opinionated, $n > 3$)

c. I don't know whether John has three or four sisters: (uncertain, $n \geq 3$)
   ^{ok}but Mary met three of them/John's sisters.

Second, it has been noted that the proper partitivity view fails to adequately capture the syntactic distribution of anti-uniqueness effects (a.o., Ionin et al. 2006; Shin 2007). On this view, the anti-uniqueness effects observed in (5) are reducible to a special

case of proper partitivity effects: anti-uniqueness effects are hypothesized to directly follow from the semantics of of_{PART} and, as a result, are predicted to arise in any syntactic environment in which of_{PART} occurs. This prediction, however, also appears to be too strong. For instance, it incorrectly rules out the measure and pronominal partitive constructions in (9), which are definite and yet fully acceptable.[1]

(9) *Missing Anti-Uniqueness Effects (from Ionin et al., 2006, (40b))*
   a. Mary, John, and Peter did not show up. The three of them were sick.
   b. John spent the (entire) two hours of his free time sleeping.

To summarize this overview, neither the 'improper' partitivity nor the proper partitivity view provides us with a satisfying solution to the proper partitivity puzzle, leaving us at this point with the following dilemma:

- **The Partitivity View is too Weak!**
  On this view, of_{PART} expresses the part-of relation, (4), which is compatible with cases of identity. This view accounts for the basic partitivity requirement, but leaves the proper partitivity and the anti-uniqueness effects unaccounted for.

- **The Proper Partitivity View is too Strong!**
  On this view, of_{PART} expresses the proper-part relation, (6), which excludes cases of identity. This view makes incorrect predictions regarding both the logical strength of the proper partitivity inferences associated with partitives and the syntactic distribution of their anti-uniqueness effects.

The solution to the partitivity puzzle advocated for in this chapter offers a way out of this dilemma. This solution comes in two parts. First, I propose that partitive constructions semantically encode partitivity (i.e., of_{PART} encodes the reflexive '$\leq$' relation, (4)), and that proper partitivity comes about as a result of an implicature. To illustrate this proposal, consider the following example:

(10) *Plain Meaning of Partitives*
   Mary met four of the professors
   SS: [$_{\phi}$ Mary met [$_{\text{DP}}$ four of$_{\text{PART}}$ the professors]]
   a. Presupposition: There is a unique plural individual made up of atomic individuals who are professors.
   b. Assertion: Mary met a plural individual that is made up of four atomic individuals, and that is part of the professors.
   Therefore, $\phi \not\Rightarrow$ the (relevant) professors are more than four

Semantically, in a situation where the number of the professors is exactly four - and therefore where Mary met all the professors - the sentence in (10) is predicted on its

[1] A common reply to these problematic examples consists in denying that the *of*-prepositions at stake in (9) are actual instances of the partitive *of* (of_{PART}). I will provide evidence in Section 4.2.2 that this line of explanation cannot be upheld. In particular, we will see that pronominal and measure partitives exhibit the exact same behavior as cardinal partitives as far as the standard proper partitivity effects are concerned (see (8) for an illustration with pronominal partitives).

plain meaning to be acceptable and true. However, this sentence competes with the following sentence (among other alternatives that are not relevant to us presently):

(11) Mary met the four professors.
SS: $[_{\psi}$ Mary met $[_{\text{DP}}$ the four professors$]]$

(11) is an excludable formal alternative to (10). Specifically, (11) is an excludable *presuppositional* alternative to (10): the possible worlds in which both (10) and ♯(11) are true are worlds in which Mary met four professors, i.e. (10) is true, but in which there aren't exactly four professors, i.e. ♯(11) is true because (11)'s presupposition is false (see Chapter 2 for discussion). I propose that the proper partitivity inference associated with (10), i.e. the inference that *the relevant professors are more than four*, comes about upon exhaustification of its meaning as a result of an implicature that delivers the negation of the presupposition of its definite non-partitive alternative (11). On this analysis, the LF of sentence (10) is as in (12), where the exhaustivity operator $\text{EXH}_{\mathcal{R}}$ occurs at matrix scope and takes (10) as its prejacent. Adding to the definedness conditions of (10) the negation of the (maximal) presupposition of (11) outputs the (anti-)presupposition that there aren't exactly four professors. Since (10) asserts that Mary met four of the professors, the strengthened meaning of this sentence now entails that the set of professors counts more than four atomic individuals, which corresponds to the proper partitivity inference we are trying to explain.

(12) *Strengthened Meaning of Partitives (Anti-Presupposition)*
Mary met four of the professors.
SS: $\text{EXH}_{\mathcal{R}}$ $[_{\phi}$ Mary met four of$_{\text{PART}}$ the professors$]$

a. Excludable Alternative:
$\text{EXCL}_{prs}(\phi) \supseteq \{[_{\psi}$ Mary met THE FOUR PROFESSORS$]\}$

b. Strengthened Meaning:

$$[\![\text{EXH}_{\mathcal{R}}\ \phi]\!](w) = \left\{ \begin{array}{ll} 1 \text{ iff} & \delta om([\![\text{THE FOUR PROFESSORS}]\!])(w) = 0 \wedge [\![\phi]\!](w) = 1 \\ 0 \text{ iff} & \delta om([\![\text{THE FOUR PROFESSORS}]\!])(w) = 0 \wedge [\![\phi]\!](w) = 0 \end{array} \right\}$$

That is, $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!]$(w) is defined iff there are professors, but not exactly four, in w. Whenever defined, $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!]$(w) is true iff Mary met four of them in w.

Therefore, $\text{EXH}_{\mathcal{R}}(\phi) \Rightarrow$ the (relevant) professors are more than four

On this approach, the proper partitivity inference associated with a partitive sentence ϕ is predicted to correspond to the negation of the (maximal) presupposition of some definite presuppositional alternative to ϕ. While this prediction amounts to the same outcome as the proper partitivity view in simple cases like (10), we will see that it improves upon the proper partitivity view for quantificational cases like (7-b): applying the exhaustivity operator $\text{EXH}_{\mathcal{R}}$ at matrix scope in these cases delivers the weaker inference that at least one student has more than three sisters. Finally, this implicature-based approach to proper partitivity will be shown to account for the possibility to suspend these inferences (as in (8-c)) as well as for the oddity effects triggered by the use of partitive constructions in contexts where the presuppositions of their definite alternatives are mutually accepted as true by the interlocutors.

The second part of my proposal is to (re-)analyze the anti-uniqueness effects as a separate phenomenon following from a general economy constraint that favors simpler over more complex syntactic structures (a.o. Chomsky, 1993b; Golan, 1993; Ruys, 1994; Reinhart, 1998). I propose that this constraint be formulated as follows:

(13) **Economy of Structure (Economy)**
An LF ϕ is deviant if there is a grammatical formal alternative to ϕ that is structurally simpler than ϕ and *semantically equivalent* to ϕ.

Building upon the suggestion in Ionin et al. (2006) (see also Le Bruyn 2007), I propose that the anti-uniqueness effects exhibited by cardinal partitives follow from a competition between these constructions and their structurally simpler, yet semantically equivalent, non-partitive alternatives. This proposal is illustrated in (14) using the examples in (5). In each of these cases, the base sentence ϕ is deemed deviant by Economy due to the availability of the grammatical ψ-alternative, which expresses the same meaning as ϕ by means of less syntactic structures.

(14) *Anti-Uniqueness and Structural Economy*
For each of the following structural pairs, $\psi < \phi$ yet $[\![\psi]\!] \equiv [\![\phi]\!]$
a. ϕ: Mary met $[_{\text{DP}}$ (the) one $[_{\text{PP}}$ of$_{\text{PART}}$ $[_{\text{DP}}$ John's father$]]]$ (✗Economy)
ψ: Mary met $[_{\text{DP}}$ John's father$]$
b. ϕ: Mary met $[_{\text{DP}}$ the two $[_{\text{PP}}$ of$_{\text{PART}}$ $[_{\text{DP}}$ John's parents$]]]$ (✗Economy)
ψ: Mary met $[_{\text{DP}}$ John's two parents$]$
c. ϕ: Mary met $[_{\text{DP}}$ (the) three $[_{\text{PP}}$ of$_{\text{PART}}$ $[_{\text{DP}}$ John's three children$]]]$ (✗Economy)
ψ: Mary met $[_{\text{DP}}$ John's three children$]$
d. ϕ: Mary met $[_{\text{DP}}$ (the) one $[_{\text{PP}}$ of$_{\text{PART}}$ $[_{\text{DP}}$ every child$]]]$ (✗Economy)
ψ: Mary met $[_{\text{DP}}$ every child$]$

On this approach, the distribution of the anti-uniqueness effects is hypothesized to relate to the availability of convergent (i.e., grammatical) simpler alternatives. In the absence of such alternatives, partitive constructions are predicted to be free of these effects. In the spirit of Ionin et al. (2006), I will argue that definite measure and pronominal partitives, (9), are cases where simpler alternatives are missing, hence their grammaticality. This approach will be shown to capture the fine-grained differences between cardinal, measure and pronominal partitives summarized in (15). On the one hand, we will see that indefinites partitives always compete with some non-weaker definite alternative, giving rise upon exhaustification to a proper partitivity inference. On the other hand, we will see that partitives differ regarding which of their alternatives counts as the most economical. In the case of cardinal partitives, (15-a), the (i)-alternatives are ruled out by Economy because of the availability of the simpler (ii)-alternative. By contrast, in the absence of simpler convergent alternatives, the (i)-alternatives of pronominal and measure partitives in (15-c)-(15-b) comply with Economy.

(15) *Proper Partitivity, Anti-Uniqueness and Missing Alternatives*

a. Cardinal Partitives: proper partitivity and anti-uniqueness
Mary met [$_{DP}$ four of$_{PART}$ the professors]
Inference: The relevant professors are more than four
(i) Mary met [$_{DP}$ the four of$_{PART}$ the professors] (✗Economy)
(ii) Mary met [$_{DP}$ the four professors]

b. Pronominal Partitives: proper partitivity only
[$_{DP}$ three of them] were sick
Inference: The denotation of 'them' counts more than three individuals
(i) [$_{DP}$ the three of them] were sick (✓Economy)
(ii) *[$_{DP}$ the three them] were sick
(iii) *[$_{DP}$ they three] were sick

c. Measure Partitives: proper partitivity only
John spent [$_{DP}$ two hours of his free time] sleeping
Inference: John had more than two hours of free time
(i) J. spent [$_{DP}$ the two hours of his free time] sleeping (✓Economy)
(ii) *J. spent [$_{DP}$ his two hours free time] sleeping

The rest of this chapter is organized as follows. In Section 4.2, I present the proper partitivity approach to partitives originating in Barker (1998), and discuss in further detail the empirical issues it encounters. I will show in Section 4.3 how the present approach offers a solution to each of these issues, and helps us solve additional puzzles related to the interpretation of English double genitive constructions. A synthesis of the solution is offered in 4.4. A summary of the mereological notions (and ontological assumptions) used throughout this chapter is provided in Appendix B.

4.2 The Proper Partitivity View

4.2.1 Explanatory Scope

As elaborated in Barker (1998) (see also Zamparelli, 1998), the proper partitivity view hypothesizes that partitive nominal phrases (e.g., *two of the associates*) have in their extension only proper subparts of the entity denoted by the DP within their *of*-phrase (e.g., *the associates*). The appeal of this approach is that it offers to kill two birds with one stone in accounting all at once for both the proper partitivity, (16), and the anti-uniqueness effects, (17), exhibited by partitives.

(16) **Proper Partitivity Effects**

a. #John met one of Mary's father.
cf. John met Mary's father

b. #John met two of Mary's parents.
cf. John met one of Mary's parents

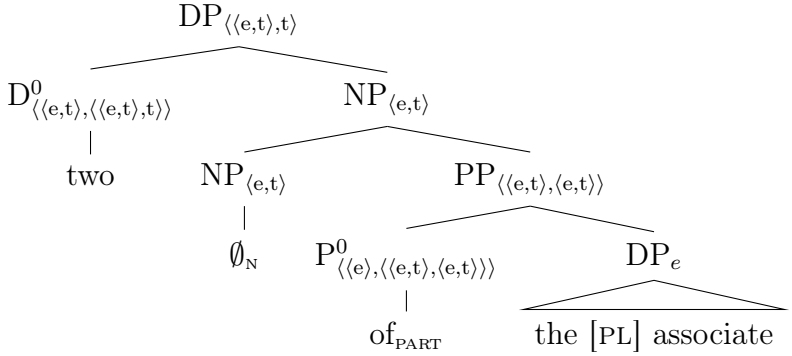
(17) **Anti-Uniqueness Effects**

a. *John met the one of Mary's father.
cf. John met Mary's father

b. *John met the two of Mary's parents.
cf. John met one of Mary's parents

To understand how this goal is achieved, let us go into the detail of Barker (1998)'s proposal. Following Barker (1998), the syntactic structure of a partitive phrase such as *two of the associates* can be represented as in (18). On this representation, partitives of the surface form *Det of Det NP* contain a phonetically silent nominal, and the *of*-phrase is analyzed as an NP modifier.[2]

(18) two of the associates



On Barker's view, the silent noun in the partitive, noted $\emptyset_N$, is to be interpreted anaphorically as referring to the set expressed by the embedded NP in the *of*-phrase. To guarantee this result, Barker proposes to treat $\emptyset_N$ as a dummy noun, i.e. as a semantically transparent nominal, with the denotation in (19).[3]

(19) $[\![\emptyset_N]\!] = \lambda x \in D_e.\ [x = x]$

[2]The hypothesis of a silent NP in partitives, originating in the pioneer works of Jackendoff (1977), Ladusaw (1982) and Hoeksema (1984), has received since then further empirical support (see in particular Sauerland and Yatsushiro, 2004). This hypothesis accounts for instance for the possibility to extract the *of*-phrase out of the partitive DP (e.g., *Of the seventeen passengers, three/many/only a few survived*), a possibility that is left unexplained on an analysis à la Chomsky (1965) or Keenan and Stavi (1986), where the *of*-phrase is not recognized as a constituent. Another appeal of this hypothesis is that it provides a unified analysis for partitives of different structures, including those where the (usually silent) NP is made overt (e.g., *three books of all the books that John has*).

[3]Sauerland and Yatsushiro (2004) observes that the silent NP in partitives can sometimes refer to a salient NP mentioned in the previous discourse, as in (i). A common alternative to Barker (1998)'s implementation consists in analyzing the silent NP as a full NP that has undergone deletion at PF (e.g., *two ~~associates~~ of the associates*), as originally proposed in Jackendoff (1977). As far as I can see, this implementation is compatible with the proper partitivity view and does not affect in any significant way the argumentation presented here.

(i) Some of the papers have missing pages. Two ⟨pages⟩ of the one I'm reading are gone.
(from Sauerland and Yatsushiro, 2004, (20))

As in most analyses of partitives, the semantics of partitivity is directly incorporated in the interpretation of the preposition *of*. What is specific to Barker's proposal is the claim that partitivity is proper partitivity: of_{PART} encodes the proper-part relation.

(20) $[\![\text{of}_{\text{PART}}]\!] = \lambda x \in D_e.\lambda P \in D_{\langle e,t\rangle}.\lambda y \in D_e.\ [P(y) \wedge y < x]$ (Barker, 1998, (34))

The rest of the semantic composition for the example in (18) is mostly concerned with the interpretation of the embedded plural description. In line with Barker (1998), we will take singular count nouns (e.g., *associate*) to refer to sets of atomic individuals, and plural count nouns (e.g., *associates*) to refer to sets that include atomic and plural individuals. On this inclusive view, the plural form of a count noun N means the same as *one or more N*, and the semantic contribution of the plural feature (noted [PL] here) amounts to a sum-closure operation on sets of atomic individual which can be expressed using Link's *-operator for sets of one-place predicates, as defined and exemplified in (21).

(21) *Sum-closure *-operator (from Link, 1983):*
$^*X$ is the smallest set such that $^*X \supseteq X$ and $\forall x, y \in {}^*X : x \oplus y \in {}^*X$
a. $[\![\text{associate}]\!] = \{a, b, c\}$
b. $[\![[\text{PL}]\ \text{associate}]\!] = {}^*[\![\text{associate}]\!] = \{a, b, c, a \oplus b, b \oplus c, a \oplus c, a \oplus b \oplus c\}$

Finally, the contribution of the definite determiner can be seen as mapping any set, which may include plural individuals, onto the maximal individual in that set (i.e., that individual that all other individuals in the set are part of). The notion of maximality is commonly expressed with the σ-operator, (22). On this conceptualization, the plural definite description *the associates* denotes the maximal entity x such that x corresponds to the collection of the associates.

(22) $[\![\text{the}]\!] = \lambda P \in D_{\langle e,t\rangle}.\ \sigma x.P(x)$
a. $[\![[\text{PL}]\ \text{associate}]\!] = {}^*[\![\text{associate}]\!] = \{a, b, c, a \oplus b, b \oplus c, a \oplus c, a \oplus b \oplus c\}$
b. $[\![\text{the}\ [\text{PL}]\ \text{associate}]\!] = \sigma x.\ {}^*[\![\text{associate}]\!](x) = a \oplus b \oplus c$

Putting all the pieces together, we obtain for the partitive NP in (18) the semantic representation in (23). In a model where the predicate *associate* only has the atomic individuals a, b and c in its extension, the partitive NP below thus denotes the set $\{a, b, c, a \oplus b, a \oplus c, b \oplus c\}$, which corresponds to the set of individuals that are proper parts of the maximal plural individual $a \oplus b \oplus c$.

(23) $[\![[\emptyset_{\text{N}}\ [\text{of}_{\text{PART}}\ [\text{the}\ [\text{PL}\ \text{associate}]]]]]\!] = \lambda x \in D_e.[x = x] \wedge x < \sigma y.\ {}^*associate(y)$
i.e., the set of individuals x such that x is identical to itself and x is a proper part of the maximal plural individual in the set of associates

We can now explain in turn how the proper partitivity and the anti-uniqueness effects are accounted for on this analysis. Consider the following example:

(24) **Proper Partitivity à la Barker (1998)**
Two of the associates showed up.

a. SS: [two [$\emptyset_{\text{N}}$ [of$_{\text{PART}}$ [the [PL associate]]]]] PL showed up

b. LF: $\exists x[\#x = 2 \wedge x = x \wedge x < \sigma y.\ ^{*}\textit{associate}(y) \wedge\ ^{*}\textit{showed-up}(x)]$
i.e., there is a plural individual x made up of two atomic individuals such that x is a proper part of the maximal plural individual in the set of associates and x showed up.

Result: (24) entails that the relevant associates are more than two

On Barker's analysis, the proper partitivity inference associated with the interpretation of (24) is logically entailed by the plain meaning of (24).[4] Specifically, in order for (24) to be true in a given model, there must be a plural individual in this model who is made up of two atomic parts and who is a proper part of the maximal individual in the set of associates. This can be the case only if the maximal individual picked out by the plural description *the associates* has more than two atomic parts, i.e. if the cardinality of the relevant associates is at least three. Capitalizing on this result, we can now explain the deviance of the sentences in (16) by observing that, in these cases, building up the partitive as a proper part of the referent of the object DP leads us to attribute contradictory beliefs to the speaker.

Specifically, suppose that whenever a speaker utters a sentence ϕ, we have it that this speaker believes ϕ to be true (e.g., by the Maxim of Quality). In uttering a sentence like (16-a)/(16-b), we conclude therefore that the speaker believes (16-a)/(16-b) to be true. The problem now is that the proper partitivity entailments of these sentences also lead us to conclude that the speaker believes these sentences to be false. For instance, (16-a) is true only if there is an individual that is a proper part of the atomic individual denoted by *Mary's father*; but this is always false since, by definition, atomic individuals have no proper parts, and therefore the speaker must believe (16-a) to be false. Similarly, the sentence in (16-b) is true only if there is a plural individual that is a proper part of the plural individual denoted by *Mary's parents*; but given common knowledge (i.e., everyone has at most two parents) this is always false, and therefore the speaker must believe (16-b) to be false. In sum, the sentences in (16) are anomalous because their proper partitivity entailments are false in every model compatible with speakers' common beliefs, contradicting the most basic conversational assumption that speakers utter sentences they believe to be true.

Following Barker, the idea that partitivity is proper partitivity can further account for the phenomenon of anti-uniqueness. To see this, consider the definite variant of the previous example:

[4]To fully derive the distributive reading of (24), we would need here to explain further how verbal predicates combine with plural noun phrases. One commonly taken path is to assume that there is a distributive operator, *Dist*, which can attach to verb phrases, and which introduces a homogeneity presupposition as well as universal quantification over individual parts. Since these refinements are orthogonal to Barker's concerns, I will set them aside for now.

(25) **Anti-Uniqueness à la Barker (1998)**
*The two of the associates showed up.

a. SS: [the [two [$\emptyset_{\text{N}}$ [of_{PART} [the [PL associate]]]]]] PL showed up
b. LF: **showed-up*($\sigma x.\ \#x = 2 \wedge x = x \wedge x < \sigma y.\ ^{*}$*associate*$(y)$)
i.e., (25) is defined if and only if there is a unique maximal individual x such that x is made up of two atomic individuals and x is a proper part of the maximal plural individual in the set of associates.

Result: (25)'s presuppositions can never be satisfied

Crucially, the proper partitivity entailment of the sentence in (25) renders the partitive NP incompatible with the definite determiner without further modification. Suppose that we are in a model where $|\textit{associate}| \leq 2$; then, there is no (maximal) plural individual x such that $\#x = 2$ and $x < \sigma y.\ ^{*}\textit{associate}(y)$; therefore, the presupposition of existence fails. Suppose now that we are in a model where $|\textit{associate}| > 2$; then, there are more than one plural individual x such that $\#x = 2$ and $x < \sigma y.\ ^{*}\textit{associate}(y)$; therefore, the presupposition of uniqueness fails because for there to be a maximum individual, there can only be one proper part individual made up of two atomic parts. This line of explanation accounts for the anti-uniqueness in (17). In each of these cases, the definite description leads to a presupposition failure (existence or uniqueness) because, by definition, any countable entity has either no proper part (i.e., *Mary's father*) or more than one proper part (i.e., *Mary's father*).

To summarize, the approach to partitives developed in Barker (1998) is an example of a minimal theoretical move with a high empirical payoff. From a theoretical standpoint, it comes at the cost of a minimal amendment of the semantics of partitivity: partitive *of* does not encode the part-of, but the proper-part relation. On the empirical side, this refinement is shown to provide a simple account of two puzzling constraints on partitives: the referent of the whole DP must be a proper part of the referent of the embedded DP (i.e., proper partitivity), and partitive constructions are infelicitous with the definite determiner (i.e., anti-uniqueness). In the rest of this section, I discuss several issues for the proper partitivity view which will lead me to reject its two key claims, first the hypothesis that proper partitivity inferences are directly encoded in the semantics of partitivity, and then the claim that proper partitivity and anti-uniqueness effects are to be accounted for in a unified way.

Before going on, let me briefly point out that there exist other implementations of the proper partitivity view in the literature. One of them is Zamparelli (1998). In a nutshell, Zamparelli proposes that $\textit{of}_{\text{PART}}$ be analyzed as the residue operator, **Re'**, which is defined as follows: **Re'**$(P)(x) = P\backslash\{x\}$ (Zamparelli, 1998, (50)). According to Zamparelli, **Re'** can be seen as a natural operator in that it corresponds, with respect to the denotation of common nouns, to the complement set of the definite determiner: when applied to a noun like *associates*, the definite determiner picks out the maximal individual in the set of associates while the **Re'**-phrase excludes it. To see how Zamparelli's operator derives proper partitivity, it suffices to replace P with the denotation of *associates* and $\{x\}$ with the denotation of *the associates*, leading to the following result:

(26) two of the associates

a. SS: [two [~~PL associate~~ [**Re'** [the [PL associate]]]]]

b. **Re'**($[\![$[PL] associate$]\!]$, $[\![$the [PL] associate$]\!]$) = $\{a, b, c, a \oplus b, a \oplus c, b \oplus c, a \oplus b \oplus c\} \backslash \{a \oplus b \oplus c\} = \{a, b, c, a \oplus b, a \oplus c, b \oplus c\}$

To the best of my knowledge, there is no conceptual reason to favor one implementation over the other, for there is nothing inherent to **Re'** that makes it more natural, primitive or simpler than $<$ (see Le Bruyn, 2007, for further discussion). The issues discussed in the following are concerned with the very assumption that proper partitivity is inherent to the semantics of partitives, and therefore concern both Barker (1998)'s and Zamparelli (1998)'s proposal.

4.2.2 Empirical Issues

Distribution and Logical Strength of the Proper Partitivity Effects

The first empirical issue concerns the distribution and semantic force of the proper partitivity inferences: encoding proper partitivity into the semantics of *of*$_{\text{PART}}$ leads to certain predictions regarding the semantic contribution of partitives that are not empirically adequate. To illustrate, consider the following sentences:[5]

(27) a. John invited two of his sisters.
Interpretation: John has more than two sisters; he invited two of them

b. Every student invited two of his sisters.
   (i) Stronger Interpretation: every student has more than two sisters and invited two of them
   (ii) Weaker Interpretation: at least one student has more than two sisters, and every student invited two of his sisters

c. No student invited two of his sisters.
   (i) Stronger Interpretation: every student has more than two sisters, and none of them invited two of his sisters
   (ii) Weaker Interpretation: at least one student has more than two sisters, and none of them invited two of his sisters

As we have already seen, the sentence in (27-a) gives rise to the inference that John has more than two sisters. On the proper partitivity view, this inference results from the inherent proper-part meaning of *of*$_{\text{PART}}$. The sentence in (27-b), by contrast, appears to offer two interpretative options. According to my informants, this sentence can be understood as conveying either that every student has more than two sisters or, alternatively, that not every student has exactly two sisters. Crucially, on this second interpretation, (27-b) is accepted as true by speakers in cases where every

[5]For the sake of completeness, it is worth emphasizing that the semantic properties of the inferences we are interested in are independent from the different ways bare numerals can be interpreted in these sentences. In particular, I notice that the possible interpretations paraphrased in (27) remain the same whether the relevant numeral (e.g., *two*) receives a lower-bound (e.g., *at least two of his sisters*) or a doubly-bound (e.g., *exactly two of his sisters*) meaning.

student invited two of his sisters, yet only one of them has more than two sisters. The availability of this (weaker) interpretation is not accounted for by the proper partitivity view which predicts (27-b) to be true only if every student has more than two sisters.

(27-b) Every student invited two of his sisters.

a. Predicted: (27-b) is true only if every student has more than two sisters
b. Not Predicted: (27-b) is true only if every student has at least two sisters and at least one student has more than two sisters

Similar observations hold of (27-c). There is an interpretation of this sentence on which it is true if and only if every student has two sisters, at least one of them has more than two sisters, and no student invited two of his sisters (e.g., on this reading, (27-c) is false in situations where some student has exactly two sisters and invited both his sisters). The truth-conditions corresponding to this interpretation, however, are not delivered by the proper partitivity analysis which predicts (27-c) to be true just in case there is no student with more than two sisters who invited two of them.

In addition, I observe that the proper partitivity analysis also leads to incorrect predictions when the partitive DP *two of his sisters* occurs and is bound within the (downward entailing) restrictor of *every* and *no*:

(28) a. Every student who invited two of his sisters had a good time.
Spontaneous interpretation (not predicted): every student who has *at least two sisters* and who invited two of them had a good time.

b. No student who invited two of his sisters had a good time.
Spontaneous interpretation (not predicted): no student who has *at least two sisters* and who invited two of them had a good time.

On the proper partitivity analysis, both these sentences are predicted to be about the set of students who have more than two sisters and invited two of them, excluding therefore those students who have exactly two sisters and invited them both. These predictions, however, are inconsistent with speakers' intuitions according to which these sentences are about all the students who have at least two sisters and invited two of them (with the requirement that it is not taken for granted that all the students have exactly two sisters). The examples in (29)-(30) provide additional support for the correctness of these intuitions. The example in (29) shows that one can felicitously deny the truth of (28-a) by finding an individual who has exactly two sisters, invited them both and yet didn't have a good time at the party; in the same vein, the example in (30) shows that the complement set of the restrictor of *every* in (28-a) does not include those students who have exactly two sisters and invited them both.

(29) A: Every student who invited two of his sisters had a good time at the party.
B: That's not true! John invited both his sisters and he got bored!

(30) Every student who invited two of his sisters had a good time at the party, but the others got bored.
$\not\rightarrow$ the students who have exactly two sisters and invited them both got bored

Similar issues arise when partitives occur in the antecedent of a conditional.[6] On the proper partitivity view, the proposition expressed by the sentence in (31-a) should be akin to a tautology, like (31-b): whenever the proposition *John met three of the professors* is true at a world w, the proper-part meaning of of_{PART} requires there be at least four professors at w, thus verifying the consequent. On the other hand, the sentence in (32-a) should be akin to a contradiction, like (32-b): whenever the proposition *John met (exactly) three of the professors* is true at a world w, the proper-part meaning of of_{PART} requires there be at least one professor that John didn't meet at w, thus falsifying the consequent. These predictions do not match speakers' judgements according to which both (31-a) and (32-a), express contingent statements, in contrast to (31-b) and (32-b).

(31) a. If John met three of the professors, then the professors are at least four.
b. If John met three of the professors, then the professors are at least three.

(32) a. If John met three of the professors, then he met them all.
b. If John met three of the four professors, then he met them all.

There is another empirical limit to the explanatory scope of the proper partitivity view. If partitivity is always proper partitivity, then partitives should be truthfully used in a conversation only when speakers are opinionated about the relevant proper-part implication. The problem is that partitivity inferences can in fact be suspended depending on our assumptions about speakers' epistemic state, and thus the use of partitives appears to be compatible with a state of ignorance as to whether proper partitivity holds. Consider first the following dialogue:

(33) A: Did John meet (all of) Mary's sisters?
B: He met two of them
$\rightsquigarrow B_{speaker}$(Mary has more than two sisters)

Upon B's reply, it seems natural to attribute to B the belief that Mary has more than two sisters. This is correctly predicted by the proper partitivity view. By Quality, B believes *John met two of Mary's sisters* to be true, and since *John met two of Mary's sisters* is taken to logically entail that Mary has more than two sisters, it follows that B must believes that Mary has more than two sisters. The next dialogue, however, teaches us that B need not believe that Mary has more than two sisters in order for his reply to be felicitous.

(34) A: How many sisters does Mary have?
B: She has two or three sisters.
A: Did John meet them?

[6]The reason for these similarities might simply be that antecedents of conditionals are, semantically, genuine downward-monotonic environments. A possible analysis along these lines is offered in von Fintel (1999, 2001) where the conditional is analyzed as a universal quantifier (downward-monotonic in its restriction) over the antecedent-satisfying worlds in a contextually given domain. That being said, the question of whether conditionals are monotonic in their antecedent is still highly debated in the semantic and philosophical literature on conditionals.

B: He met two of them.
$\not\rightsquigarrow B_{speaker}$(Mary has more than two sisters)

In this dialogue, B starts by asserting that *Mary has two or three sisters*. The assertion of this disjunctive statement leads us to attribute to B a state of ignorance concerning the truth of each disjunct, i.e. B ignores whether Mary has (exactly) two sisters and B ignores whether Mary has three sisters. As a result, we have it that B believes that Mary has two or three sisters but remains ignorant as to whether she has more than two sisters. Crucially, despite B's state of ignorance, the assertion that *John met two of Mary's sisters* sounds completely natural. The possibility for a speaker to utter such a sentence while being ignorant as to whether Mary has more than two sisters is incompatible with the proper partitivity view. A summary of the perceived status of partitives (natural vs. odd) as a function of the speaker's epistemic state is provided in (35). The proper partitivity view incorrectly predicts that the contrast between (35-a) vs. (35-b) should also be observed for (35-a) vs. (35-c).

(35) *Felicity of Partitives as a Function of the Speaker's Epistemic State*
Did John meet all of Mary's sisters?
a. #Yes, he met two of them/Mary's sisters. (opinionated, $n = 2$)
b. ok No, he met two of them/Mary's sisters. (opinionated, $n > 2$)
c. ok I don't know whether Mary has two or three sisters:
but John met two of them/Mary's sisters. (uncertain, $n \geq 2$)

In sum, the proper partitivity view does not offer an empirically adequate characterization of the proper partitivity inferences. It fails to account for the distribution of these inferences across different semantic environments (e.g., (27-a) vs. (27-b)/(27-c)), for the different possible strengths of these inferences in a given environment (e.g., (27-b)), and finally for their possible suspension in cases of ignorance (e.g., (34)). I will argue in section 4.3.2 that an analysis of proper partitivity inferences as implicatures is better suited to capture their linguistic signature.

Distribution of the Anti-Uniqueness Effects

How does the proper partitivity view fare regarding the distribution of the anti-uniqueness effects? Recall that anti-uniqueness effects are hypothesized to follow from a proper partitivity implication; as a result, their syntactic distribution is expected to mirror that of the proper partitivity effects. We can formulate this expectation in a principled way by means of a bi-conditional statement: for any indefinite partitive DP α, the definite variant of α, i.e. 'the α', is anti-unique iff α is properly partitive. We will now see that this statement is empirically wrong in both directions.

In light of the data we have just presented, the falsity of this statement in the left-to-right direction should be easy to see. Taking another look at the examples in (28), we observe that the partitives in these sentences are anti-unique even though they are free from proper partitivity effects, (36). As we have already shown, the absence of proper partitivity effects in these environments is a problem *per se* for the proper partitivity view. Here, the additional observation that anti-uniqueness effects

arise independently from proper partitivity suggests further that these effects are to be accounted for on independent grounds.

(36) a. Every student who invited two of his sisters had a good time.
$\not\rightsquigarrow$ every student who has *more than two sisters* and who invited only two of them had a good time.
b. *Every student who invited the two of his sisters had a good time.

Let me now turn to the right-to-left direction: are there partitive constructions that trigger proper partitivity effects and yet are not anti-unique? I suggest that there are at least three such cases. The first case is this of pronominal partitives. Descriptively, pronominal partitives, e.g. *three of them*, are cardinal partitives; they minimally differ from the cardinal partitives we have seen so far in that they involve a pronominal form (as opposes to a full DP) in place of the embedded DP. Their partitive behavior is exemplified by the paradigm in (37).

(37) **Pronominal Partitives**
a. Three of them were sick.
Inference: The denotation of 'them' counts more than three individuals
b. The three of them were sick.
Inference: The denotation of 'them' counts exactly three individuals
c. Mary, John, and Peter did not show up today:
(i) #three of them were sick.
(ii) the three of them were sick.
d. Every professor who talked to the three new students thinks that ...
(i) #three of them are smart.
(ii) the three of them are smart.

The critical observation here is that pronominal partitives pattern like genuine cardinal partitives as far as the proper partitivity effects go, (37-a), but are exempt from the anti-uniqueness condition, (37-b). As it is shown in (37-c) and (37-d), the definite determiner must be used whenever the cardinality of the plural individual denoted by the pronoun is known to be equal to the numeral used in the partitive; otherwise, a proper partitivity inference arises and, as a result, the sentence is perceived as odd.

Measure partitives like *two hours of John's free time* or *two pages of John's book* provide us with another class of counterexamples. Descriptively, these partitives involve a measure phrase (i.e., *two hours*/*two pages*) and a definite noun phrase indicating what thing is measured (e.g., *John's free time*/*John's book*). Following much of the literature on partitives since Selkirk (1977) (see also Ladusaw, 1982; Krifka, 1989), it is commonly assumed that these measure partitives involve a meaningful instance of partitive *of*, and are thus to be distinguished syntactically from pseudo-partitives (e.g., *two hours of free time*, *two pages of prose*).[7] The partitive behavior of these constructions is illustrated below in (38). This paradigm is construed just like this

[7]Empirical evidence supporting this distinction are reviewed and discussed in Schwarzschild (2002).

in (37). Measure partitives behave like pronominal partitives: (i) they give rise to proper partitivity inferences, and (ii) they can be definite and yet fully grammatical, without any need for further modification.

(38) **Measure Partitives**

a. John spent two hours of his free time cooking.
Inference: John had more than two hours of free time

b. John spent the two hours of his free time cooking.
Inference: John only had two hours of free time

c. John only had two hours of free time yesterday and ...
(i) #he spent two hours of his free time cooking.
(ii) he spent the two hours of his free time cooking.

d. Every student who had only two hours of free time yesterday ...
(i) #spent two hours of his free time cooking.
(ii) spent the two hours of his free time cooking.

The third and last case we will consider is this of demonstrative double genitives, e.g. *that nose of his*. As shown by Barker (1998), (non-demonstrative) double genitive constructions share a number of general properties with partitive constructions. In particular, these constructions exhibit proper partitivity and anti-uniqueness effects. For instance (39-a) is fine but (39-b) is odd because it conveys that John has more than two parents; (39-c) and (39-d) show that double genitives cannot be combined with a definite determiner without receiving additional modification.

(39) **Possessive Partitives**

a. Mary met one parent of John's
Inference: John has at least two parents

b. #Mary met two parents of John's
Inference: John has at least three parents (proper partitivity)

c. #Mary met the (two) parents of John's

d. Mary met the son of John's #(that you met) (anti-uniqueness)

Based on these and related observations, Barker proposes to analyze the double genitive as a variant of the partitive construction (as opposed to a variant of the post-nominal genitive) and to give the possessive-partitive *of* (noted $of_{\text{POSS-PART}}$) a denotation similar in spirit to this of of_{PART} (only slightly amended for the sake of semantic composition). On this view, the denotation of double genitives, (40-a), ends up roughly equivalent to the denotation of regular partitives, (40-b).

(40) a. parents of John's
$[\![[\text{parents } [\text{of}_{\text{POSS-PART}} \text{ [John's]}]]]\!] := \lambda x.\ \textit{parents}(x) \wedge x < \textit{john's-parents}$
$\approx \lambda x.\ x < \textit{john's-parents}$

b. of John's parents
$[\![[\emptyset_{\text{N}} \ [\text{of}_{\text{PART}} \text{ [John's parents]}]]]\!] := \lambda x.\ x = x \wedge x < \textit{john's-parents}$
$\approx \lambda x.\ x < \textit{john's-parents}$

As noted by many authors (Sweet, 1898; Narita, 1986; McCawley, 1988) and acknowledged by Barker himself, demonstrative double genitives constitute a (narrow) class of double genitives which is exempt from the anti-uniqueness condition, as exemplified in (41). For instance, it is possible to say *that mother of his*, even though it is common knowledge that each person has a unique (biological) mother. Although these constructions have a limited distribution because of their specific discourse requirements (i.e., these constructions must have some rhetorical effect), the absence of anti-uniqueness effects in these constructions remains puzzling on the proper partitivity view which lacks the resources for circumventing the anti-uniqueness implications normally associated with the possessive partitive construction.

(41) **Demonstrative Possessive Partitives**

a. That nose of his is really huge!
(cf. #The nose of his is really huge!)

b. That telephone book of his sure is moldy.
(cf. #The telephone book of his sure is moldy.)

To summarize, the partitive constructions investigated in this section show that the distribution of the anti-uniqueness effects is not parasitic on that of the proper partitivity effects. Not only are these observations problematic for the proper partitivity view, but any attempt to overcome the observed discrepancies (e.g., by means of *ad hoc* stipulations) seems to be doomed. In principle, a defender of the proper partitivity view could either deny that the constructions we have presented are true partitives, or (try to) tweak the denotation of partitive *of* to grant certain exceptions to the proper partitivity requirement (or some mix of these two options). Such a theoretical move, however, would leave the proper partitivity effects associated with pronominal and measure partitives unaccounted for. I will argue in section 4.3.3 that an approach in terms of structural economy is better suited to capture the variations in the anti-uniqueness condition across partitive constructions.

4.3 Simpler Structural Alternatives

4.3.1 The Core Proposal

My proposal is articulated around two key claims. First of all, going back to Ladusaw (1982)'s proposal, I claim that the semantic contribution of partitive *of* is to return the set of parts of its complement, as indicated in (42). For the time being, I will simply assume that of_{PART} has semantic type $\langle e, \langle e, t\rangle\rangle$ just like any other transitive preposition (see Ionin et al., 2006, for similar suggestions); that is, of_{PART} combines with an entity of type $\langle e\rangle$, i.e. a definite noun phrase or a trace, to form a predicate of type $\langle e, t\rangle$, i.e. the *of*-PP, which is true of the parts of the referent of that entity.

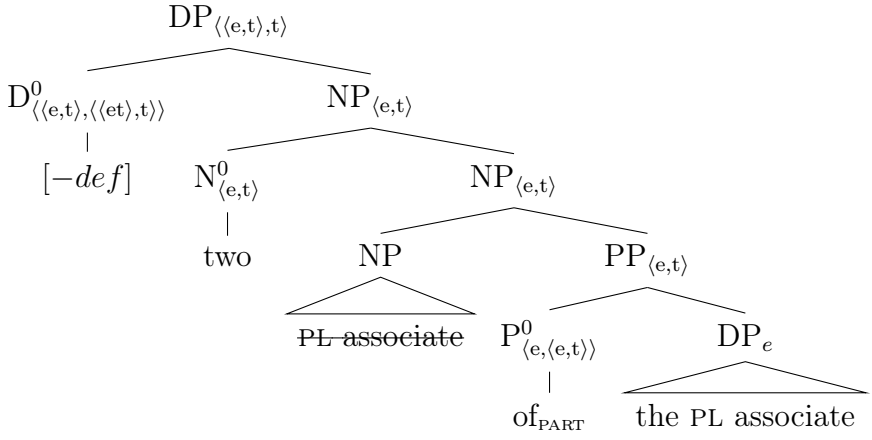
(42) **Partitivity is just Partitivity**
$[\![\text{of}_{\text{PART}}]\!] = \lambda y \in D_e.\lambda x \in D_e.\ x \leq y$

As far as the rest of the composition goes, my analysis of partitives is pretty much in line with Barker (1998) and the previous literature (a.o. Jackendoff, 1977; Hoeksema, 1984; Schwarzschild, 2002; Sauerland and Yatsushiro, 2004; Ionin et al., 2006).[8] The only aspect on which I differ from Barker (1998)'s concerns the treatment of cardinal numerals. On Barker's analysis, cardinal numerals are treated as determiners bringing about their 'adjectival' meaning together with existential quantification. I propose on the other hand that both semantic contributions be compositionally teased apart. Adopting a simplified version of the system developed in Ionin and Matushansky (2005) and Ionin et al. (2006), I assume that simplex cardinal numerals are lexical heads (nouns or adjectives), with the semantic type of modifiers, which require their complements to be a set of individuals (divisible into and) containing a certain number of atomic parts (e.g., $[\![\text{two}]\!] = \lambda x \in D_e.\ \#x = 2$). Since cardinal numerals do not have by themselves any quantificational force, I propose that existential quantification comes about by means of a silent determiner, noted $[-def]$, whose meaning is akin to this of an indefinite like *some*, (43).

(43) $[\![[-def]]\!] = \lambda P \in D_{\langle e,t\rangle}.\lambda Q \in D_{\langle e,t\rangle}.\ \exists x[P(x) \wedge Q(x)]$ ($\approx$ *some*)

Following these assumptions, the syntactic structure of a cardinal partitive DP like *two of the associates* can be represented as in (44).

(44) two of the associates



[8] Following previous works, I assume that cardinals combine with a silent NP that contains the *of*-PP (see footnote 2) and that this silent NP is a full NP which has undergone deletion at PF (e.g., Jackendoff, 1977; Sauerland and Yatsushiro, 2004). This analysis captures the observation that the determiners that cannot occur in the higher position of partitives when the NP is silent, (i), are precisely those that do not license NP-deletion in English, (ii). We will see that the deletion analysis is also well-suited to account for the possible variations in the phonological realizations of partitives.

(i) a. John read all/most/three ~~books~~ of the books.
b. *John read the/every/no ~~books~~ of the books.

(ii) a. John read all these books, but Peter didn't read all/most/three ~~books~~.
b. *John read all these books, but Peter didn't read the/every/no ~~books~~.

On this analysis, the truth-conditions delivered by the plain meaning of a sentence like *Two of the associates showed up* are logically compatible with a situation in which the number of relevant associates is exactly two, as shown in (45) (following standard rules of composition).

(45) Two of the associates showed up.
   a. SS: [[$-def$] [two ⟨PL associate⟩ [of$_{\text{PART}}$ [the [PL associate]]]]] showed up
   b. LF: $\exists x[\#x = 2 \wedge {}^*associate(x) \wedge x \leq \sigma y.\ {}^*associate(y) \wedge {}^*showed\text{-}up(x)]$
      i.e., there is a plural individual x made up of two atomic individuals such that x is part of the maximal plural individual in the set of associates and x showed up.

My second claim is that the source of the proper partitivity and anti-uniqueness effects associated with sentences of (45) lies in the availability of a certain kind of structural alternatives, e.g. *the two associates showed up*, (46).

(46) The two associates showed up.
   SS: [the [two [PL associate]]] showed up
   a. Presupposition: $\exists!x[\#x = 2 \wedge {}^*associate(x)]$
      i.e., there is a unique individual x such that x is made up of two atomic parts and x is in the set of associates.
   b. Assertion: ${}^*showed\text{-}up(\sigma x.\ \#x = 2 \wedge {}^*associate(x))$
      i.e., the maximal individual of cardinality two in the set of associates showed up.

First of all, I argue that these structural alternatives are taken into consideration when speakers compute the strengthened meaning of sentences like *two of the associates showed up*. We will see that adding to (45) the negation of the presupposition of its consistently deniable alternative (46) delivers the expected inference that the number of the associates is at least two but not exactly two (i.e., at least three). On this proposal, the reasoning underlying the derivation of proper partitivity effects will reduce to a more basic competition between definite and indefinite DPs similar in spirit to the original cases that motivated Heim's formulation of *Maximize Presupposition* (e.g., #A sun is rising). We will see that this line of explanation extends to all partitive constructions, including pronominal and measure partitives, and accounts for the distribution of the proper partitivity effects across environments. I will conclude that the proper partitivity effects are to be thought of as a subset of the broader class of anti-maximality implicatures we are already familiar with.

Second, I argue that the availability of these structural alternatives is also the source of the anti-uniqueness effects. By Economy of Structure, (13), a sentence like **The two of the associates showed up* is deemed deviant because its competitor, *The two associates showed up*, can express the same logical meaning by means of less syntactic structures. We will see that the distribution of these structurally simpler alternatives matches the distribution of the anti-uniqueness effects. In particular, we will see that there is no such convergent alternatives in the case of pronominal

partitives (e.g., **the three them*), measure partitives (e.g., **John's two hours free time*) and demonstrative possessive partitives (e.g., *his nose* has a different meaning from *that nose of his*). I will conclude that the anti-uniqueness condition is to be analyzed as a natural consequence of Economy of Structure.

4.3.2 Proper Partitivity Effects as Implicatures

Proper Partitivity Effects Across Partitives

Cardinal Partitives Consider again a sentence like *Three of the associates showed up*. I propose that the proper partitivity inference associated with this sentence, i.e. the associates are more than three, comes about as a result of an implicature. As a starting point, I will simply establish that this inference can in principle obtain by excluding any of the alternative sentences in (47).[9]

(47) **Alternatives to Cardinal Partitives**
ϕ: Three of$_{\text{PART}}$ the associates showed up
a. ψ: The associates showed up (definite)
b. γ: The three associates showed up (definite+cardinal)
c. χ: Every associate showed up (universal)

A good way to convince ourselves that ψ, γ and χ are excludable alternatives to ϕ is to go over the formal requirements excludable alternatives are assumed to be subject to. On our approach, the set of excludable alternatives for a given sentence ϕ are those structural alternatives to ϕ that can be denied consistently with ϕ. To begin with, one can verify in (48)-(50) that ψ, γ and χ are structural alternatives to ϕ: ψ is derivable from ϕ by substituting the whole partitive DP with the lower DP *the associates*, γ and χ are each derivable from ϕ by (a) substituting the higher $[-def]$ determiner with *the*/*every* and (b) by substituting the partitive NP before the preposition with the lower NP within the *of*-phrase. Consequently, $\psi, \gamma, \chi \in \text{ALT}_{str}(\phi)$.

(48) *Definite Structural Alternative*
ϕ: [$_{\text{DP}}$ $[-def]$ three ⟨PL associate⟩ of$_{\text{PART}}$ the PL associate] showed up
ψ: [$_{\text{DP}}$ the PL associate] showed up

(49) *Definite+Cardinal Structural Alternative*
ϕ: [$_{\text{DP}}$ $[-def]$ three ⟨PL associate⟩ of$_{\text{PART}}$ the PL associate] showed up
a. [$_{\text{DP}}$ **the** three ⟨PL associate⟩ of$_{\text{PART}}$ the PL associate] showed up
b. [$_{\text{DP}}$ the three ~~⟨PL associate⟩ of$_{\text{PART}}$ the~~ PL associate] showed up
γ: [$_{\text{DP}}$ the three PL associate] showed up

[9] There is another structural alternative that we could consider here, namely **The three of the associates showed up*, which results from replacing the top silent $[-def]$ with an overt instance of $[+def]$. On our analysis of partitive-*of*, this alternative is semantically equivalent to γ in (47), *The three associates showed up*, and therefore the presuppositional implicature associated with this alternative is semantically equivalent to that associated with γ, i.e. there aren't exactly three associates. I will set aside this alternative in the following on the assumption that structural alternatives that the exhaustivity operator quantifies over must be well-formed and thus obey Economy of Structure.

(50) *Universal Structural Alternative*

ϕ: [$_{\text{DP}}$ [$-def$] three ⟨PL associate⟩ of$_{\text{PART}}$ the PL associate] showed up

a. [$_{\text{DP}}$ **every** three ⟨PL associate⟩ of$_{\text{PART}}$ the PL associate] showed up

b. [$_{\text{DP}}$ every ~~three ⟨PL associate⟩ of$_{\text{PART}}$ the PL~~ associate] showed up

χ: [$_{\text{DP}}$ every associate] showed up]

Next, the propositions expressed by ψ, γ and χ can be consistently denied together with the truth of the proposition expressed by ϕ, as shown in (51)-(53). Specifically, on our approach, ψ and γ are excludable presuppositional alternative to ϕ, while χ is an excludable assertive alternative to ϕ.

(51) *Definite Alternative:* $\psi \in \text{EXCL}_{prs}(\phi)$

a. $\exists w \in W[[\![\phi]\!](w) = 1 \wedge \sharp[\![\psi]\!](w) = 1]$
There is a possible world w in which ϕ is true and $\sharp\psi$ is true because ψ's homogeneity presupposition is false in w (i.e., some associates showed up but not every associate did).

b. $\neg\exists w \in W[[\![\phi]\!](w) = 1 \wedge \neg[\![\psi]\!](w) = 1]$
Whenever ψ's homogeneity presupposition is true at a world w, if ϕ is true in w, then so is ψ, and thus $\neg\phi$ is false in w.

(52) *Definite+Cardinal Alternative:* $\gamma \in \text{EXCL}_{prs}(\phi)$

a. $\exists w \in W[[\![\phi]\!](w) = 1 \wedge \sharp[\![\gamma]\!](w) = 1]$
There is a possible world w in which ϕ is true and $\sharp\gamma$ is true because γ's homogeneity presupposition is false in w or because γ's uniqueness presupposition is false in w (i.e., there aren't exactly three associates).

b. $\neg\exists w \in W[[\![\phi]\!](w) = 1 \wedge \neg[\![\gamma]\!](w) = 1]$
Whenever γ's presuppositions are true at a world w, if ϕ is true in w, then so is γ, and thus $\neg\gamma$ is false in w.

(53) *Universal Alternative:* $\chi \in \text{EXCL}_{asr}(\phi)$

a. $\exists w \in W[[\![\phi]\!](w) = 1 \wedge \sharp[\![\chi]\!](w) = 1]$
There is a possible world w in which ϕ is true and $\sharp\chi$ is true because not every associate showed up in w.

b. $\exists w \in W[[\![\phi]\!](w) = 1 \wedge \neg[\![\chi]\!](w) = 1]$
There is a possible world w in which ϕ is true and $\neg\chi$ is true because not every associate showed up in w.

It remains to be shown that excluding any of these alternatives provides us with the expected result. The results in (54-a)-(54-c) establish that applying ϕ to the exhaustivity operator $\text{EXH}_{\mathcal{R}}$ outputs the proper partitivity inference that the (relevant) associates are more than three, and this regardless of which alternative one picks up. In (54-a), this inference follows from the negation of ψ's homogeneity presupposition. In (54-b), it follows from either the negation of γ's homogeneity presupposition or the negation of γ's uniqueness presupposition. Finally, in (54-b), it follows from the negation of χ's assertive content which, together with the prejacent ϕ, entails that some associate didn't show up.

(54) $\text{EXH}_{\mathcal{R}}$ [$_{\phi}$ three of the associates showed up]

a. Strengthened Meaning from the Definite Alternative
$[\![\text{EXH}_{\mathcal{R}}\ \phi]\!](\text{w})$ is defined if and only if
(i) there are associates in w (ϕ's presuppositions), and
(ii) some but not all associates showed up in w (negation of ψ's homogeneity presupposition).
Whenever defined, $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!](\text{w})$ is true if and only if three of the associates showed up in w.

b. Strengthened Meaning from the Definite+Cardinal Alternative
$[\![\text{EXH}_{\mathcal{R}}\ \phi]\!](\text{w})$ is defined if and only if
(i) there are associates in w (ϕ's presuppositions), and
(ii) some but not all associates showed up in w (negation of γ's homogeneity presupposition) or there aren't exactly three associates in w (negation of γ's uniqueness presupposition).
Whenever defined, $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!](\text{w})$ is true if and only if three of the associates showed up in w.

c. Strengthened Meaning from the Universal Alternative
$[\![\text{EXH}_{\mathcal{R}}\ \phi]\!](\text{w})$ is defined if and only if there are associates in w (ϕ's presuppositions). Whenever defined, $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!](\text{w})$ is true if and only if three of the associates but not every associate showed up in w.

Result: $\text{EXH}_{\mathcal{R}}(\phi) \Rightarrow$ the (relevant) associates are more than three.

In sum, each of the alternatives to ϕ in (47) is an excludable structural alternative to ϕ and, upon exhaustification of ϕ's meaning, the exclusion of any of these alternatives delivers the entailment that the (relevant) associates are more than three, which corresponds to the proper partitivity inference we were trying to account for. For completeness, we can further observe that ψ, γ and χ are all together consistently deniable with ϕ, and that excluding all these alternatives at once does not give rise to any logical inconsistency. In other words, the results in (54-a)-(54-c) are not only convergent, they are also mutually compatible.

There are nonetheless subtle differences between the definite, definite+cardinal and universal alternatives to cardinal partitives which naturally affect both their excludability and their relevance in context. First of all, universal alternatives to indefinite partitives are assertive alternatives and, consequently, they are not excludable under negation, unlike the definite presuppositional alternatives (negation is a hole to presuppositions). To illustrate, consider the following sentence on its reading where negation takes scope over the indefinite cardinal partitive:

(55) Three of the associates didn't show up.
SS: NEG [[$_{\text{DP}}$ [$-def$] three ⟨PL associate⟩ of$_{\text{PART}}$ the PL associate] showed up]

a. ψ: NEG [[$_{\text{DP}}$ the associates] showed up] (excludable)
b. γ: NEG [[$_{\text{DP}}$ the three associates] showed up] (excludable)
c. χ: NEG [[$_{\text{DP}}$ every associate] showed up] (non-excludable)

Inference: the (relevant) associates are more than three

On its plain meaning, (55) is true if and only if it is not the case that three of the relevant associates showed up. The proper partitivity inference associated with (55) cannot be derived on the basis of its universal alternative χ for this structural alternative is not an excludable alternative to (55) (because (55) logically entails that not every associate showed up). Thus, in these environments, proper partitivity entailments can only obtain by computing the presuppositional implicatures associated with the definite alternatives ψ or γ, each of which remains excludable.

Second, it is worth emphasizing that the range of contexts in which the definite and universal alternatives are relevant appears to be more restricted than that in which the definite+cardinal alternative is relevant. The reason for this discrepancy is relatively simple: unlike the definite+cardinal alternative, the definite and universal alternatives do not provide any information regarding the cardinality of the set of individuals denoted by the relevant NP. Hence, whenever the question under discussion targets such a piece of information (i.e., a *how many*-question) and the cardinality of the set of individuals denoted by the relevant NP is not common ground, there are some reasons to believe that speakers may consider the definite and universal alternatives as contextually irrelevant, as exemplified in (56). In such cases, it is reasonable to think that the derivation of the proper partitivity entailment may solely rely upon the availability of the definite+cardinal alternative.

(56) *Context: Some professor is unaware of the number of incoming students this year and wonders how many graduate students registered for his seminar.*
Ten of the graduate students registered for the seminar.
Inference: the graduate students are more than ten
a. ??The graduate students registered for the seminar.
b. The ten graduate students registered for the seminar.
c. ??Every graduate student registered for the seminar.

To summarize, the proper partitivity inference associated with the interpretation of cardinal partitives can be derived as a genuine implicature on the basis of their definite or universal alternatives. In cases like (47), the exclusion of any of these alternatives delivers the target inference; in cases like (55), on the other hand, the derivation of this inference makes a critical use of the definite presuppositional alternatives. Finally, I have suggested that, in terms of relevance, the definite+cardinal alternative to cardinal partitives may have primacy over the other two alternatives simply because it is the only alternative that directly provides information about the cardinality of the set of individuals denoted by the relevant NP.

Double Genitives (aka Partitive Possessives) Barker (1998) observed that the proper partitivity effects exhibited by cardinal partitives are also found in double genitive constructions, and proposed to analyze these constructions as a special kind of partitives which he coined *partitive possessives* (see (40) above). I propose to go one step further and argue that double genitive constructions *are* genuine partitives with respect to their core semantics, possible surface realizations and scalar behavior. Consider the following paradigm:

(57) a. [$_{\text{DP}}$ three of$_{\text{PART}}$ John's associates] showed up
b. [$_{\text{DP}}$ three associates of$_{\text{PART}}$ John's] showed up
c. [$_{\text{DP}}$ three of$_{\text{PART}}$ John's] showed up
Inference: John has more than three associates

My proposal is that the double genitives in these sentences all have the same underlying representation, (58). On this representation, the possessor *John* is base-generated and interpreted within the (possibly silent) lower NP as an argument of the relational noun *associate*. I assume here that the embedded DP, i.e. the complement of *of*$_{\text{PART}}$, can be spelled out in one of two ways: either by marking the possessor with possessive-*of* and realizing overtly [+*def*] as the definite determiner (i.e., *the associates of John*), or by realizing the possessor in place of [+*def*] and marking it with possessive-*s'* (i.e., *John's associates*).[10] The rest of the composition is already familiar to us.

(58) *Underlying representation of double genitives*
[$_{\text{DP}}$ [−*def*] three [PL associate] of$_{\text{PART}}$ [$_{\text{DP}}$ [+*def*] [PL associate] of$_{\text{POSS}}$ John]]

On this proposal, the sentences in (57) only differ from each other with respect to their surface realizations: one or both NPs in the partitive DP undergoes PF-deletion, as shown in (59-a)-(59-c). The option of deleting both NPs, (59-c), is naturally more restricted than the other two as it requires an overt antecedent NP in the surrounding context, e.g. *two of Peter's associates and three of John's showed up*.

(59) *Possible surface realizations for double genitives*
a. PF$_1$: three ~~associates~~ of John's associates (higher NP deleted)
b. PF$_2$: three associates of John's ~~associates~~ (lower NP deleted)
c. PF$_3$: three ~~associates~~ of John's ~~associates~~ (both NPs deleted)

The possible surface realizations of double genitives are similar to these of genuine partitives in which one or both NPs can be phonologically deleted, as exemplified in (60) (this paradigm is modeled after the examples (10)-(12) from Sauerland and Yatsushiro, 2004).

(60) *Possible surface realizations for genuine partitives*
No deletion: three books of all the books John bought
a. PF$_1$: three ~~books~~ of the books that John bought (higher NP deleted)
b. PF$_2$: three books of those ~~books~~ that John bought (lower NP deleted)
c. PF$_3$: three ~~books~~ of those ~~books~~ that John bought (both NPs deleted)

Finally, on this proposal, double genitive constructions end up with the same (three types of) alternatives as those we have identified for genuine cardinal partitives, namely a definite, definite+cardinal and universal alternative.

[10] On this analysis, the alternation between postnominal vs. prenominal possessives (e.g., *the son of John* vs. *John's son*) is primarily conceived as a morpho-phonological alternation rather than as a structural one. I notice however that this analysis does not exclude the possibility that structural considerations be involved too, depending on one's take on case-assignment. I will leave aside for now these possible, and perhaps necessary, refinements.

(61) **Alternatives to Double Genitives**
ϕ: Three (associates) of$_{\text{PART}}$ John's (associates) showed up
a. ψ: John's associates showed up (definite)
b. γ: John's three associates showed up (definite+cardinal)
c. χ: Every associate of John showed up (universal)

As shown in (62)-(64), each of these alternative sentences obtains from the base structure in (58) by a series of substitution and/or simplification operations. The derivations schematized below are similar to those presented in (48)-(50).

(62) ϕ: [$_{\text{DP}}$ [$-def$] three [PL associate] of$_{\text{PART}}$ [$+def$] [PL associate] of$_{\text{POSS}}$ John]
ψ: [$_{\text{DP}}$ [$+def$] [PL associate] of$_{\text{POSS}}$ John]
where ψ is spelled-out as 'John's associates'

(63) ϕ: [$_{\text{DP}}$ [$-def$] three [PL associate] of$_{\text{PART}}$ [$+def$] [PL associate] of$_{\text{POSS}}$ John]
a. [$_{\text{DP}}$ **[+def]** three [PL associate] of$_{\text{PART}}$ [$+def$] [PL associate] of$_{\text{POSS}}$ John]
b. [$_{\text{DP}}$ [$+def$] three ~~[PL associate] of$_{\text{PART}}$ [$+def$]~~ [PL associate] of$_{\text{POSS}}$ John]
γ: [$_{\text{DP}}$ [$+def$] three [PL associate] of$_{\text{POSS}}$ John]
where γ is spelled-out as 'John's three associates'

(64) ϕ: [$_{\text{DP}}$ [$-def$] three [PL associate] of$_{\text{PART}}$ [$+def$] [PL associate] of$_{\text{POSS}}$ John]
a. [$_{\text{DP}}$ **every** three [PL associate] of$_{\text{PART}}$ [$+def$] [PL associate] of$_{\text{POSS}}$ John]
b. [$_{\text{DP}}$ every ~~three [PL associate] of$_{\text{PART}}$ [$+def$] PL~~ associate of$_{\text{POSS}}$ John]
χ: [$_{\text{DP}}$ every associate of$_{\text{POSS}}$ John]

Since double genitive constructions can be analyzed as genuine partitive constructions, it follows that their proper partitivity entailments obtain upon exhaustification exactly as described in (54).

Pronominal, Measure Partitives and Generalization We have seen that pronominal and measure partitives also give rise to proper partitivity entailments, (65).

(65) a. *Pronominal Partitives*
Three of them talked to Mary.
Inference: The denotation of 'them' counts more than three individuals
b. *Measure Partitives*
John spent three hours of his free time cooking.
Inference: John had more than three hours of free time

These partitive constructions can be analyzed along the same lines as above (e.g., (44), (58)): *three of them* and *three hours of his free time* are DPs headed by a silent indefinite determiner, i.e. [$-def$]. For pronominal partitives, I further assume that the silent NP is headed by a (count) noun with a very bland meaning like *person* or *thing*, and that the deletion of this noun does not require an antecedent (for similar suggestions about mass nouns see Sauerland and Yatsushiro, 2004).

(66) *Underlying representation of indefinite pronominal and measure partitives*

a. $[_{\text{DP}}\ [-def]\ [\text{three}\ [\sout{\text{people}}\ [\text{of}_{\text{PART}}\ [_{\text{DP}}\ \text{them}]]]]]$
i.e., 'three of them'

b. $[_{\text{DP}}\ [-def]\ \text{two hours}\ [\text{of}_{\text{PART}}\ [[+def]\ \text{free time of}_{\text{POSS}}\ \text{his}]]]$
i.e., 'two hours of his free time'

On this analysis, indefinite pronominal and measure partitives end up with the same kinds of formal alternatives as indefinite cardinal partitives, as exemplified in (67) and (68). The γ and χ alternatives obtain by substituting $[-def]$ either with the definite (i.e., *the*/*[+def]*) or with a universal determiner (e.g., *every*).[11]

(67) **Alternatives to Pronominal Partitives**

ϕ: Three of them talked to Mary

a. ψ: They talked to Mary (definite)
b. γ: The three of them talked to Mary (definite+cardinal)
c. χ: Every one of them talked to Mary (universal)

(68) **Alternatives to Measure Partitives**

ϕ: John spent three hours of his free time cooking

a. ψ: John spent (the hours of) his free time cooking (definite)
b. γ: John spent the three hours of his free time cooking (definite+cardinal)
c. χ: John spent every hour of his free time cooking (universal)

Following these assumptions, the proper partitivity entailments associated with the sentences in (65) obtain by exhaustification of their meaning in the same way as before. To illustrate, consider for instance the sentence in (65-a). On the present view, the LF of this sentence involves an exhaustivity operator at matrix scope level:

(69) $\text{EXH}_{\mathcal{R}}\ [_{\phi}\ [[-def]\ \text{three}\ \langle\text{people}\rangle\ \text{of}_{\text{PART}}\ \text{them}_x]\ \text{talked to Mary}]$

The plain meaning of the prejacent ϕ of $\text{EXH}_{\mathcal{R}}$ is given in (70). In a nutshell, ϕ is felicitous in an utterance context c only if c furnishes a (unique) referent for the free pronoun *them* consistent with its ϕ-feature specifications, i.e. a plural 3rd-person referent.[12] Whenever ϕ is uttered in an appropriate utterance situation, it is true only if there is some individual y such that y is made up of three atomic parts and

[11] Unlike structural alternatives to cardinal partitives, note that the structural alternatives to pronominal and measure partitives need not be structurally less complex, e.g. the γ-alternatives in (67) and (68) are structurally as complex as their ϕ base sentence. I will explain the reasons for these discrepancies when I discuss the anti-uniqueness effects in Section 4.3.3.

[12] In line with the previous literature (a.o. Adger, 2011; Adger and Ramchand, 2005; Heim and Kratzer, 1998; Sudo, 2012; Von Stechow, 2002; Heim, 2008; Kratzer, 2009), I assume that referring pronouns can be analyzed as definite descriptions of the following syntactic form $[_{\text{DP}}\ [+def]\ [_{\Phi\text{P}}\ \Phi\ [\text{ID}]]]$, where $[+def]$ is a definite determiner with a classical Fregean semantics, ΦP is a structured set of ϕ-features (i.e., number, gender, person), and ID specifies how the pronoun is to be semantically identified (i.e., via variable assignment functions or via contexts). On this view, the composition of a pronoun like *them*/*they*, when it is used referentially, can proceed as indicated in (i); the value of the (free) individual variable x, i.e. the ID of the pronoun, must be provided by the utterance context, consistent with the additional restrictions imposed by the ϕ-feature specifications.

y is part of the referent of *them*. On these truth-conditions, it is only required that *them* be used to refer to a plural individual counting at least three proper parts.

(70) *Indefinite Pronominal Partitives (= prejacent of* $\text{EXH}_{\mathcal{R}}$*)*
ϕ: $[_{\text{DP}}$ $[-def]$ three ⟨people⟩ $[\text{of}_{\text{PART}}$ $[_{\text{DP}}$ $\text{them}_x]]]$ talked to Mary
a. Presupposition: there is exactly one individual in c which is x, and x is plural and contains neither the speaker nor the hearer in c
b. Assertion: there is an individual y such that $\#y = 3$ and $y \leq x$ and y talked to Mary

Consider now the definite+cardinal alternative γ to ϕ. This alternative comes with an additional presupposition: there must be a unique individual y such that y is made up of three atomic parts and y is part of the referent of *them*. That is, the contextual referent of *them* must now count exactly three proper parts (otherwise the uniqueness presupposition we just described fails).

(71) *Definite+Cardinal Pronominal Partitives (= alternative to the prejacent)*
γ: $[_{\text{DP}}$ $[+def]$ three ⟨people⟩ $[\text{of}_{\text{PART}}$ $[_{\text{DP}}$ $\text{them}_x]]]$ talked to Mary
a. Presupposition: there is exactly one individual which is x, and x is plural and contains neither the speaker nor the hearer in c, and there is exactly one individual y such that $\#y = 3$ and $y \leq x$
b. Assertion: the individual y such that $\#y = 3$ and $y \leq x$ talked to Mary

In any context in which γ is relevant, the LF in (69) will thus deliver the anti-presupposition that the additional uniqueness component conveyed by γ's presuppositions must be false, resulting in a proper partitivity entailment: there is an individual, *but not exactly one individual*, that is made up of three atomic parts and that is part of the referent of *them*, (72). As before, a similar result obtains by excluding the definite or universal alternative.

(72) *Deriving Proper Partitivity as an Implicature*
$[\![\text{EXH}_{\mathcal{R}}\ \phi]\!](\text{w})$ is defined if and only if
a. there is exactly one individual which is x, and x is plural and contains neither the speaker nor the hearer in c.
b. there isn't a unique individual z such that $\#z = 3$ and $z \leq x$

Whenever defined, $[\![\text{EXH}_{\mathcal{R}}\ \phi]\!](\text{w})$ is true if and only if there is an individual y such that $\#y = 3$ and $y \leq x$ and y talked to Mary.
Result: $\text{EXH}_{\mathcal{R}}(\phi) \Rightarrow$ the referent of 'them' counts more than three individuals.

(i) *Referring Pronouns (e.g., Adger, 2011; Adger and Ramchand, 2005)*
'them'/'they': $[_{\text{DP}\langle e\rangle}$ $[+def]$ $[_{\text{PERSON}\text{P}\langle e,t\rangle}$ $[3rd]$ $[_{\text{NUM}\text{P}\langle e\rangle}$ $[plural]$ $[[\text{ID}]]]]]$
$[\![\text{ID}]\!]^c = x$; $[\![\text{NumP}]\!]^c = x$ *is plural*$: x$;
$[\![\text{PersonP}]\!]^c =$ *speaker* $\not\leq x \wedge$ *hearer* $\not\leq x \wedge x$ *is plural*$: \lambda y.\ y = x$;
$[\![\text{DP}]\!]^c = \exists!y(y = x) \wedge$ *speaker* $\not\leq x \wedge$ *hearer* $\not\leq x \wedge x$ *is plural*$: \sigma y.\ y = x$;
$\approx$ *they* is defined only if there is exactly one individual in c which is x, and x is plural and contains neither the speaker nor the hearer in c; whenever defined, *they* denotes x.

To summarize, I have proposed that the proper partitivity effects associated with indefinite partitives arise due to the computation of an implicature which excludes their definite and/or universal structural alternatives, and I have shown that this implicature-based approach can apply in full generality to all types of (indefinite) partitives. On this view, proper partitivity inferences fall out from a more basic competition between indefinite DPs vs. definite/universal DPs, and can be generally conceived as anti-uniqueness or anti-maximality implicatures similar in essence to these triggered by the use of overt indefinite determiners like *a* and *some* in non-partitive constructions, as exemplified in (73-a) and (73-b).

(73) a. *Indefinite vs. Definite DPs*
John talked to [$_{DP}$ **a** brother of$_{POSS}$ Mary]
(i) Presuppositional Alternative:
John talked to [$_{DP}$ **[+def]** brother of$_{POSS}$ Mary]
(ii) Presuppositional Implicature:
Mary doesn't have exactly one brother
Anti-uniqueness: Mary has more than one brother

b. *Indefinite vs. Universal DPs*
John talked [$_{DP}$ **some** students]
(i) Assertive Alternative:
John talked to [$_{DP}$ **every** student]
(ii) Assertive Implicature:
John didn't talk to every student
Anti-maximality: John talked to some but not all students

In the remainder of this section, I turn to the semantic strength and distribution of the proper partitivity inferences. We will see that their distribution mirror that of other implicatures in the following two ways: (i) they are dispreferred whenever they weaken (rather than strengthen) the global meaning of a sentence, but (ii) they are mandatory whenever the alternative they are associated with is contextually equivalent to the prejacent of the exhaustivity operator.

Semantic Strength and Distribution Across Environments

Bound and Free Presupposition Triggers We have seen in section 4.2.2 that the semantic strength and distribution of the proper partitivity entailments is not as predicted by the proper partitivity view. In particular, focusing on cases of quantification over a presuppositional predicate, we have seen that this analysis can neither account for the possible weakening of these entailments in sentences of (74), nor for their disappearance in sentences of (75). I will now explain how an implicature-based approach to proper partitivity can handle these facts.

(74) Every/No student invited two of his sisters.
a. Stronger Interpretation: every student has more than two sisters and every/no student invited two of them.

b. Weaker Interpretation: every student has at least two sisters, at least one has more than two sisters and every/no student invited two of them

(75) a. Every student who invited two of his sisters had a good time.
Spontaneous Interpretation: every student who has at least two sisters and invited two of them had a good time
b. No student who invited two of his sisters had a good time.
Spontaneous Interpretation: no student who has at least two sisters and invited two of them had a good time

Let me start with the two readings in (74). These readings differ along one dimension, namely the strength of the proper partitivity inference. On its stronger interpretation, (74) presupposes that every student has more than two sisters whereas, on its weaker interpretation, it presupposes that every student has (at least) two sisters and that one of them has more than two sisters. I propose that these two interpretations correspond to the two possible ways whereby the meaning of this sentence can be strengthened, each of which relates to a different syntactic position at which the exhaustivity operator can occur. To explain, consider first the plain meaning of the sentence in (74), i.e. without any occurrence of $\textsc{exh}_{\mathcal{R}}$:[13]

(74) Every student invited two of his sisters.
$[_{\textsc{tp}}$ [every student] $\lambda 1$ $[_{v\textsc{p}'}$ [$[-def]$ two of his$_1$ sisters] $\lambda 2$ $[_{v\textsc{p}}$ [t_1 v invited t_2]]]]
a. Presupposition: for every student x, x has (at least) two sisters
b. Assertion: for every student x, there is a plural individual y such that $\#y = 2$ and $y \leq x$'s sisters, and x invited y

On this representation, (74) is acceptable and true in a situation where every student has exactly two sisters and invited them both. However, as we have already seen, indefinite partitives have among their structural alternatives definite non-partitives. For instance, (74) has the following alternative:

(76) Every student invited his two sisters.
$[_{\textsc{tp}}$ [every student] $\lambda 1$ $[_{v\textsc{p}'}$ [$[+def]$ his$_1$ two sisters] $\lambda 2$ $[_{v\textsc{p}}$ [t_1 v invited t_2]]]]
a. Presupposition: for every student x, there is a unique individual y such that $\#y = 2$ and $y \leq x$'s sisters
b. Assertion: for every student x, x invited the unique individual y such that $\#y = 2$ and $y \leq x$'s sisters

[13] It is my understanding that most (if not all) theories of projection attribute universal (or near-universal) presuppositions to cases of quantification over a presuppositional predicate. Although the projection behavior of certain quantificational expressions does not fit well in this picture (e.g., *at least/exactly two*), it remains appropriate for the quantifiers that we will be looking at (i.e., *every/no*). For example, the following presuppositions seem plausible:

(i) a. Each/none of these ten students invited his sisters.
Presupposition: each of these ten students has sisters.
b. Each/none of these ten students has stopped smoking.
Presupposition: each of these ten students has smoked in the past.

Unlike (74), this sentence is defined only if every student has exactly two sisters and, whenever defined, it is true if and only if every student invited both his sisters. My proposal is that the two interpretations of (74) come about by excluding this presuppositionally stronger alternative, but differ regarding the level at which this implicature is computed. Specifically, let us assume with Magri (2009, 2011) that the exhaustivity operator is not just mandatory at the matrix level but at every scope site. On this assumption, the full syntactic representation of (74) shall be as follows:[14]

(77) **EXH**[$_{\text{TP}}$ [every S] λ1 **EXH**[$_{v\text{P}}$, [[$-def$] two of his$_1$ Ss] λ2 [$_{v\text{P}}$ [t$_1$ v invited t$_2$]]]]

The two occurrences of the exhaustivity operator apply to distinct propositions. On the one hand, the lower occurrence of $\text{EXH}_{\mathcal{R}}$ has scope over the extended vP domain and thus applies to the proposition denoted by the extended vP. If it is relevant to the conversation to know, for every student, whether this student has exactly two or more than two sisters, then the domain of the higher EXH may be empty, but the computation of the lower EXH will consider the definite presuppositional alternative to the bound partitive *two of his sisters*. As shown in (78), negating the presupposition of this presuppositional alternative at the vP-level gives us the anti-presupposition that every student has not just two sisters, which corresponds to the stronger interpretation of (74).

(78) *Derivation of the Stronger Interpretation*
$\text{EXH}_{\emptyset}$[$_{\text{TP}}$ [every S] λ1 **EXH**[$_{v\text{P}}$, [[$-def$] two of his$_1$ Ss] λ2 [$_{v\text{P}}$ [t$_1$ v invited t$_2$]]]]
$\text{EXCL}_{prs}(v\text{P'}) \supseteq \{$[[[$+def$] his$_1$ two Ss] λ2 [$_{v\text{P}}$ [t$_1$ v invited t$_2$]]]$\}$

a. Presupposition: for every student x, x has (at least) two sisters and there is not a unique individual y such that $\#y = 2$ and $y \leq x$'s sisters
$\approx$ every student has more than two sisters

b. Assertion: for every student x, there is a plural individual y such that $\#y = 2$ and $y \leq x$'s sisters, and x invited y

On the other hand, the higher occurrence of EXH has scope over the whole TP and thus applies to the matrix proposition. If it is relevant to the conversation to know whether it is the case that every student has exactly two sisters, then the domain of the lower EXH may be empty but the computation of the higher EXH will consider the embedded definite alternative to the bound partitive *two of his sisters*. As shown in (79), negating the presupposition of this presuppositional alternative at the TP-level gives us the presuppositions that every student has at least two sisters but not all of them have just two sisters (i.e., some students have two sisters, others have more), which corresponds to the weaker interpretation of (74). Note that in order for this reasoning to go trough, it must be assumed - as we do - that the lower occurrence of EXH has no semantic effect in this case, otherwise the strong reading would again obtain (i.e., every student has more that two sisters and not every student has exactly two sisters).

[14]For our purposes, it is possible to identify the two syntactic positions at which the exhaustivity operator is syntactially mandatory as corresponding to the edge of the TP and to that of the vP.

(79) *Derivation of the Weaker Interpretation*
EXH$[_{\text{TP}}$ [every S] $\lambda 1$ $\text{EXH}_{\emptyset}[_{vP'}$ $[[-def]$ two of his$_1$ Ss$]$ $\lambda 2$ $[_{vP}$ [t$_1$ v invited t$_2$]]]]
$\text{EXCL}_{prs}(\text{TP}) \supseteq \{$[[every S] $\lambda 1$ $\text{EXH}_{\emptyset}$[[[$+def$] his$_1$ two Ss] $\lambda 2$ $[_{vP}$ [t$_1$ v invited t$_2$]]]]$\}$

a. Presupposition: every student has (at least) two sisters but it is not the case that for every student x, there is a unique individual y such that $\#y = 2$ and $y \leq x$'s sisters
$\approx$ some student has more than two sisters

b. Assertion: for every student x, there is a plural individual y such that $\#y = 2$ and $y \leq x$'s sisters, and x invited y

Our analysis of (74) relies on a comparison between indefinite vs. definite DPs in cases where these DPs trigger bound presuppositions. If this analysis is on the right track, then the ambiguity we have investigated should replicate in non-partitive cases where indefinite and definite bound DPs compete, but it should disappear when the relevant DP (partitive or not) is not subject to binding. Both predictions are empirically borne out. First of all, a sentence like *every student invited a brother of his* can also receive a stronger and weaker interpretation, as exemplified in (80). This ambiguity can be accounted for in an analogous way as that observed for (74).

(80) *Similar Ambiguity with Non-Partitive Bound DPs*
Every student invited a brother of$_{\text{POSS}}$ his.
LF: **EXH**$[_{\text{TP}}$ [every S] $\lambda 1$ **EXH**$[_{vP'}$ $[[-def]$ B of his$_1$] $\lambda 2$ $[_{vP}$ [t$_1$ v invited t$_2$]]]]
$\text{ALT} \supseteq \{[_{\text{TP}}$ [every S] $\lambda 1$ $[_{vP'}$ $[[+def]$ B of his$_1$] $\lambda 2$ $[_{vP}$ [t$_1$ v invited t$_2$]]]]$\}$
i.e., in words, 'every student invited his brother'

a. Stronger Interpretation:
every student has more than one brother and invited one of them.

b. Weaker Interpretation:
every student has a brother, at least one student has more than one brother, and every student invited a brother of his.

Second, there is no such ambiguity when the relevant DPs are not associated with a bound presupposition. In a sentence like (81-a), the partitive DP *two of John's brothers* triggers the presupposition that *John has at least two brothers*. Since this presupposition has no bound expression in it, it can project out of the scope of *every student*. Upon the negation of the presupposition of its definite scalar alternative, the presupposition of this sentence is strengthened to *John has more than two brothers*. The same explanation holds for (81-b).

(81) *No Ambiguity with Free DPs*

a. Every student talked to two of John's brothers.
$\text{EXCL}_{prs} \supseteq \{$[Every student talked to John's two brothers]$\}$
$\rightsquigarrow$ John has more than two brothers (proper partitivity)

b. Every student talked to a brother of John.
$\text{EXCL}_{prs} \supseteq \{$[Every student talked to John's brother]$\}$
$\rightsquigarrow$ John has more than one brother (anti-uniqueness)

Let me now turn to the sentences in (75). In these sentences, the bound presupposition triggers occur in the restrictor of the quantifiers *every* and *no*. Although the projection of presuppositions from restrictors is not fully understood, it is commonly observed that such sentences, unlike the one in (74), lack a universal presupposition (see for instance George, 2008a). In a nutshell, the observation is that a sentence like *Every student who invited two of his sisters had a good time* does not require that every student has two sisters. For instance, this sentence can be felicitously uttered in a situation where some students have two sisters but some students are only children. For the time being, I will simply assume that bound presuppositions can be locally accommodated in the restrictors of *every* and *no* as exemplified in (82).

(82) *Local Accommodation of Bound Presuppositions*
Every student who invited two of his sisters VP
Parse: every student **A**[who$_1$ t$_1$ invited two of his$_1$ Ss] VP
$\approx$ every student x s.t. **A**[x invited two of x's Ss] VP
$\approx$ every student x s.t. [x has at least two Ss and x invited two of them] VP

Following these clarifications, the challenge for us is now to understand why these sentences do not give rise to the same kind of proper partitivity entailments as those observed for sentences of (74). To put if differently, why aren't these sentences, in run-of-the-mill contexts, understood as being only about those students who have more than two sisters? Following Fox and Spector (2009) and Magri (2011), I propose that the explanation for this missing reading follows from the fact the implicature whereby this reading comes about is generally disfavored because it weakens, rather strengthens, the global meaning of this sentence. On our assumptions, the meaning of (75-a) could in principle be exhaustified in at least two ways, globally or locally:

(75-a) **EXH**[$_{TP}$ every student **A**[who$_1$ **EXH**[$_{vP}$ [[$-def$] two of his$_1$ sisters] λ_2 [t$_1$ v invited t$_2$]]] had a good time]

The definite alternative to this sentence, no matter which occurrence of EXH we consider, obtains as previously by substituting the (embedded) indefinite partitive DP with a structurally simpler definite non-partitive DP, (83). Consistent with speaker's intuitions, I take for granted that bound presuppositions are also locally accommodated in these cases (i.e., *every student who invited his two sisters had a good time* does not require that every student has two sisters).[15]

[15]The judgments of my informants are not as clear-cut for these definite alternatives. A couple of them report that the sentence *every student who invited his two sisters had a good time* does not sound as felicitous as *every student who invited two of his sisters had a good time* in cases where the speaker knows that some students are only children or have more than two sisters, suggesting that the former sentence can be interpreted with a universal presupposition. I have no explanation at this point for this discrepancy. I note however that, if the bound presupposition in this sentence need not be locally accommodated, i.e. if *every student who invited his two sisters had a good time* is interpreted with a universal presupposition (e.g., by deleting further the A-operator in (83)), then (83) qualifies as a scalar alternative to (75-a) at the TP-level. In this case, the higher occurrence of EXH in (75-a) would deliver the implicature that *Not every student has exactly two sisters*, which seems to be a plausible result.

(83) [$_{TP}$ every student **A**[who$_1$ [$_{vP}$ [[+*def*] his$_1$ two sisters] λ_2 [t$_1$ *v* invited t$_2$]]] had a good time] i.e., 'every student who invited his two sisters had a good time'

At the TP-level, (83) does not qualify as a excludable alternative to (75-a). If it is true that every student who has at least two sisters and invited two of them had a good time, then it follows that every student who has exactly two sisters and invited them both had a good time. Hence, the higher occurrence of EXH in (75-a) has no semantic effect here because its prejacent entails (83), and therefore (83) cannot be excluded (see footnote 15 for refinements). However, at the *v*P-level, the relevant alternative is excludable, (84): there are possible worlds in which every student who has at least two sisters — but not exactly two sisters (i.e., at least three) — and invited two of them had a good time. If this local implicature were computed, we would end up with a proper partitivity meaning component within the restrictor of the quantifier. The generation of this implicature, however, would weaken the global meaning of the sentence: (75-a) with its local implicature, i.e. (84), is entailed by (75-a) without its local implicature. Such an implicature is predicted to be disfavored by the Economy Principle proposed in Fox and Spector (2009) (see also Magri, 2011, (85)). Whenever the prejacent of the lower occurrence of EXH is not (locally) contextually equivalent to the local *v*P-alternative of (75-a), this alternative is expected to be pruned so that EXH does not have in its domain an alternative whose corresponding implicature leads to a weakening of the global meaning. Hence, the absence of proper partitivity entailments in these cases.

(84) *Local Implicature for (75-a) = Weakening of Global Meaning*
LF: EXH$_\emptyset$[$_{TP}$ every student **A**[who$_1$ **EXH**[$_{vP}$ [[−*def*] two of his$_1$ sisters] λ_2 [t$_1$ *v* invited t$_2$]]] had a good time]
EXCL$_{prs}$(*v*P)$\supseteq${[[[+*def*] his$_1$ two sisters] $\lambda 2$ [[t$_1$ *v* invited t$_2$]]]}
$\approx$ every student x such that **A**[[x invited two of x's sisters] $\wedge$ $\neg$[x has exactly two sisters]] had a good time
$\approx$ every student x such that [x has two sisters $\wedge$ x invited two of x's sisters $\wedge$ $\neg$[x has exactly two sisters]] had a good time
$\approx$ every student x such that [x has at least three sisters $\wedge$ x invited two of them] had a good time (weaker than (75-a))

It is worth emphasizing that the interpretative contrasts observed between (74) vs. (75) is not peculiar to proper partitivity implicatures. Rather, the present observations echo the long-standing observation that, in run-of-the-mill-contexts, scalar implicatures are (generally) dispreferred in DE embedded environments. Focusing here on the case of anti-maximality implicatures (i.e., anti-uniqueness and *not-all* implicatures), (85) and (86) show that similar contrasts are found for other presuppositional (e.g., *a brother of his*) and non-presuppositional (e.g., *some students*) indefinite DPs when embedded in upward-entailing (UE) vs. downward-entailing (DE) environments.

(85) *Implicatures Embedded in UE vs. DE environments (Bound presuppositions)*

a. Every student invited a brother of his. (UE)
LF: every S $\lambda 1$ $\mathbf{EXH}_{[+def]}$[t_1 invited a B of his$_1$]
$\rightsquigarrow$ every S has more than one B and invited a B of his

b. Every student who invited a brother of his came in. (DE)
LF: Every S $\mathbf{A}$[who $\lambda 1$ $\mathbf{EXH}_{\emptyset}$[t_1 invited a B of his$_1$]] came in
$\not\rightsquigarrow$ every S who has more than one B and invited a B of his came in

(86) *Implicatures Embedded in UE vs. DE environments (Non-presuppositional)*

a. Every professor talked to some students. (UE)
LF: every P $\lambda 1$ $\mathbf{EXH}_{all}$[t_1 talked some Ss]
$\rightsquigarrow$ every P talked to some but not all Ss

b. Every professor who talked to some students came in. (DE)
LF: every P who $\lambda 1$ $\mathbf{EXH}_{\emptyset}$[t_1 talked to some Ss] came in
$\not\rightsquigarrow$ every P who talked to some but all Ss came in

Finally, note that no such contrasts between UE vs. DE environments are expected when the relevant indefinite DPs trigger *free* presuppositions. This is exemplified in (87) for partitives and in (88) for possessives. In these cases, the presuppositions triggered by these DPs project out of the restrictors of the quantificational phrase and are thus interpreted at the global level of the sentence in which they occur. For instance, both (87-a) and (87-b) presuppose that John has at least two sisters. The inferences that John has more than two sisters, (87), and John has more than one brother, (88), are derived as (global) scalar implicatures in a similar way as before.

(87) *Global Implicatures in UE vs. DE contexts (Free presuppositions)*

a. Every professor talked to two of John's sisters. (UE)
LF: $\mathbf{EXH}_{[+def]}$ [every P $\lambda 1$ [t_1 talked to [$-def$] two of J's Ss]]
$\rightsquigarrow$ J. has more than two Ss and every P talked to two of them

b. Every professor who talked to two of John's sisters came in. (DE)
LF: $\mathbf{EXH}_{[+def]}$ [every P who $\lambda 1$ [t_1 talked to [$-def$] two of J's Ss] came in]
$\rightsquigarrow$ J has more than two Ss and every P who talked to two of them came in

(88) *Global Implicatures in UE vs. DE contexts (Free presuppositions)*

a. Every student talked to a brother of John. (UE)
LF: $\mathbf{EXH}_{[+def]}$ [every S $\lambda 1$ [t_1 talked to **a** B of J]]
$\rightsquigarrow$ J has more than one B and every S talked to a B of J

b. Every student who talked to a brother of John came in. (DE)
LF: $\mathbf{EXH}_{[+def]}$ [every S who $\lambda 1$ [t_1 talked to **a** B of J] came in]
$\rightsquigarrow$ J. has more than one B and every S who invited a B of J came in

In sum, the distribution of the proper partitivity inferences matches that of genuine implicatures: in run-of-the-mill-contexts, they are dispreferred when their computation leads to a weakening of global meaning. I have suggested that this property is captured by the Economy Principle offered in Fox and Spector (2009) (see also Magri, 2011) that demands as few relevant alternatives as possible in the domain of

the exhaustivity operator and retains only those alternatives that can strengthen the overall meaning of a sentence. By this principle, whenever an exhaustivity operator is embedded within a DE environment, i.e. when embedded in the restrictor of *every* or *no*, any alternative that can be pruned from its domain shall be pruned if the computation of the implicature associated with this alternative would otherwise weaken the overall meaning of the sentence.

Opinionatedness, Uncertainty and Oddity Effects To conclude this section, let me go back to the observations we have made regarding the relationship between the felicitous use of partitives and the belief state of the interlocurtor(s). In substance, we have seen that a speaker can felicitously use a partitive DP like *two of Mary's sisters* at a context C as long as it is acceptable in C that it is not the case that the speaker believes that Mary has exactly two sisters; by contrast, if the speaker is believed to be opinionated about that matter, then the sentence is perceived as odd.

(89) *Felicity of Partitives as a function of the Speakers' Epistemic State*

a. Opinionated: $|\textit{Mary's sisters}| = 2$
#Mary has only two sisters. John met two of them.

b. Opinionated: $|\textit{Mary's sisters}| > 2$
^{ok}Mary has three sisters. John met two of them.

c. Uncertainty: $|\textit{Mary's sisters}| \geq 2$
^{ok}Mary has two or three sisters. John met two of them
^{ok}I don't know how many sisters Mary has, but John met two of them.

To the best of my knowledge, these observations extend to other indefinites DPs that can give rise to anti-maximality implicatures, as exemplified in (90) and (91).

(90) *Felicity of 'some' as a function of the Speakers' Epistemic State*

a. Opinionated: *every student got a B*
#John gave the same grade to every student. Specifically, he gave some students a B.

b. Opinionated: *only some students got a B*
^{ok}John gave the same grade to every student. Specifically, he gave every student a B.

c. Uncertainty: *some students, possibly all, got a B*
^{ok}I don't know whether John gave the same grade to every student but he gave some students a B.

(91) *Felicity of 'a' as a function of the Speakers' Epistemic State*

a. Opinionated: *uniqueness*
#John has a unique brother. Mary fell in love with a brother of his.

b. Opinionated: *non-uniqueness*
^{ok}John has two brothers. Mary fell in love with a brother of his.

c. Uncertainty: *uncertainty about uniqueness*
^{ok}I don't know whether John has just one or more brothers, but Sue fell in love with a brother of his.

The felicity of the (b)-sentences should not surprise us. Regardless of how alternatives are manipulated by the exhaustivity operator(s) in these sentences, all the possible outcomes are contextually consistent. Accounting for the felicity of the (c)-sentences requires further explanation but nothing beyond what we have already seen. In these cases, the speaker explicitly states that he is ignorant about the truth of the possibly relevant alternatives. Hence, these alternatives are simply pruned from the domain of the exhaustivity operator(s) to avoid a contradiction in context. But why are the (a)-sentences odd?

Following the proposal in Magri (2009, 2011, 2014), I propose that the oddness of the (a)-sentences follows from the fact that the computation of the corresponding anti-maximality implicatures are mandatory in these cases, resulting in interpretations that conflict with speakers' contextual assumptions (given here by the previous discourse). Specifically, let us assume with Magri that, whenever a sentence ϕ is relevant at a context C, then every sentence that is contextually equivalent to ϕ in C is relevant in C (see also Fox and Katzir, 2011; Fox and Spector, 2009). It follows from this assumption that any excludable alternative that is contextually equivalent to the prejacent of an exhaustivity operator shall be contextually relevant and therefore cannot be pruned form the domain of this operator. When it is so, the computation of the implicature associated with this alternative becomes obligatory, even when it results in a contextual contradiction. On Magri's proposal, the account of the oddness of the (a)-sentences above could thus go as follows:

(89-a) $C \subseteq$ *Mary has exactly two sisters*

a. $\text{EXH}_{\mathcal{R}}$ [$_\phi$ John met two of Mary's sisters] ($\phi \Leftrightarrow_C \psi$)
b. $\text{EXCL}_{prs}(\phi) \supseteq \{[_\psi$ John met Mary's two sisters$]\}$
c. $\text{EXH}_{\mathcal{R}}(\phi) \Rightarrow$ #Mary doesn't have exactly two sisters
Therefore, $C \cap \text{EXH}_{\mathcal{R}}(\phi) = \emptyset$

(90-a) $C \subseteq$ *John gave the same grade to every student*

a. $\text{EXH}_{\mathcal{R}}$ [$_\phi$ John gave some students a B] ($\phi \Leftrightarrow_C \psi$)
b. $\text{EXCL}_{asr}(\phi) \supseteq \{[_\psi$ John gave every student a B$]\}$
c. $\text{EXH}_{\mathcal{R}}(\phi) \Rightarrow$ #John didn't give every student a B
Therefore, $C \cap \text{EXH}_{\mathcal{R}}(\phi) = \emptyset$

(91-a) $C \subseteq$ *John has a unique brother*

a. $\text{EXH}_{\mathcal{R}}$ [$_\phi$ Mary loves a brother of John] ($\phi \Leftrightarrow_C \psi$)
b. $\text{EXCL}_{prs}(\phi) \supseteq \{[_\psi$ Mary loves John's brother$]\}$
c. $\text{EXH}_{\mathcal{R}}(\phi) \Rightarrow$ #John has more than one brother
Therefore, $C \cap \text{EXH}_{\mathcal{R}}(\phi) = \emptyset$

Suppose for instance that the sentence *John met two of Mary's sisters*, (89-a), has been uttered at a context C to address in the discussion the question *Who did John meet?*. This sentence contains an exhaustivity operator whose associated set of excludable alternatives includes the sentence *John met Mary's two sisters*. Suppose now that it is common ground that Mary has only two sisters. Then, (89-a) and (89-a)'s presuppositional alternative are contextually equivalent in C which, by Ma-

gri's proposal, implies that (89-a)'s alternative is contextually relevant. Therefore, the exclusion of (89-a)'s presuppositional alternative will be added to the meaning (89-a), resulting in a strengthened meaning that contradicts common knowledge, hence the oddness of the sentence (89-a).

An interesting prediction that follows from Magri's proposal is that, in cases of contextual equivalence, implicatures embedded in DE environments should also be obligatory because the alternatives they follow from cannot be filtered out by the Economy Principle, even though these implicatures result in a weakening of the overall meaning (see in particular Magri, 2011). The examples in (92) and (93) provide further empirical support for this proposal. The contrasts previously observed for embedded implicatures in UE vs. DE environments (see (84)-(86) above) disappear when the relevant alternatives are locally contextually equivalent to the prejacent of the embedded occurrence of $\text{EXH}_{\mathcal{R}}$. In such cases, embedded implicatures are predicted to be mandatory, accounting for the oddness of these examples.

(92) $C \subseteq$ *every student has exactly two sisters*

a. #Every student invited two of his sisters. (UE)

b. #Every student who invited two of his sisters had a good time (DE)

(93) $C \subseteq$ *every student has a unique brother*

a. #Every student invited a brother of his. (UE)

b. #Every student who invited a brother of his had a good time. (DE)

Magri's proposal provides us with the last piece we needed to solve the proper partitivity puzzle. Consider again the example in (94) that we started with:

(94) #John met two of Mary's parents/two parents of Mary's.

We can now attribute the oddness of this sentence to the mandatory proper partitivity implicature it gives rise to. The presence of this implicature results in a meaning that conflicts with our common assumption that everybody has at most two (biological) parents. On the present view, the oddness of this sentence is thus to be considered on a par with Heim's, (95-a), and Magri's, (95-b), classical examples.

(95) *Mandatory Implicatures and Oddity Effects*

a. #A sun is shining.
(cf. The sun is shining)
$\rightsquigarrow$ #There are at least two suns (anti-uniqueness)

b. #Some Italians come from a beautiful country.
(cf. Italians come from a beautiful country)
$\rightsquigarrow$ #Not all Italians come from a beautiful country. (not-all)

c. #John met two of Mary's parents.
(cf. John met Mary's two parents)
$\rightsquigarrow$ #Mary has at least three parents (proper partitivity)

4.3.3 Anti-Uniqueness and Structural Economy

Cardinal Partitives and Partitive Possessives

We are left with the puzzle of the anti-uniqueness condition: why are definite cardinal partitives deviant?

(96) *The three of the associates met John.
LF: $\text{EXH}_{\mathcal{R}}$ [[$_{\text{DP}}$ the three <associates> of$_{\text{PART}}$ [$_{\text{DP}}$ the associates]] met John]
a. *Presupposition Failure? - No*
$\exists!x[\#x = 3 \wedge {}^*associate(x) \wedge x \leq \sigma y.\ {}^*associate(y)]$
b. *Mismatching Implicature? - No*
$\text{EXCL} \not\supseteq \{$[[$_{\text{DP}}$ the three associates] met John]$\}$

The deviance of definite cardinal partitives does not follow from what we have said so far. On our analysis, sentences of (96) are not expected to give rise to systematic presupposition failures. Since *of*$_{\text{PART}}$ semantically expresses partitivity (as opposed to proper partitivity), the uniqueness presupposition associated with the higher definite determiner only requires that there is a unique individual made up of three atomic associates that is part of the plural individual denoted by *the associates*. This condition is met whenever the plural individual denoted by *the associates* counts exactly three atomic parts. Next, note that the deviance of (96) cannot be attributed to the presence of a mismatching implicature. In this case, the structurally simpler definite alternative to (96), *the three associates met John*, is semantically equivalent to (96), and therefore is not excludable. Hence, no proper partitivity entailments are expected. So, what's wrong with these sentences?

Building upon Ionin et al. (2006) (see also Le Bruyn 2007), I propose that the deviance of definite cardinal partitives follows from a general economy constraint that favors simpler over more complex syntactic structures . This constraint, (13), is repeated below for convenience.

(13) **Economy of Structure (Economy)**
An LF ϕ is deviant if there is a grammatical formal alternative to ϕ that is structurally simpler than ϕ and *semantically equivalent* to ϕ.

The intuition underlying the formulation of (13) is that grammars monitor the relationships between structural complexity and meaning: any additional layer of structure beyond what is needed for convergence should have a semantic contribution (a.o. Chomsky, 1993b; Golan, 1993; Ruys, 1994; Reinhart, 1998). In order to guarantee that the ratio between syntactic complexity and semantic information is balanced, (13) states that a sentence ϕ is grammatical (in a language L) only if there is no structurally simpler formal alternative to ϕ (in L) that can express the same logical meaning as ϕ. This principle can be exemplified by the contrasts in (97)-(98). The (a)-sentences, unlike the (b)-sentences, are ruled by Economy because their meaning is expressible by means of a simpler formal alternative.

(97) a. *The one student came to the meeting.
(cf. The student came to the meeting)
b. The three students came to the meeting.

(98) a. *The student each came to the meeting.
(cf. The student came to the meeting)
b. The students each came to the meeting.

My proposal is that definite cardinal partitives are ruled out by Economy because the meaning they express is logically equivalent to this expressed by their structurally simpler non-partitive definite alternatives:

(99) **Structural Economy: 'the three of the associates'**
a. *The three of the associates met John.
ϕ: [$_{\text{DP}}$ the three <associates> of$_{\text{PART}}$ the associates] met John
b. The three associates met John
ψ: [$_{\text{DP}}$ the three associates] met John
Result: $\psi < \phi$ and $[\![\psi]\!] \equiv [\![\phi]\!]$, hence ϕ is deviant by (13)

On our assumptions about the syntax of partitives, definite cardinal partitives always have structurally simpler non-partitive alternatives. These alternatives are derivable from the same procedure(s) as previously described. For illustration purposes, two simplification strategies are sketched out in (100).

(100) *Structurally Simpler Alternatives:* $\psi < \phi$
ϕ: [$_{\text{DP}}$ the three <associates> of$_{\text{PART}}$ the associates]
a. [$_{\text{DP}}$ the three ~~<associates> of$_{\text{PART}}$ the~~ associates], or
b. [$_{\text{DP}}$ the three <associates> ~~of$_{\text{PART}}$ the associates~~]
ψ: [$_{\text{DP}}$ the three associates]

On our assumptions about the semantics of partitives, the meaning of definite cardinal partitives is also equivalent to this of their structurally simpler non-partitive alternatives, both at the presuppositional and at the assertive level, (101).

(101) *Semantically Equivalent Alternatives:* $[\![\psi]\!] \equiv [\![\phi]\!]$
a. ϕ: [$_{\text{DP}}$ the three <associates> of$_{\text{PART}}$ the associates]
(i) Presupposition: $\exists!x[\#x = 3 \wedge {}^*associate(x) \wedge x \leq \sigma y.\, {}^*associate(y)]$
(ii) Assertion: $\sigma x.\, \#x = 3 \wedge {}^*associate(x) \wedge x \leq (\sigma y.\, {}^*associate(y))$
b. ψ: [$_{\text{DP}}$ the three associates]
(i) Presupposition: $\exists!x[\#x = 3 \wedge {}^*associate(x)]$
(ii) Assertion: $\sigma x.\, \#x = 3 \wedge {}^*associate(x)$

Given (100) and (101), the sentence ϕ is deemed deviant by Economy because of the availability of its ψ-alternative. As shown in (102), this line of explanation extends to the case of definite partitive possessives. I refer the readers to the previous section for the detail of the syntactic composition and possible spell-outs of these constructions.

(102) **Structural Economy: 'the parents of her boyfriend's'**

a. *Mary met the parents of her boyfriend's.
ϕ: Mary met [$_{DP}$ the parents of$_{PART}$ [$_{DP}$ [$+def$] <parents> of $_{POSS}$ her BF]]

b. Mary met the parents of her boyfriend/her boyfriend's parents.
ψ: Mary met [$_{DP}$ [$+def$] <parents> of $_{POSS}$ her BF]

Result: $\psi < \phi$ and $[\![\psi]\!] \equiv [\![\phi]\!]$, hence ϕ is deviant by (13)

It is worth noting that indefinite cardinal partitives, unlike their definite counterparts, need not be subject to this competition. Consider for instance the sentence in (103-a). This sentence has structurally simpler indefinite and definite non-partitive alternatives, namely (103-b) and (103-c). Yet neither of these alternatives is semantically equivalent to (103-a): (103-b) does not impose any definitness requirement on the set of associates, while (103-c) imposes further that there be a unique individual made up of ten associates. Hence, the sentence in (103-a) obeys Economy.

(103) *Plain Indefinite Cardinal Partitives: No Competition*

a. John met ten of the associates.
b. John met ten associates. (presuppositionally weaker)
c. John met the ten associates. (presuppositionally stronger)

That being said, it is possible to create cases in which, regardless of the nature of the higher determiner, cardinal partitives are predicted to violate Economy. For instance, if the lower DP in these partitives denotes a singular individual (e.g., *Mary's father*), then the corresponding cardinal partitives shall be systematically ruled out, (104). The reason for that is quite simple. Singular individuals denote atoms and every atom has nothing but itself as a part. As a result, it is true that John met an individual who is part of the atomic individual denoted by *Mary's father* if and only if John met the unique individual who is part of the individual denoted by *Mary's father*, and this is true if and only if John met the individual denoted by *Mary's father*.

(104) **Structural Economy: '(the) one of Mary's father'**

a. *John met one of Mary's father.
ϕ: [John met [$_{DP}$ [$-def$] one <father> of$_{PART}$ [$_{DP}$ Mary's father]]]

b. *John met the one of Mary's father.
χ: [John met [$_{DP}$ the one <father> of$_{PART}$ [$_{DP}$ Mary's father]]]

c. John met Mary's father.
ψ: [John met [$_{DP}$ Mary's father]]

Result: $\psi < \phi, \chi$ and $[\![\psi]\!] \equiv [\![\phi]\!] \equiv [\![\chi]\!]$, hence ϕ and χ are deviant by (13)

A second case is exemplified in (105). In this case, the lower NP is plural but modified by a cardinal numeral that is identical in value to this modifying the higher (silent) NP. Whether the higher determiner is indefinite or definite, the whole phrase ends up semantically equivalent to the lower definite DP. Suppose for instance that there is a group of ten students. Then, it is true that Mary met ten of these students if and only if she met all of them, that is, if and only if she met the ten students.

(105) **Structural Economy: '(the) ten of the ten students'**

a. *Mary met ten of the ten students.
ϕ: [M. met [$_{\text{DP}}$ [$-def$] ten <students> of$_{\text{PART}}$ [$_{\text{DP}}$ the ten students]]]

b. *Mary met the ten of the ten students.
χ: [Mary met [$_{\text{DP}}$ ten <students> of$_{\text{PART}}$ [$_{\text{DP}}$ the ten students]]]

c. Mary met the ten students.
ψ: [Mary met [$_{\text{DP}}$ the ten students]]

Result: $\psi < \phi, \chi$ and $[\![\psi]\!] \equiv [\![\phi]\!] \equiv [\![\chi]\!]$, hence ϕ and χ are deviant by (13)

A third and last case is exemplified in (106). In this example, the DP embedded in the partitive (i.e., *every student*) has to QR out of the partitive DP to be interpretable at LF (i.e., to avoid type-mismatch). The resulting LFs, ϕ and χ, output the following truth-conditions: *(the) one of every student met John* is true if and only if for every student x, there is some/a unique y such that $\#y = 1$ and $y \leq x$ and y met John. These LFs, however, compete with their ψ-alternative which is structurally simpler and yet delivers the same truth-conditions: for every student x, x met John.[16] As a result, ϕ and χ are deemed deviant by Economy.

(106) **Structural Economy: '(the) one of every student'**

a. *One of every student met John.
ϕ: [[$_{\text{DP}}$ every student] $\lambda 1$ [$_{\text{DP}}$ [$-def$] one <student> of$_{\text{PART}}$ t_1] met John]

b. *The one of every student met John.
χ: [[$_{\text{DP}}$ every student] $\lambda 1$ [$_{\text{DP}}$ the one <student> of$_{\text{PART}}$ t_1] met John]

c. Every student met John.
ψ: [[$_{\text{DP}}$ every student] $\lambda 1$ t_1 met John]

Result: $\psi < \phi, \chi$ and $[\![\psi]\!] \equiv [\![\phi]\!] \equiv [\![\chi]\!]$, hence ϕ and χ are deviant by (13)

The paradigm in (107) provides empirical support for this analysis. For the same reasons as above, the sentences in (107-a) and (107-b) are predicted to be deviant by Economy. By contrast, the meaning expressed by the sentence in (107-c) is not expressible by means of a structurally simpler alternative. In particular, (107-c) does not imply that John talked to every guest, every two guests or every four guests who arrived. Rather, it says that, for every (group of) four guests who arrived, John talked to two of these guests. As a result, the sentence in (107-c) is not predicted to be deviant by Economy and, indeed, this sentence is perceived as grammatical by native speakers.

[16] The way the ψ-alternative in (106) is derived depends on the specifics of the theory of movement one assumes. On the trace-theoretic semantics adopted here, the simplest way to go from ϕ/χ to ψ is simply to delete all the syntactic materials but the trace left by *every student* from within the subject DP. On a copy theory of movement, this alternative obtains by deleting all the syntactic materials but the lower copy of *every student* from within the subject DP and by deleting further the highest copy of *every student*.

(107) **Quantificational DPs: Breaking Semantic Equivalence**

a. *John talked to [$_{DP}$ one <guest> of every [guest who arrived]]
≡ John talked to [$_{DP}$ every [guest who arrived]]

b. *John talked to [$_{DP}$ two <guests> of every two [guests who arrived]]
≡ John talked to [$_{DP}$ every two [guests who arrived]]

c. John talked to [$_{DP}$ two <guests> of every four [guests who arrived]]
≢ John talked to [$_{DP}$ every two/four [guests who arrived]]

Finally, this analysis of the anti-uniqueness condition in terms of Economy of Structure accounts for Jackendoff's and Barker's observation that definite cardinal partitives become grammatical upon further modification. Consider for instance a sentence like *John talked to the three of the associates that Sue met yesterday*, (108). In principle, the relative *that*-clause could be interpreted either as modifying the lower NP or the higher silent NP. However, by Economy, only the second parse is available for it is the only parse that breaks semantic equivalence with the structurally simpler alternative *John talked to the three associates that Sue met yesterday.* I notice that similar observations hold of partitive possessives: additional modification of the higher NP is expected to break semantic equivalence, hence the grammaticality of a sentence like *John talked to the friends of Mary's who met Peter* under the relevant parse.

(108) **Definite Partitives: Breaking Semantic Equivalence**
John talked to the three of the associates that Sue met yesterday.

a. *Modification of the lower NP*: $\psi < \phi$ and $[\![\psi]\!] \equiv [\![\phi]\!]$
   (i) ϕ: J. talked to [$_{DP}$ the three <associates> of$_{PART}$ [$_{DP}$ the [[associates] [that Sue met yesterday]]]]
   (ii) ψ: J. talked to [$_{DP}$ the three [[associates] [that Sue met yesterday]]]

b. *Modification of the higher NP*: $\psi < \chi$ but $[\![\psi]\!] \not\equiv [\![\chi]\!]$
   (i) χ: J. talked to [$_{DP}$ the three [[<associates>] [of$_{PART}$ [$_{DP}$ the associates]] [that Sue met yesterday]]]
   (ii) ψ: J. talked to [$_{DP}$ the three [[associates] [that Sue met yesterday]]]

In the remainder of this section, I focus on the three kinds of partitive constructions (i.e., pronominal, measure and demonstrative) that we have shown to be exempt from the anti-uniqueness condition. I will argue that the absence of these effects is to be attributed to the fact that these constructions lack structurally simpler alternatives, hence their grammaticality.

Pronominal, Measure and Demonstrative Partitives

On the present analysis, anti-uniqueness effects are predicted to follow from the availability of semantically equivalent simpler alternatives. In the absence of such an alternative, a definite partitive construction is thus predicted to be free of these effects. I will now explain in turn how this prediction correctly captures the grammaticality of definite pronominal, measure and demonstrative partitives.

(109) *Missing Anti-Uniqueness Effects*

a. The three of them talked to Mary. (pronominal)
b. John spent the two hours of his free time sleeping. (measure)
c. That nose of his is huge! (demonstrative)

We have seen that indefinite pronominal partitives (e.g., *three of them*) behave just like genuine cardinal partitives (e.g., *three of the associates*) as far as proper partitivity entailments are concerned. I have proposed that this similarity be accounted for by the fact that, just like indefinite cardinal partitives, indefinite pronominal partitives have definite and universal scalar alternatives, each of which has the potential to give rise to a proper partitivity implicature.

(67) *Alternatives to Pronominal Partitives*
ϕ: Three of them talked to Mary

a. ψ: The three of them talked to Mary (definite+cardinal)
b. γ: They talked to Mary (definite)
c. χ: Every one of them talked to Mary (universal)

We have also seen that pronominal cardinal partitives differ from their non-pronominal counterparts in that they are not anti-unique. I propose that this discrepancy between both constructions follows from Economy: in English, there is no convergent simpler alternative that can express the meaning expressed by definite partitives involving a plural pronoun. Consider the potential simpler alternatives to *the three of them*:

(110) *Hypothetical Simpler Alternatives to Pronominal Partitives*
ϕ: $[_{\text{DP}}$ the three <people> of_{PART} $[_{\text{DP}}$ them]] talked to Mary

a. $^{*}[_{\text{DP}}$ the three them] talked to Mary (ungrammatical)
b. $^{*}[_{\text{DP}}$ they three] talked to Mary (ungrammatical)
c. $[_{\text{DP}}$ the three people] talked to Mary (no equivalence)
d. $[_{\text{DP}}$ they] talked to Mary (no equivalence)

All these hypothetical competitors are structurally simpler than the base sentence ϕ they are derived from. However, none of them qualify as a competitor to ϕ in terms of Economy. The first two candidates, (110-a) and (110-b), are ungrammatical and therefore do not qualify as convergent formal alternatives to ϕ to begin with. The other two candidates are grammatical, but are not logically equivalent to ϕ. The description *the three people* in (110-c) lacks the deictic/anaphoric presupposition expressed by the free pronoun in *the three of them*: it does not require that the individual it refers to be already part of the universe of discourse.[17] Next, the description *they* in (110-d) lacks the cardinal information provided by the numeral modifier in

[17]There is of course another obvious difference between the two definite descriptions. In the absence of any contextual restriction, *the three people* is defined only if there is a unique individual made up of three atomic people, while *the three of them* is defined only if there is a unique individual made up of three atomic people *that is part* of the individual denoted by *them*. This difference, however, looses importance if we allow contexts to implicitly restrict the domain of individuals the definite determiner quantifies over.

the three of them: it does not require that the individual it refers to count (exactly) three atomic parts. Since ϕ has no competitor, it follows that ϕ obeys Economy.

An interesting prediction made by this analysis is that pronominal partitives involving a singular pronoun (as opposed to a plural pronoun) should pattern with genuine cardinal partitives embedding a singular DP and therefore exhibit structural economy effects (e.g., **(the) one of Mary's father* in (104)). This prediction is empirically borne out, as exemplified in (111) and (112). In contrast to (110), the cardinal information provided by the numeral in constructions like **(the) one of him/me* is logically redundant for it is already given by the ϕ-features carried by the singular embedded pronouns. Hence, the (a)-sentences are deviant by Economy.

(111) a. *The one of him talked to Mary.
(cf. He talked to Mary)
b. The two of them talked to Mary.

(112) a. *The one of me talked to Mary.
(cf. I talked to Mary)
b. The two of us talked to Mary.

Following Ionin et al. (2006), I propose to extend this analysis to definite (true) measure partitives. These constructions, in which the substantive consists of partitive-*of* combined with a definite noun phrase, are exempt from structural economy effects because they have no competitor. As shown in (113), the hypothetical simpler alternatives to definite measure partitives either fail to converge, i.e. the (a)-sentence, or fail to be semantically equivalent, i.e. the (b) and (c)-sentences.[18]

(113) *Hypothetical Simpler Alternatives to Measure Partitives*
ϕ: John spent $[_{\text{DP}}$ the two hours of$_{\text{PART}}$ $[_{\text{DP}}$ his free time$]]$ sleeping
a. *John spent $[_{\text{DP}}$ his two hour free time$]$ sleeping (ungrammatical)
b. John spent $[_{\text{DP}}$ his free time$]$ sleeping (no equivalence)
c. John spent $[_{\text{DP}}$ $[-def]$ two hours$]$ sleeping (no equivalence)

Ionin et al. (2006) suggest further that this line of explanation could account for the behavior of 'vague' measure partitives like *the totality of John's friends*, which can also be definite without modification, (114).

(114) a. Mary met the totality of John's friends.
b. *Mary met John's totality/total friends. (ungrammatical)

I will leave for now this suggestion as it is. I notice though that extending the present analysis to these cases is not a trivial task. In particular, one has to explain why a partitive like *the totality of John's friends* is not deemed deviant by Economy despite the availability of a simpler alternative which seemingly has the same meaning, namely *John's friends*. A possible explanation could start from the observation that definite plurals like *John's friends* can receive a non-maximal reading. Typically,

[18]For an explanation as to why the (a)-sentence in (113) is ungrammatical, I refer the reader to Schwarzschild (2002).

speakers tend to accept as true a sentence like *Mary met John's friends* in a situation where Mary met a fair amount of John's friends, even though she didn't met every single friend of John. Following this intuition, the use of *the totality of John's friends* could be analyzed as strengthening the truth-conditions of this sentence by forcing a maximal reading in a way similar to *all of John's friends* or *each of John's friends* (see in particular Brisson, 1998). I leave the study of these effects for future works.

Finally, we have seen that anti-uniqueness does not hold of a certain class of double genitives, those involving demonstrative expressions, e.g. (115). For instance, we can say *that mother of John's!* even though John has a unique mother; similarly, we can use expressions like *those eyes of Mary's* or *that nose of John's* without implying that Mary and John have an uncommon amount of eyes and noses.

(115) Now he tells how she plucked him to my chamber. Oh, I see that nose of yours, but not that dog I shall throw it to.
(Shakespeare, Othello, Act 4, Scene 1)

As many authors have noted, theses constructions have a rather limited distribution. To being with, these double genitives are grammatical only if they involve a demonstrative (i.e., *this/these*, *that/those*); they remain robustly bad if one uses the definite determiner instead.

(116) a. That/*The dog of mine!
b. Oh, I see that/*the nose of yours.
c. That/*The telephone book of his is surely moldy.

Next, the use of these demonstrative constructions comes with certain discourse requirements. Barker (1998) describes this requirement as follows: *there must be something unusual or noteworthy about the referent of the collocation, or at least some aspect of the situation that provokes an emotional response in the speaker (p.714).* The intuitions of my informants regarding the use of these constructions are largely in line with Barker's description. For instance, a sentence like *those eyes of hers are brown* sounds odd out of the blue (compare to *those eyes of hers are beautiful*), arguably because brown eyes are neither uncommon nor usually conceived as emotional triggers. This sentence becomes perfectly fine, however, if it is supplemented with additional context favoring this second possibility, e.g. *those eyes of hers are brown, just like a chocolate bar, and make me want to swim in them* (Amanda Swenson, p.c.). These observations suggest that demonstrative partitives have some expressive component that genuine possessives lack. Although I have no analysis to offer at this point regarding how this additional meaning component comes about, it seems reasonable to hypothesize that this component breaks semantic equivalence between demonstrative partitives (e.g., *those eyes of hers are beautiful*) and their simpler non-demonstrative alternatives (e.g., *her eyes are beautiful*).

Barker (1998) suggested that the preposition *of* occurring in these constructions might be after all a use of *of* distinct from partitive-*of*, one that does not encode proper partitivity but simply partitivity, hence the suspension of the anti-uniqueness implications normally associated with possessive partitives. I suggest that it is other-

wise. Specifically, I propose that the *of* occurring in these constructions is a regular instance of partitive-*of*, and that the contrasts observed between definite and demonstrative possessive partitives follow from Economy. Definite possessive partitives (e.g., **the nose of his*) are ruled out by Economy because their meaning is directly expressible by means of simpler definite possessives (e.g., *his nose*):

(117) *Simpler Alternatives to Definite Possessive Partitives*
ϕ: *[$_{\text{DP}}$ the nose of$_{\text{PART}}$ [$_{\text{DP}}$ his <nose>]] is humongous
ψ: [$_{\text{DP}}$ his nose] is humongous (grammatical and equivalent)

By contrast, demonstrative possessive partitives (e.g., *that nose of his*) have no such competitors. The simpler demonstrative-genitive alternatives to these constructions are blatantly ungrammatical (e.g., **that his nose*, **his that nose*), presumably because the genitive and the demonstrative cannot both occupy the determiner position. On the other hand, their definite possessive alternatives are grammatical, but they lack the expressive component that characterizes the use of demonstrative possessive partitives and thus semantic equivalence does not obtain. Hence, demonstrative possessive partitives obey Economy.

(118) *Hypothetical Simpler Alternatives to Demonstrative Possessive Partitives*
ϕ: [$_{\text{DP}}$ that nose of$_{\text{PART}}$ [$_{\text{DP}}$ his <nose>]] is humongous
χ: *[$_{\text{DP}}$ that his nose] is humongous. (ungrammatical)
γ: *[$_{\text{DP}}$ his that nose] is humongous. (ungrammatical)
ψ: [$_{\text{DP}}$ his nose] is humongous (no equivalence)

4.4 Synthesis

In this chapter, I have provided empirical evidence that Barker (1998)'s classical view on partitives cannot be upheld: the proper partitivity hypothesis makes incorrect predictions regarding the distribution of both the proper partitivity and the anti-uniqueness effects exhibited by partitives. In the face of these issues, I have proposed to move back to the weaker view that *partitivity is just partitivity*, (42), and to tease apart the two sets of phenomena that the proper partitivity hypothesis aimed at capturing all at once.

(42) **Partitivity is just partitivity (after all)**
$[\![\text{of}_{\text{PART}}]\!] = \lambda y \in D_e.\lambda x \in D_e.\ x \leq y$

In essence, I have proposed that proper partitivity and anti-uniqueness have the same remote source, namely the availability of structurally simpler non-partitive alternatives, but that the competition between partitive constructions and their simpler alternatives is evaluated by distinct grammatical mechanisms, one dedicated to meaning strengthening (119) and the other to structural economy (120).

(119) *Definite non-partitive alternatives have stronger presuppositions*
ϕ: Three of the associates showed up.

a. $[_{\text{DP}}$ $[-def]$ three $\langle$PL associate$\rangle$ of_{PART} $[_{\text{DP}}$ the PL associate$]]$ showed up
b. $[_{\text{DP}}$ **the** three $\langle$PL associate$\rangle$ of_{PART} $[_{\text{DP}}$ the PL associate$]]$ showed up
c. $[_{\text{DP}}$ the three PL associate$]$ showed up

ψ: The three associates showed up (Stronger Meaning)

(120) *Definite non-partitive alternatives are simpler but semantically equivalent*
ϕ: The three of the associates showed up.

a. $[_{\text{DP}}$ the three $\langle$PL associate$\rangle$ of_{PART} $[_{\text{DP}}$ the PL associate$]]$ showed up
b. $[_{\text{DP}}$ the three PL associate$]$ showed up

ψ: The three associates showed up (Same Meaning)

Specifically, I have argued that proper partitivity inferences reduce to genuine cases of implicatures, (121), and that the anti-uniqueness condition follows from a principle of structural economy favoring structurally simpler alternatives of identical meaning, (122). This proposal was shown to offer a satisfying solution to both puzzles, and to provide a better empirical coverage of these phenomena than previously achieved.

(121) **Proper partitivity inferences are genuine implicatures**
Three of the associates met John.
SS: $\text{EXH}_{\mathcal{R}}$ $[_{\phi}$ $[_{\text{DP}}$ $[-def]$ three <associates> of_{PART} $[_{\text{DP}}$ the associates$]]$ met J.$]$

a. $\text{EXCL}_{prs}(\phi) \supseteq \{[_{\psi}$ $[_{\text{DP}}$ the three associates$]$ met John$]\}$
b. *Strengthened Meaning*
$\text{EXH}(\phi)$ is defined in w iff ϕ is defined and there aren't exactly three associates in w (ψ is undefined in w). Whenever defined, $\text{EXH}(\phi)$ is true in w iff ϕ is true in w.
c. *Resulting Proper Partitivity Inference*
There are at least three but not exactly three associates.

(122) **Anti-uniqueness follows from Economy of Structure**
*The three of the associates met John.
SS: $[_{\phi}$ $[_{\text{DP}}$ the three <associates> of_{PART} $[_{\text{DP}}$ the associates$]]$ met John$]$

a. ϕ: *$[_{\text{DP}}$ the three <associates> of_{PART} $[_{\text{DP}}$ the associates$]]$ met John
b. ψ: $[_{\text{DP}}$ the three associates$]$ met John

Result: $\psi < \phi$ and $[\![\psi]\!] \equiv [\![\phi]\!]$, hence ϕ violates Economy of Structure

THIS PAGE INTENTIONALLY LEFT BLANK

Chapter 5

Extended 'i-within-i' Effects

Summary This chapter is concerned with the interpretative effects generated by the use of descriptions like *the wife of Mary's childhood sweetheart*. On purely logical grounds, nothing in the meaning of this description forces its denotation to be distinct from that of the description *Mary*, as demonstrated by the fact that we can felicitously assert identity statements such as *The wife of Mary's childhood sweetheart is Mary*. Yet upon hearing a sentence like *The wife of Mary's childhood sweetheart left*, we spontaneously understand that somebody other than Mary left, and thus we are lead to conclude that Mary is *not* the wife of her childhood sweetheart. Typically, in a context where this identity relation is known to hold, an utterance of this sentence is perceived as odd by the interlocutors. In this chapter, I defend the view that these interpretative effects, a subset of the 'i-within-i' effects, result from the computation of an implicature whereby logically independent — yet possibly contextually equivalent — structural alternatives to the relevant sentences are excluded (i.e., *the wife of Mary's childhood sweetheart* left but *Mary* didn't). This application of the theory of implicatures to the case of descriptions will be shown to apply in full generality to all descriptions, beyond the restricted area of the 'i-within-i' environment, and to offer an empirical coverage of these interpretative effects previously unreached.

Keywords: i-within-i effects, disjoint reference effects, descriptions, implicatures

5.1 The (extended) 'i-within-i' Puzzle

Suppose that you have been invited to a party with lots of guests and that, at some point of the evening, some of them start leaving. You believe that the next person to leave is the woman who told you earlier in the evening that she married her childhood sweetheart. Suppose now that you want to express the thought that this person is about to leave: why can't you use the sentence in (1-a) to express this thought (compare with (1-b))?

(1) a. #The wife of her childhood sweetheart is about to leave.
b. ✓The woman who married her childhood sweetheart is about to leave.

On logical grounds, the contrast between these two sentences is somewhat mysterious as the intended meaning of *the wife of her childhood sweetheart* in (1-a) is very similar to the meaning expressed by the minimally different description *the woman who married her childhood sweetheart* in (1-b). Suppose, for the sake of the argument, that we take the pronoun *her* in (1-a) to denote the individual Mary, i.e. (1-a) is true just in case the wife of Mary's childhood sweetheart is about to leave. Then, (1-a) is true in particular if Mary is about to leave and Mary's childhood sweetheart is Mary herself. Intuitively though, an utterance of (1-a) sounds acceptable precisely if the speakers' belief state does not determine in the first place that such an identity relationship holds. Otherwise, this utterance is perceived as odd, as in the above scenario and as illustrated further by the contrast in (2).[1]

(2) The wife of her childhood sweetheart is about to leave.
a. Deviant reading:
#The wife of Mary's child.sweet. (namely Mary herself) is about to leave.
b. Possible reading:
✓The wife of Mary's child.sweet. (namely Sue) is about to leave.

Researchers who have discussed these puzzling facts have proposed that the generalization underlying the sort of contrasts observed in (1) and (2) is to be thought as a restriction on co-referential readings. This proposal is motivated in substance by the following two observations. First, it has been observed that, due to the syntax of common nouns, the pronoun *her* in a construal like (1-a) cannot be bound within the DP in which it occurs, and therefore can only be interpreted as a referential (i.e., free) pronoun (a.o., Chomsky, 1981; Williams, 1982; Chomsky, 1993a; Haïk, 1984; Hoeksema and Napoli, 1990; Jacobson, 1994). By contrast, in a construal like (1-b), the

[1] I will often appeal in this chapter to a descriptive terminology which implicitly assumes that definite descriptions are referential expressions and, as such, can in principle *corefer* with other referential expressions (e.g., referring pronouns). This terminology is used for ease of exposition - mostly to be consistent in my observations with the literature I will comment on - and does not reflect any theoretical commitment on my part regarding the question of the adequate semantic treatment of descriptions. Neither the puzzle at hand, nor the solution I will advocate for hinges upon a particular view on descriptions, i.e. whether we treat them as referential (i.e., à la Frege) or as quantificational (i.e., à la Russell) expressions.

embedded pronoun need not be referential to begin with for it can be bound within the relative clause in which it occurs, (3).

(3) Referential vs. Bound Pronouns (e.g., (1-a) vs. (1-b))

a. [The wife of [her] childhood sweetheart]
≈ the wife x of *her* childhood sweetheart (✗Bound)

b. [The woman [PRO$_1$ who t$_1$ married [her$_1$] child.sweet.]]
≈ the woman x s.t. x married x's childhood sweetheart (✓Bound)

Second, it has been observed that descriptions like *the wife of her childhood sweetheart* are perceived as deviant only when the free pronoun they involve is presupposed to be co-referential with an expression that contains this pronoun. This point is established by the minimal pair in (4). Here and throughout this chapter, subscript indices are used to indicate the interlocutors' belief state: two expressions α and β are co-indexed at a context C just in case α and β are presupposed in C to have the same denotation, e.g. α and β pick up the same individual in each world in C.[2]

(4) Presupposed vs. Asserted Identity

a. *Context: All the participants in the conversation believe that Mary married her childhood sweetheart.*
#[The wife of [her]$_i$ childhood sweetheart]$_i$ is about to leave

b. *Context: Some participant in the conversation wonders who married Mary's childhood sweetheart.*
✓[The wife of [her]$_i$ childhood sweetheart] is [Mary]$_i$ (herself)

Several descriptive generalizations have been offered to capture these observations, e.g. Vergnaud (1974)'s Disjunction Condition (see also Zwarts, 1976; Jullens, 1983), Williams (1982)'s NP$_i$/NP$_i$ Constraint, the 'i-within-i' Condition in Chomsky (1981, 1993a). For our present purposes, this generalization can be stated as in (5). This generalization takes the restriction imposed by Chomsky's classical 'i-within-i' Condition to be that of presupposed co-reference.[3]

[2]The notion of 'context' that is intended here is the same as in Stalnaker (1978, 2004). Using the possible worlds framework, we can identify a context in which some instance of linguistic communication takes place as the set of possible candidates for the world of evaluation (i.e., the actual world): it is the set of all possible worlds that an utterance might be true in for all the discourse participants assume (believe or pretend to believe) for the purposes of the conversation. On this characterization, we can think of the individual picked up by a referential expression α at a world w in a context set C as the individual that α would denote if w were the world of evaluation. On these assumptions, the notion of presupposed co-reference can be defined as in (i). This characterization is reminiscent of the proposal in Heim (1982, 1998, 2007).

(i) **Presupposed Co-reference**
Let α and β by any two referential expressions: α and β are presupposed to be co-referential at a context C just in case α and β pick up the same individual in each world in C.

[3]There are a number of variants of this generalization in the literature. The main points of this chapter apply to all generalizations that aim at capturing the oddity and disjoint reference effects of the sorts we are interested in. Note however that we are only concerned here with the 'i-within-i'

(5) **The 'i-within-i' Condition:** $^{\#}[_{\alpha}\ldots[\beta]_i\ldots]_i$
No description may co-refer with a description that contains it.
Technically: for any context C, any two descriptions α and β, $[_{\alpha}\ldots[\beta]\ldots]$ is deviant if α and β are presupposed in C to have the same denotation.

By this principle, an utterance of (1-a) is deemed deviant whenever, on speakers' common assumptions, the definite description *the wife of her childhood sweetheart* and the pronominal expression *her* pick out the same individual in each world of the context set. The examples in (6) (adapted from famous examples by Vergnaud (1974); Chomsky (1981); Hoeksema and Napoli (1990)) illustrate further the so-called 'i-within-i' effects: a free pronoun within the complement of a transitive noun cannot be presupposed to co-refer with the whole description it is embedded in.

(6) **Classical 'i-within-i' Effects (Pronouns)**
a. $^{\#}$[[Her]$_i$ best friend's wife]$_i$ lives in Somerville
b. $^{\#}$[The friends of [their]$_i$ parents]$_i$ arrived on time
c. $^{\#}$[The son of the woman who killed [him]$_i$]$_i$ was insane
d. $^{\#}$[The book by the man who designed [its]$_i$ cover]$_i$ came out last week
e. $^{\#}$[The conclusion of the text that precedes [it]$_i$]$_i$ is a non-sequitur

In the classic theories of Chomsky (1981), Lasnik (1989) and Webelhuth (1995), the 'i-within-i' Condition is stipulated. Yet it has long been acknowledged that this principle is not a plausible primitive of the grammar and that, as it is, its stipulation remains unsatisfactory. The goal of this chapter is to tackle this explanatory problem by investigating the following question: what is the source of the 'i-within-i' effects?

The position that has prevailed so far in the literature is that the 'i-within-i' Condition (or, alternatively, Vergnaud's Disjunction Condition) may be a direct consequence of the interpretative strategy deployed by speakers for solving the reference of the pronouns in these environments (a.o. Vergnaud, 1974; Jacobson, 1979; Higginbotham and May, 1981; Brody, 1982; Higginbotham, 1983; Haïk, 1984; Hoeksema and Napoli, 1990). In essence, researchers have proposed to analyze the deviance of the sentences in (6), i.e. the classical 'i-within-i' effects, as follows:

1. Solving the reference of the pronouns in these sentences requires speakers to look for a contextually salient antecedent. Out of additional context, these pronouns can only draw their reference from the description containing them.

2. If the reference of these pronouns depends upon that of their container description, then a problem of referential circularity arises: solving the reference of the pronoun requires to determine the reference of the whole description which requires in turn to solve the reference of the pronoun, and so on and so forth.

3. As a result, in trying to solve the reference of the pronoun, speakers enter an infinite loop of interpretative steps which ultimately fails to establish the reference of the relevant expressions, hence the deviance of these sentences.

effects that relate to the interpretation of descriptions (definite descriptions, pronouns, etc.).

On this proposal, the 'i-within-i' Condition reduces to a truism: for compositional reasons, a pronoun cannot anaphorically depend upon a description whose reference depends upon the reference of that pronoun. It has been common practice since then to reinterpret the 'i-within-i' Condition as a ban against circular referential chains (a.o. Higginbotham and May, 1981; Brody, 1982; Hoeksema and Napoli, 1990). Hereafter, I will refer to this hypothesis as the Referential Circularity (RC) view. To the best of my knowledge, the empirical adequacy of the RC-view has only been discussed for cases involving pronouns, e.g. (6). But consider now the following sentences where the embedded pronoun has been replaced with a non-anaphoric description (e.g., definite description, demonstrative, indexical):

(7) **More 'i-within-i' Effects**

a. #[The wife of [Mary]$_i$'s childhood sweetheart]$_i$ is about to leave
b. #[[John]$_i$'s financial advisor's coach]$_i$ is a former Marine
c. #Mary met [the famous author of [D.Brown]$_i$'s books]$_i$
d. #John is dating [the mother of the son of [this woman]$_i$]$_i$
e. #[The boss of [my]$_i$ secretary]$_i$ has a very busy schedule

Curiously enough, the examples in (7) have received little-to-no attention in the previous literature, and this despite their striking — yet overlooked — similarities with the classical 'i-within-i' effects. That being said, let me notice straightaway that the 'i-within-i' Condition proves to be descriptively correct for these cases too. As it is formulated in (5), this principle applies to all descriptions and therefore the parallelism observed between the examples in (6) and (7), although previously unnoticed, is nonetheless expected. However, these data are problematic for the RC-view since they show that referential circularity is not a necessary condition for the 'i-within-i' effects to arise. In sum, the reinterpretation of (5) as a ban against circular chains does not allow us to get rid of the 'i-within-i' Condition *per se*: we still need to stipulate it to capture the deviance of the examples in (7). In other words, the puzzle of the 'i-within-i' effects still remains to be solved.

The proposal that I will put forward in this chapter starts out from the observation that there is another way to approach the phenomenology of the 'i-within-i' effects. In essence, we observe that these effects are found whenever a speaker produces a sentence of the form $[_{\phi} \ldots [_{\alpha} \ldots \beta \ldots] \ldots]$ in a context where he could have produced a structurally simpler, yet contextually equivalent sentence of the form $[_{\psi} \ldots \beta \ldots]$. In all the examples above, this alternative sentence corresponds to the one we obtain by substituting the complex container description (e.g., *the wife of Mary's childhood sweetheart*) with the embedded description (e.g., *Mary*) it is presupposed to co-refer with, as exemplified by the minimal pairs in (8).

(8) *Context: It is presupposed that the person named 'Mary' married her childhood sweetheart. The speaker wants to express the thought that she is about to leave.*

a. (i) #[$_{\phi}$ [The wife of [Mary]$_i$'s childhood sweetheart]$_i$ is about to leave]
   (ii) [$_{\psi}$ [Mary]$_i$ is about to leave]
b. (i) #[$_{\phi}$ [The wife of [her]$_i$ childhood sweetheart]$_i$ is about to leave]
   (ii) [$_{\psi}$ [She]$_i$ is about to leave]

Looking at the 'i-within-i' effects from this perspective invites us to envision a different generalization regarding the conditions under which these oddity effects arise. In particular, it is tempting to (re-)interpret the contrasts in (8) — and subsequently the restriction on presupposed co-reference imposed by the 'i-within-i' Condition — as indicating that speakers shall use the structurally simpler description available to them when referring to an individual. As a first approximation, such a minimization principle could be formulated as follows (this generalization will be later revised):

(9) **Odd Descriptions (first pass)**
Let δ be any description and $\phi(\delta)$ be any sentence. An utterance of $\phi(\delta)$ is odd at a context C if there is a structurally simpler alternative δ' to δ such that $\phi(\delta')$ is contextually equivalent to $\phi(\delta)$ in C.

If this reinterpretation of the 'i-within-i' Condition is on the right track, then the so-called 'i-within-i' effects shall not be specific to the 'i-within-i' environments so to speak. On this broader view, we expect oddity effects similar to those observed in (6) and (7) to arise whenever our contextual assumptions determine that a sentence ϕ is contextually equivalent to a sentence ψ, and ψ can be derived from ϕ by replacing some description in ϕ with a structurally simpler formal alternative to this description. So, is this expectation met? The paradigms in (10)-(13) provide empirical evidence in favor of this new generalization.

(10) *Context: A and B are friends with John since college and know his family quite well, in particular his father, Peter, and his sister, Sue.*
A asks B: What's your plan for tonight?
a. #I am going out with [[Peter]'s son]$_i$
b. #I am going out with [[Sue]'s brother]$_i$
c. I am going out with [John]$_i$

(11) *Context: A professor of semantics and a professor of syntax are arguing with each other. The professor of semantics is speaking.*
a. #[The professor [of semantics]]$_i$ agrees with [you]$_j$
b. #[I]$_i$ agree with [the professor [of syntax]]$_j$
c. [I]$_i$ agree with [you]$_j$

(12) *Context: It is common ground that Sue is married to her childhood sweetheart, and that she and her husband have a son.*
a. #Sue's mother talked to [the father of [[her] son]]$_i$
b. #Sue's mother talked to [[her] childhood sweetheart]$_i$
c. Sue's mother talked to [[her] husband]$_i$

(13) *Context: It is common ground that John is Mary's assistant.*
a. #[[John]$_i$'s boss] gave [[Mary]'s assistant]$_i$ a raise
b. #[[[Mary]'s assistant]$_i$'s boss] gave [John]$_i$ a raise
c. [[John]$_i$'s boss] gave [John]$_i$ a raise

These contrasts parallel these in (8): the more complex (a) and (b)-sentences sound odd, while their structurally simpler, yet contextually equivalent (c)-alternatives sound perfectly natural. Both the existence and the direction of these contrasts are fully expected if we broaden the scope of the 'i-within-i' Condition to a principle along the lines of (9). For our present purposes, these observations are directly relevant in the following two ways. First of all, they support the idea that the 'i-within-i' effects are not isolated effects, but rather particular instances of a broader set of phenomena that appear to follow from the same logic. Second, they suggest that any solution to remedy the lack of explanatory power of the 'i-within-i' Condition should be general enough to extend to the minimally different cases of the kind exemplified in (10)-(13). This is what the proposal defended in this chapter offers to achieve.

The core of my proposal is that the oddity effects exhibited by the sentences above result from the mandatory computation of the implicatures associated with their contextually equivalent formal alternatives. To illustrate the logic of this proposal, consider again the sentence in (14-a) together with its intended alternative (14-b):

(14) a. $[_{\phi}$ [the wife of [[Mary]'s childhood sweetheart]] left]
Assertion tier: λw. the wife of mary's childhood sweetheart left in w
b. $[_{\psi}$ [Mary] left]
Assertion tier: λw. mary left in w

The key observation here is that the sentence ψ in (14-b) is an excludable structural alternative to the sentence ϕ in (14-a). It is a structural alternative to ϕ because it can be derived from ϕ by substituting the whole phrase *the wife of Mary's childhood sweetheart* with its subconstituent *Mary*. It is excludable because ψ is not a logical entailment of ϕ: there are possible worlds in which ϕ is true but ψ is false, i.e. the set of possible worlds in which the wife of Mary's childhood sweetheart left but Mary didn't. Upon exhaustification of the meaning of ϕ, the implicature associated with ψ is thus added to the semantic representation of ϕ, as shown in (15). The representation resulting from this meaning strengthening process gives us the 'non-identity' entailment that the wife of Mary's childhood sweetheart is not Mary.[4]

(15) **The 'i-within-i' Effects as Implicatures**
The wife of Mary's childhood sweetheart left.
SS: $\text{EXH}_{\mathcal{R}}[_{\phi}$ [the wife of [[Mary]'s childhood sweetheart]] left]
a. Excludable Structural Alternative:
$\text{EXCL}_{asr}(\phi) \supseteq \{[_{\psi}$ [Mary] left]$\}$
b. Strengthened Meaning:
$[\![\text{EXH}_{\mathcal{R}}(\phi)]\!] \Rightarrow \lambda w$. (the wife of mary's child.sweet. left in $w) \wedge \neg$(mary left in w)
Entailment: the wife of Mary's childhood sweetheart is not Mary

[4]We will latter see that this line of explanation extends in fact to sentences like (1-b), despite the availability of pronoun binding. For instance, if it is known that one of the guests, known to all the interlocutors as 'Mary', married her childhood sweetheart, then an utterance of (1-b) in this context becomes odd. I refer the reader to examples (71)-(72) for discussion.

This first result accounts for the inference of non-identity that speakers spontaneously report on when they are presented with a sentence like *The wife of Mary's childhood sweetheart left*, namely the inference that the wife of Mary's childhood sweetheart is not Mary herself.[5] In the absence of further contextual specifications, the computation of the implicature giving rise to this inference remains in principle optional (although it might still be preferred) as the relevant alternative can still be pruned from the domain of the exhaustivity operator. However, in the spirit of Magri (2009, 2011, 2014), I propose that this pruning strategy is available only for those alternatives that are not contextually equivalent to the prejacent of the exhaustivity operator. On this view, whenever an excludable formal alternative ψ is contextually equivalent to the prejacent of an exhaustivity operator, the computation of the implicature associated with ψ becomes mandatory, even when it leads to a contradiction in context, as exemplified by the minimal contrast in (16).

(16) **Mandatory Implicatures and Oddity Effects**

a. **Opinionated Speakers: Mismatching Implicatures**
Context: The NYPD are looking for an arms dealer named Smith. Yesterday, they caught his accomplice. Under pressure, Smith's accomplice confesses that Smith is his fence and tell them where he is hiding.
Police Chief: #The mission is to catch the fence of Smith's accomplice.
(i) $\text{EXH}_{\mathcal{R}}[_{\phi}$ the mission is to catch the fence of Smith's accomplice]
(ii) $\text{EXCL}_{asr}(\phi)=\{[_{\psi}$ the mission is to catch Smith]$\}$ $(\phi \Leftrightarrow_C \psi)$
⚠ ψ cannot be pruned from the domain of $\text{EXH}_{\mathcal{R}}$
(iii) $[\![\text{EXH}_{\mathcal{R}}(\phi)]\!] \Rightarrow \lambda w.\ \neg$(the mission is to catch Smith in w)
Therefore, $C \cap [\![\text{EXH}_{\mathcal{R}}(\phi)]\!] = \emptyset$

b. **Uncertain Speakers: Pruning Strategy**
Context: The NYPD are looking for an arms dealer named Smith. Yesterday, they caught his accomplice. Under pressure, Smith's accomplice confesses that he has a fence but denies any connection with Smith. The cops do not exclude the tiny chance that the fence in question be Smith himself and decide to investigate further to clear the matter up.
Police Chief: ✓The mission is to catch the fence of Smith's accomplice.
(i) $\text{EXH}_{\mathcal{R}}[_{\phi}$ the mission is to catch the fence of Smith's accomplice]
(ii) $\text{EXCL}_{asr}(\phi)=\{[_{\psi}$ the mission is to catch Smith]$\}$ $(\phi \not\Leftrightarrow_C \psi)$
⚠ ψ can be pruned from the domain of $\text{EXH}_{\mathcal{R}}$
(iii) $[\![\text{EXH}_{\mathcal{R}}(\phi)]\!] \not\Rightarrow \lambda w.\ \neg$(the mission is to catch smith in w)
Therefore, $C \cap [\![\text{EXH}(\phi)]\!] \neq \emptyset$

This second result accounts for the presence of oddity effects and for the direct connection between the distribution of these effects and the belief state of the interlocutors. This line of analysis will be shown to offer an explanatory view on the 'i-within-i' effects and to fruitfully extend to the range of cases presented in (10)-(13), thus subsuming all these phenomena under the same roof. Interestingly, the theory resulting

[5] As a follow-up to footnote 1, it is worth emphasizing here that this result obtains regardless of whether we treat definite descriptions as referential or as quantificational expressions.

from this proposal will lead us to formulate new expectations that are either beyond or inconsistent with the naïve minimization logic we started with, i.e. (9). First of all, on the present approach, the availability of a structurally simpler, yet contextually equivalent, alternative is expected to give rise to oddity effects upon exhaustification only if this alternative is excludable to begin with. This predicts that the use of non-'maximally minimal' descriptions, i.e. descriptions with contextually redundant descriptive content, should be possible if their more minimal formal alternatives cannot be consistently excluded. This prediction is empirically borne out, as evidenced by the minimal pair in (17) (an analysis of this contrast is offered in Chapter 3).

(17) **Non-Excludable Simpler Alternatives: No Oddity Effects**

a. **Excludable Simpler Alternative:** $\psi < \phi$ and $\phi \not\Rightarrow \psi$
Context: John's brothers are American and his sister is French.
#His American brothers (just) arrived $(\phi \Leftrightarrow_C \psi)$

$$\left\{ \begin{array}{ll} \phi\text{:} & \text{[[His [[American] [brothers]]] arrived]} \\ \psi\text{:} & \text{[[His brothers] arrived]} \end{array} \right\}$$

Implicature: $[\![\text{EXH}_{\mathcal{R}}(\phi)]\!] \Rightarrow \lambda w.\ \neg$(all of J.'s brothers are American in w)

b. **Non-Excludable Simpler Alternative:** $\psi < \phi$ but $\phi \Rightarrow \psi$
Context: John has four brothers and one sister.
✓His four brothers (just) arrived. $(\phi \Leftrightarrow_C \psi)$

$$\left\{ \begin{array}{ll} \phi\text{:} & \text{[[His [[four] [brothers]]] arrived]} \\ \psi\text{:} & \text{[[His brothers] arrived]} \end{array} \right\}$$

No Implicature: $[\![\text{EXH}_{\mathcal{R}}(\phi)]\!] \not\Rightarrow \lambda w.\ \neg$(J.'s brothers are four in w)

The oddness of the sentence in (17-a) follows from the mandatory computation of the implicature associated with its ψ-alternative which results in an interpretation that contradicts contextual assumptions (i.e., not all of John's brothers are American). By contrast, in (17-b), the ψ-alternative is not excludable because ϕ logically entails ψ (i.e., if John's four brothers arrived, then all of John's brothers arrived). Hence, the strengthened meaning of (17-b) is predicted to be free of oddity effects, and this despite the availability of a structurally simpler, contextually equivalent alternative. We will see that similar observations hold of identity statements: regardless of the state of the common ground, the simpler alternatives to identity statements cannot be consistently excluded, hence the absence of oddity effects for these sentences, (18).[6]

[6]I notice that cases where identity is asserted, as in (18), are also cases where the target alternative could be pruned from the domain of $\text{EXH}_{\mathcal{R}}$ since it is presumably not contextually equivalent to the prejacent (otherwise identity would be presupposed). Nonetheless, I believe that the observation that this alternative cannot be excluded no matter what the common ground is allows us to further account for contrasts such as (i).

(i) a. Mary married her childhood sweetheart.
Therefore, the wife of Mary's childhood sweetheart is Mary (herself).
b. Mary married her childhood sweetheart and she left.
#Therefore, the wife of Mary's childhood sweetheart left.

(18) **Identity Statements: No Oddity Effects**
✓The wife of Mary's childhood sweetheart is Mary (herself)

$$\left\{ \begin{array}{ll} \phi\text{:} & \text{[[the wife of [Mary]'s childhood sweetheart] is Mary]} \\ \psi\text{:} & \text{[[Mary] is Mary]} \end{array} \right\}$$

$\psi < \phi$ but $\phi \Rightarrow \psi$ and therefore $\psi \notin \text{EXCL}_{asr}(\phi)$
No Implicature: $[\![\text{EXH}_{\mathcal{R}}(\phi)]\!] \not\Rightarrow \lambda w.\ \neg(\text{Mary is Mary in } w)$

The second aspect whereby the present proposal significantly differs from an approach in terms of minimization is that there is no reason a priori to restrict the reasoning we have just described to structurally simpler alternatives. In principle, the present proposal is expected to apply in full generality to all formal alternatives, that is to all alternatives that are at most as complex as the sentence they are derived from. This predicts that the use of 'maximally minimal' descriptions should generate similar oddity effects whenever the sentences in which they occur have equally complex alternatives that are contextually equivalent but excludable. This prediction is also borne out, as evidenced by the telling contrast in (19).

(19) **The Siamese Twins Scenario**
Context: John and Peter are conjoined twins.

a. Who is smart? - ✓John is smart.

$$\left\{ \begin{array}{ll} \phi\text{:} & \text{[[John] is smart]} \\ \psi\text{:} & \text{[[Peter] is smart]} \end{array} \right\}$$

$\psi \backsim \phi$, $\psi \in \text{EXCL}_{asr}(\phi)$ but $\phi \not\Leftrightarrow_C \psi$
Optional implicature: $[\![\text{EXH}_{\mathcal{R}}(\phi)]\!] \Rightarrow \lambda w.\ \neg(\text{Peter is smart in } w)$

b. Who arrived? - #John arrived.

$$\left\{ \begin{array}{ll} \phi\text{:} & \text{[[John] arrived]} \\ \psi\text{:} & \text{[[Peter] arrived]} \end{array} \right\}$$

$\psi \backsim \phi$, $\psi \in \text{EXCL}_{asr}(\phi)$ and $\phi \Leftrightarrow_C \psi$
Mandatory implicature: $[\![\text{EXH}_{\mathcal{R}}(\phi)]\!] \Rightarrow \lambda w.\ \neg(\text{Peter arrived in } w)$

Consistent with these results, the generalization originally sketched out in (9) is to be reformulated as in (20). In essence, this reformulation embodies the characteristic features of the implicature-based approach to descriptions pursued in this chapter. This generalization will be shown to adequately capture the oddity effects we are trying to account for, within and beyond the 'i-within-i' environments.

(20) **Odd Descriptions (final)**
Let δ be any description and $\phi(\delta)$ be any sentence. An utterance of $\phi(\delta)$ is odd at a context C if there is a sentence $\phi(\delta')$ s.t. $\phi(\delta')$ is an excludable formal alternative to $\phi(\delta)$, and $\phi(\delta')$ is contextually equivalent to $\phi(\delta)$ in C.

The rest of this chapter is organized as follows. In the next section, I start by reviewing previous explanatory approaches to the classical 'i-within-i' effects, e.g. (6). I will argue that the two assumptions at the core of these analyses are misleading: (i)

the possibility to bind a pronoun within a description is not a sufficient condition to prevent oddity effects from arising, and (ii) referential circularity is not a necessary condition for these effects to arise. My proposal is presented in Section 5.3. I will first explain how an implicature-based approach to descriptions accounts for the disjoint reference and oddity effects associated with the 'i-within-i' constructions. I will then develop the proposal in its full generality and show how it extends at no additional cost to other expressions beyond the 'i-within-i' environments. Section 5.4 concludes.

5.2 Previous Approaches to the 'i-within-i' Effects

5.2.1 Explanatory Scope

Previous explanatory approaches to the 'i-within-i' effects have focused their attention on trying to explain the sort of contrasts exemplified in (1).

(1) *Context: The next person to leave is the woman who told you earlier in the evening that she married her childhood sweetheart.*

a. #The wife of her childhood sweetheart is about to leave.

b. ✓The woman who married her childhood sweetheart is about to leave.

As we have already seen, the contrast between these two sentences is puzzling for the intended meaning of *the wife of her childhood sweetheart* in (1-a) is very similar to the meaning expressed by the description *the woman who married her childhood sweetheart* in (1-b). Yet the sentence in (1-b) sounds natural, while this in (1-a) sounds odd. The explanation for this contrast offered in the previous literature usually boils down to the following two claims:

(C1) Relational nominals such as *wife (of)* or *sweetheart (of)* cannot bind within their complement DP (a.o., Chomsky, 1981; Williams, 1982; Chomsky, 1993a; Haïk, 1984; Hoeksema and Napoli, 1990; Jacobson, 1994). Hence, pronouns embedded in nominal constructions like *the wife of her childhood sweetheart* in (1-a) cannot be bound within these constructions (i.e., they are free). By contrast, the syntactic composition of the sentence in (1-b) allows the pronoun *her* to be bound within the relative clause it is embedded in.

(C2) Without further contextual support, the (free) pronoun *her* in (1-a) cannot be interpreted deictically and must draw its reference from its container DP. In other words, *her* is interpreted as a short description standing for the whole DP *the wife of her childhood sweetheart* (a.o. Vergnaud, 1974; Jacobson, 1979; Higginbotham and May, 1981; Brody, 1982; Higginbotham, 1983; Haïk, 1984; Hoeksema and Napoli, 1990). This resolution strategy leads to a problem of infinite regress, hence the oddness of (1-a).

Although the specifics of **(C1)** may vary from one framework to another, there exists a consensus that the internal structure of relational constructions like *the wife of her childhood sweetheart* has no syntactic subject slot and thus does not leave room

for deriving a bound reading of the embedded pronoun, regardless of whether one assumes that binding obtains by λ-binding this pronoun or by applying some alternative reflexivization operation.[7] As a result, in a sentence like (1-a), the pronoun *her* is free within the complement DP *her childhood sweetheart*, (21-a)[8]. By contrast, it is possible to derive a bound reading for the sentence in (1-b). In this case, the head nominal *woman* is modified by the relative clause *who married her childhood sweetheart* which can be built up as a reflexive property, (21-b).[9]

(21) *Relational vs. Predicative Constructions*

a. the wife of **her** childhood sweetheart (✗Bound)
[$_{\text{DP}}$ the [$_{\text{NP}}$ [$_{\text{N'}}$ [$_{\text{N}}$ wife] [$_{\text{DP}}$ (of) her childhood sweetheart]]]

b. the woman who married **her** childhood sweetheart (✓Bound)
[$_{\text{DP}}$ the [$_{\text{NP}}$ [$_{\text{N}}$'[$_{\text{N}}$'[$_{\text{N}}$ woman]] [$_{\text{CP}}$ PRO$_1$ who t$_1$ married her$_1$ child.sweet.]]]]

The hypothesis that binding is available in predicative constructions of (1-b)/(21-b), but unavailable in relational constructions of (1-a)/(21-b) is supported by several pieces of evidence. I will mention two of them here. First of all, reciprocals such as *each other*, which are subject to (Condition A) locality restriction, can be used grammatically in the former constructions but not in the latter, (22).

(22) *Distribution of Reciprocals*

a. *The friends of **each other**'s parents left. (✗Bound)
[$_{\text{DP}}$ the friends of each other$_1$'s parents] left

b. The people who criticized **each other**'s parents left. (✓Bound)
[$_{\text{DP}}$ the people [$_{\text{CP}}$ PRO$_1$ who t$_1$ criticized each other$_1$'s parents]] left

Second, the interpretative contrast assumed in (21) is easily detectable using DPs that are uncontroversially non-referential, (23).

[7] These observations are consistent for instance with other frameworks like Jacobson's free-variable semantics in which there are no variables in the semantics nor indexing in the syntax (see Jacobson, 1991, 1992, 1994). Following Jacobson, binding effects are located in type-shifting rules which apply to the meanings of expressions which take (at least) two arguments. In the present case, although relational common nouns denote functions of type $\langle e, \langle e, t\rangle\rangle$, they are nonetheless syntactically only one-place, and therefore the type-shifting rules whereby binding normally comes about cannot apply. On this view, the impossibility of binding in structures like (1-a) is to be related to the fact that NPs have no syntactic subject slot, unlike other phrases like CPs, IPs, APs, PPs, etc.

[8] Following Barker (1991, 2011), I treat the genitive *of*-phrase associated with (two-place) relational nouns as a pure syntactic marker signaling that the object of the preposition is an argument of the relational head nominal. On this view, the possession relation for a post-nominal possessive (e.g., *wife (of)*) is simply the denotation of the relational head noun.

[9] We can remain agnostic here as to what approach to relative clauses proves the most adequate. To the best of my knowledge, all existing analyses assume that relative clauses are predicative constructions whose syntactic derivation (or representation) meets the requirements for pronoun binding to happen. For the time being, we can simply assume that binding happens by the movement of an empty category which is semantically vacuous, PRO. As a result of this movement, the relative clause has a non-vacuous subject, i.e. the indexed trace left by PRO, and coindexed pronouns c-commanded by PRO are semantically bound. Note that, since PRO is not a variable, it need not be bound. Thus, the syntactic representation in (21-b) has no unbound variable and delivers the following meaning: 'the woman x such that x married x's childhood sweetheart'.

(23) *Co-varying interpretation with non-referential DPs*

a. No wife of **her** childhood sweetheart left. (✗Bound)
[$_{DP}$ no wife of her childhood sweetheart] left

b. No woman who married **her** childhood sweetheart left. (✓Bound)
[$_{DP}$ no woman [$_{CP}$ PRO$_1$ who t$_1$ married her$_1$] child.sweet.]] left

In the relational construction in (23-a), the embedded pronoun *her* can only receive a free reading: it must refer to some sentence-external antecedent with matching ϕ-features (e.g., some contextually salient woman). On the other hand, in the predicative construction in (23-b), this pronoun can be bound within the relative clause and, by composition, its interpretation can then covary with this of the quantificational DP. These observations appear to extend to all NP modifiers which have been found in the syntactic literature to have an internal subject (see in particular Stowell, 1982) such as adjectival, prepositional and participial phrases (noted as AP, PP and IP, respectively), as illustrated in (24).[10]

(24) *Pronoun Binding across Predicative Constructions*

a. The woman in **her** car is John's mother.
[$_{DP}$ the woman [$_{PP}$ PRO$_1$ t$_1$ in her$_1$ car]] is John's mother.

b. The boy on **his** bike is John's son.
[$_{DP}$ the boy [$_{PP}$ PRO$_1$ t$_1$ on his bike]] is John's son.

c. Every man angry at **himself** should calm down.
[$_{DP}$ every man [$_{AP}$ PRO$_1$ t$_1$ angry at himself$_1$]] should calm down

d. A man proud of **himself** isn't interesting to talk with.
[$_{DP}$ A man [$_{AP}$ PRO$_1$ t$_1$ proud of himself$_1$]] isn't interesting to talk with

e. Every guest sleeping in **his** sleeping bag is drunk.
[$_{DP}$ Every guest [$_{IP}$ PRO$_1$ t$_1$ sleeping in his sleeping bag]] is drunk.

f. The dog turning around **himself** is John's.
[$_{DP}$ The dog [$_{IP}$ PRO$_1$ t$_1$ turning around himself$_1$]] is John's.

By itself, **(C1)** only gives us an explanation as to why pronouns embedded in relational DPs like *the wife of her childhood sweetheart* cannot be bound within these DPs. This does not account for the oddness of sentences of (1-a) yet: so why are these sentences perceived as odd when the relevant pronouns are assumed to be co-referential with their containing DPs?

The idea put forward by many researchers, **(C2)**, is that the oddness of these sentences, on their intended co-referential readings, comes from a problem of referential circularity (see for instance Vergnaud, 1974; Jacobson, 1979; Higginbotham and May, 1981; Brody, 1982; Higginbotham, 1983; Haïk, 1984; Hoeksema and Napoli, 1990).[11]

[10]For simplicity, I also assume here that these syntactic phrases takes as an internal subject an empty category (PRO) which is base-generated in specifier position and then undergoes a short movement (see footnote 9 for details).

[11]There exist several implementations of this idea. For Higginbotham (1987), it means that the function g that assigns a referent to each pronoun delivers for *her* in (1-a) the following equation: *g(her)=the wife of g(her) childhood sweetheart.* For Jacobson (1979) (see also Brody, 1982; Haïk, 1984), it means that *her* is substituted in (1-a) with the whole phrase *the wife of her childhood*

Specifically, it has been proposed that sentences with circular readings are ill-formed because they have 'referential chains' which may be infinitely long. The gist of this proposal is illustrated in (25) for the minimal pair in (1). The notation used to represent the dependencies of pronominal forms in these examples is borrowed from Higginbotham and May (1981).[12]

(25) a. #The wife of her childhood sweetheart left.
LF: [$_{DP}$ the wife of [$_{DP}$ her childhood sweetheart]] left
*Chain: her → the wife of her childhood sweetheart > her
b. ✓The woman who married her childhood sweetheart left.
LF: [$_{DP}$ the woman [$_{CP}$ PRO$_1$ who t$_1$ married her$_1$ child.sweet.]] left
✓Chain: her$_1$ → PRO$_1$

On this view, the puzzle of the 'i-within-i' effects reduces to a compositional issue. In (25-a), the referential chain attached to *her* is circular: the interpretation of *her* anaphorically depends on the DP *the wife of her childhood sweetheart*, whose interpretation compositionally depends on *her*, etc. By contrast, in (25-b), the interpretation of *her* anaphorically depends on PRO whose interpretation only depends on PRO's meaning. It has been pointed out that this solution was general enough to account for more complex cases involving more pronominal forms, as exemplified in (26).

(26) *Context: some girl bumped into her ex-boyfriend.*
#His ex-girlfriend bumped into her ex-boyfriend.
LF: [$_{DP}$ his ex-girlfriend]$_1$ bumped into [$_{DP}$ her$_1$ ex-boyfriend]
*Chain: his → her$_1$ ex-boyfriend > her$_1$ → [his ex-girlfriend]$_1$ > his

Following these considerations, it has been proposed that the 'i-within-i' Condition be thought of as a natural consequence of this general ban against circular chains. This ban has been formulated in various ways (e.g., Higginbotham and May (1981)'s Circularity Principle, Higginbotham (1982)'s filter, Hoeksema and Napoli (1990)'s Condition on circular chains), reflecting different views on why referential chains need be circularity-free. I will not discuss the conceptual motivations underlying these formulations as the point I will take issue with in the following is much more basic and concerns the description of the interpretative processes whereby speakers can arrive at a (well-formed) semantic representation of the problematic sentences.

---

sweetheart in the semantic computation. Setting aside these differences, both views predict that the interpretation of (1-a) involving coreference is inaccessible because (1-a) fails to be a closed sentence interpretable in a finite number of steps. On Higginbotham's view, it is so because speakers cannot eliminate the reference to g from the semantic representation of (1-a). On Jacobson's view, it is so because the substitution process targeting *her* in (1-a) has infinitely many iterations.

[12]Following Higginbotham and May (1981), referential chains are hypothetical objects that represent anaphoric (i.e., coreference or binding) and compositional (i.e., containement) dependencies and take part to the semantic representation. In a nutshell, if the reference of a pronoun A depends on that of a segment B, then 'A→B' forms part of the chain representing that B is the antecedent of A (antecedence relation). If a segment A contains a pronoun B, then A and B are linked in the following notation: 'A>B' (containment relation). A chain of the form $X^1 * X^2 * \ldots * X^n$ (where $*$ is either $\rightarrow$ or $>$) is deemed circular just in case $X^i = X^j$, $i \neq j$ and both X^i and X^j are members of the chain (after Hoeksema and Napoli, 1990).

5.2.2 Empirical Issues

Limits of the Referential Circularity View

The limits of the Referential Circularity (RC) hypothesis come from the very specific set of assumptions it relies on and which severely restricts its explanatory power. Strictly speaking, the scope of the RC hypothesis is limited to cases involving pronouns, used anaphorically, out of a specific context. It is only in these cases that speakers may attempt to interpret the relevant pronouns as standing for the descriptions that contain them, and that the derivation of co-referential readings for sentences of (1-a) is expected to give rise to a problem of circularity. This line of explanation, however, disregards alternative circularity-free representations of these readings, and fails to provide an empirically adequate description of the conditions under which the oddity effects of interest arise.

First of all, it fails to account for the fact that the classical 'i-within-i' effects replicate when pronouns are replaced with non-anaphoric descriptions such as proper descriptions, demonstratives or indexicals:

(7) **The 'i-within-i' Effects Replicate with Non-Anaphoric Expressions**

a. #[The wife of [Mary]$_i$'s childhood sweetheart]$_i$ is about to leave
b. #[[John]$_i$'s financial advisor's coach]$_i$ is a former Marine
c. #Mary met [the famous author of [D.Brown]$_i$'s books]$_i$
d. #John is dating [the mother of the son of [this woman]$_i$]$_i$
e. #[The boss of [my]$_i$ secretary]$_i$ has a very busy schedule

Similar observations hold of cases involving sentence-internal crossing-reference. Hence, in parallel to the sentence in (26), we find the minimally different sentences in (27). The oddness of these sentences, in which the referential chains are no longer circular, escapes the explanatory scope of the CR hypothesis.

(27) **Crossing-Reference: Breaking circularity doesn't help**

a. *Context: John's ex-girlfriend bumped into him at the supermarket.*
#John's ex-girlfriend bumped into her ex-boyfriend.
LF: [$_{DP}$ John's ex-girlfriend]$_1$ bumped into [$_{DP}$ her$_1$ ex-boyfriend]
✓Chain: her$_1$ ex-boyfriend > her$_1$ → [John's ex-girlfriend]$_1$

b. *Context: the speaker is talking about his wife's latest request.*
#My wife asked her husband to stop complaining.
LF: [$_{DP}$ my wife]$_1$ asked [$_{DP}$ her$_1$ husband] to stop complaining
✓Chain: her$_1$ husband > her$_1$ → [my wife]$_1$ > my → the speaker

Second, it fails to account for the fact that the very same effects obtain in cases where the context (i.e., background knowledge, surrounding grammatical environment, co-speech gestures) is rich enough to allow speakers to solve the reference of the target pronouns without entering any circular reasoning:

(28) *Context: A TV show is hosting the author of the 2003 bestselling novel 'The Da Vinci Code', Dan Brown. The identity of the guest is common ground.*
#Tonight, this show is hosting [the author of [his]$_i$ book 'The DVC']$_i$

(29) *Context: At the beginning of a TV show, the host is revealing the identity of the special guest in front of the audience.*
#Tonight, our special guest is Dan Brown. You will have the chance to ask all the questions you want to [the author of [his]]$_i$ book 'The DVC']$_i$

(30) *Context: The special guest of a TV show is entering the television set.*
#Here comes [the author of [his]$_i^{\text{[pointing to Dan Brown]}}$ book 'The DVC']$_i$

The examples above provide us with one or more non-circular ways to solve the reference of the target pronoun. In (28), we can solve the reference of *his* by relying on the background information that the guest is the author of 'The Da Vinci Code', namely Dan Brown. In (29), we can further do so by using the discourse antecedent *Dan Brown*. Finally, in (30), it is possible to establish the reference of *his* deictically simply by identifying *his* as the person the host is pointing to, i.e. Dan Brown. Despite the availability of these non-circular resolution strategies, the sentences above remain odd. Intuitively, all these sentences seem to convey that the guest of the TV show is somebody other than Dan Brown and thus that Dan Brown is not the author of the book 'The Da Vinci Code', which is inconsistent with the contextual assumptions.

These data establish that referential circularity is not a necessary condition for the 'i-within-i' (and related) effects to arise and, consequently, that a reduction of the 'i-within-i' Condition to a ban against circular chains is not possible without the loss of generality. I suggest therefore to reconsider the ban against circularity for what it seems to be, namely an interpretability condition which restricts the set of potential sentence-internal antecedents for a given free pronoun to the set of constituents that do not have this pronoun as a subconstituent, as proposed in (31).

(31) **Interpretability Condition on Free Pronouns**
Let ϕ be any parse tree and π be any pronoun occurring freely in ϕ, i.e. π is not bound in ϕ. A subpart α of ϕ qualifies as an antecedent for π only if π is not a subpart of α.

This condition, formulated here as a syntactic condition, appears to be sufficient to rule out circular interpretations and thus to avoid the possible issues of infinite regress that we have discussed. Understood as such, the ban against circularity is arguably a compositional principle that any grammatical theory would acknowledge.

Let me add a further comment. The ban on circularity has often been motivated on semantic grounds as a ban on circular readings. The interpretability condition in (31) allows alternative, more syntactic explanations in the spirit of Jacobson (1994). One possibility in line with Elbourne (2001)'s NP-deletion theory (see also Elbourne, 2005) is that, when a pronoun π is intended to stand for a sentence-internal DP (e.g., *his* stands for the DP *the boss* in *his secretary talked to the boss*), π is construed as a definite description whose internal NP is a copy of the internal NP of that DP stranded by NP-deletion (e.g., *[the$_{\phi\text{-features}}$ ~~boss~~] secretary talked to the boss*). If so,

then it follows that π can only stand at LF for a DP that does not contain π itself. On this view, (31) could be then conceived as a consequence falling out from the way pronominalization works. This hypothesis looks promising to account for the contrasts in (32)-(34) which, to the best of my knowledge, have not been noted yet:

(32) a. #The son of **the** woman who tried to kill **him** lodged a complaint.
b. ✓The son of **a** woman who tried to kill **him** lodged a complaint.

(33) a. #Marie met the author of **the** three books that made **him** famous.
b. ✓Marie met the author of **three** books that made **him** famous.

(34) a. #I talked to the wife of **the** man who cheated on **her** for 10 years.
b. ✓I talked to the wife of **a** man who cheated on **her** for 10 years.

The oddness generated by the co-referential readings of the (a)-sentences is in line with our previous observations. First, the pronoun *him* cannot stand for the whole description it is embedded in. On an NP-deletion approach à la Elbourne, this can be accounted for simply by observing that the representation corresponding to this pronominalization is not grammatical to begin with, (35-a). Next, if the pronoun *him* is presupposed to be coreferential with the description *the son of the woman who tried to kill him*, then an 'i-within-i' environment obtains, (35-b).

(35) The son of the woman who tried to kill him lodged a complaint.
a. *The son of the woman [PRO_1 who t_1 tried to kill [$_{*\text{DP}}$ the$_{\phi\text{-features}}$ ~~son of the woman who tried to kill~~]] VP
b. #[The son of the woman [PRO_1 who t_1 tried to kill [him]$_i$]]$_i$ VP

Now, the contrasts observed between the (a) and (b)-sentences suggest that the syntactic derivation of the (b)-sentences succeeds in escaping both pitfalls. How so? Descriptively, the (b)-sentences only differ from the (a)-sentences in that the complement of the relational nominal (i.e., *son (of)*, *author (of)*, *wife (of)*) is now an indefinite DP (as opposed to a definite DP). One way to make sense of this difference is to assume that non-definite DPs, unlike definite DPs, can QR at LF to a position above the relational nominal in which they are base-generated, as illustrated in (36). The representation resulting from this additional operation offers an interpretative option that was previously unavailable: the definite DP spelled-out as *him* is now allowed by (31) to stand for the subject DP which it is structurally parallel with.

(36) The son of a woman who tried to kill him lodged a complaint.
a. Base-generated representation (No NP-identity)
[the son of [a wo. [PRO_1 who t_1 tried to kill [$_{\text{DP}}$ the$_{\phi\text{-features}}$ son of t_1]]]] VP
b. Representation after QR of the indefinite DP (NP-identity)
[a wo. [PRO_1 who t_1 tried to k. [$_{\text{DP}}$ the$_{\phi\text{-features}}$ ~~son of t_1~~]]]$\lambda 2$ [the son of t_2] VP
$\approx$ some woman tried to kill her son and her son lodged a complaint

I will set aside this research avenue for now and leave a more in-depth analysis of the contrasts in (32)-(34) for future works. My goal here was simply to provide a possible application of the interpretability condition offered in (31), and sketch out a

plausible explanation regarding its *raison d'être* in light of previous proposals about the structure of free and donkey pronouns. In the following, I will take for granted that the syntactic structures ruled out by (31) are ill-formed and therefore cannot be generated by the computational system in the first place.

Limits of the Distinction between Free vs. Bound Pronoun

The second issue concerns the explanatory role of the distinction between free vs. bound pronouns. Researchers who have discussed the kind of contrasts exemplified in (1) have pointed out that the possibility to bind the relevant pronouns in sentences like (1-b) permits to overcome the problematic 'i-within-i' environment at work in sentences like (1-a), hence the absence of oddity effects. I can only agree with this observation. However, I argue that the depart between free vs. bound pronoun, although relevant to explain our intuitions about contrasts of (1), does not play any decisive role in the distribution of the oddity effects associated with the use of complex descriptions. I propose instead that these oddity effects are found whenever a speaker uses a complex description in a context where a structurally simpler, yet contextually equivalent description is available. Before explaining the intuition underlying this proposal, let me first present more data points which support at first sight the idea that pronoun binding could be a sufficient condition to escape oddness.

Jacobson (1994) observes that speakers (tend to) accept sentences minimally different from (1-a) with relational nouns that are transparently agentive-like nominalizations, as illustrated in (37). These sentences involve agent/holder-denoting nominals derived by adding the nominalizing suffix *-er* to a verb stem (e.g., *writ-er*). These nominals occupy normal NP positions, appear with a determiner, and have a 'genitive' object that is marked with the preposition *of*.

(37) *Little-to-no oddity effects with agentive-like nominals (Jacobson, 1994, (39))*
(Context: The speaker wants to express the thought that the man who wrote his mother's biography is about to leave.)
a. #The author of his mother's biography left. (common noun)
b. ?The writer of his mother's biography left. (agentive-like nominal)

In parallel, Jacobson (1994) observes that speakers accept co-varying interpretations of pronominal forms embedded within these nominals, (38), suggesting that these syntactic environments, unlike those involving common noun, allow pronoun binding.

(38) *Co-varying interpretations with agentive-like nominals (Jacobson, 1994, (39))*
a. Every author of his mother's biography left. (✗Bound)
Cannot Mean: every author x of x's mother's biography left
b. Every writer of his mother's biography left. (?Bound)
Can Mean: every person x who wrote x's mother's biography left

Despite some variability across speakers and lexical items, these judgments are consistent with those of my own informants. As a follow-up to Jacobson's observations, I notice that the co-varying interpretations of these sentences, difficult to access at first

for some speakers, become much more natural if we add the reflexive marker 'own' (e.g., *his own NP*), (39), or if we add further contextual specifications, (40).

(39) *Improving co-varying interpretations using 'own'*

a. ✗The Mayor's Office asked to meet [the/every secretary of **his** own boss]

b. ✓The Mayor's Office asked to meet [the/every producer of **his** own show]

(40) *Improving co-varying interpretations via priming*

a. Priming sentence
The/Every man who produces the TV show **he created** became rich.

b. Test sentence
✓The/Every producer of **his** TV show(s) became rich.

It would lead us too far from our immediate subject to go into the detail of how pronoun binding can be achieved within these nominal constructions. For continuity, I defer to Appendix C the formal analysis of the co-varying interpretations of these sentences. The main point remains that these data, involving this time relational nominals, suggest once again that there is a strong correlation between the availability of pronoun binding and the absence of oddity effects. But consider now the contrast in (41) which is built up by varying the context in which (1-b) is uttered:

(41) **Oddity Effects with Predicative Constructions, (1-b)**

a. *Context: It is assumed that one of the guests married her childhood sweetheart; however, the name of this person, 'Mary', is unknown.*
(1-b): [The woman who married her child. sweetheart]$_i$ left
Alternative: [Mary]$_i$ left (UNAVAILABLE)

b. *Context: It is assumed that one of the guests, known to all the interlocutors as 'Mary', married her childhood sweetheart.*
(1-b): #[The woman who married her child. sweetheart]$_i$ left
Alternative: [Mary]$_i$ left (AVAILABLE)

The new observation here is that an utterance of (1-b), acceptable in the context in (41-a), becomes suddenly odd in the context in(41-b), despite the fact that the embedded pronoun can be bound. So where does this contrast come from? In both cases, the speaker uses the same description to describe the individual who left. The use of this description seems very natural in (41-a) for the speaker has no obvious alternative way to describe the relevant individual. By contrast, in (41-b), this same description sounds odd for we know that the speaker could have used instead the simpler phrase *Mary*, which is presupposed to have the same denotation as *the woman who married her childhood sweetheart*. On this description of the problem, it is striking to see that the difference previously observed between (1-a) and (1-b) fades away: these two sentences are perceived as odd in contexts where the complex descriptions *the woman who married her childhood sweetheart* and *the wife of Mary's childhood sweetheart* are presupposed to have the same denotation as *Mary*, (42).

(42) **A Comparison with the 'i-within-i' Effects, (1-a)**
Same context as in (41-b): It is assumed that one of the guests, known to all the interlocutors as 'Mary', married her childhood sweetheart.
(1-a): #[The wife of [Mary]$_i$'s childhood sweetheart]$_i$ left
Alternative: [Mary]$_i$ left (AVAILABLE)

These observations invite us to reevaluate the relevance of the distinction between free vs. bound pronouns as well as the place of the 'i-within-i' effects in the empirical landscape. To begin with, the present data suggest that the main factor driving the distribution of these oddity effects is the availability of alternative descriptions that could be used to produce contextually equivalent sentences. In cases where a pronoun embedded within a description is bound, we have no reason a priori to assume that such an alternative exists, hence the naturalness of sentences of (1-b) in run-of-the-mill contexts. By contrast, whenever a free pronoun or a proper description is embedded within a larger description, it is always the case that such an alternative exists, hence the inferences of non-identity we spontaneously derive upon hearing sentences of (1-a).

Next, the present data suggest that there is nothing special in the end about the 'i-within-i' environments. These environments undoubtedly offer paradigmatic instances of the problem we have just described, but the 'i-within-i' effects are only particular reflections of a more general phenomenon which is observable elsewhere in language, independently of the peculiar 'i-within-i' configuration. The examples in (10)-(13), repeated below for convenience, give us a better idea of the spectrum of this phenomenon. To get rid of the notion of containment intrinsic to the 'i-within-i' Condition, I propose to call this family of interpretative effects the 'i-versus-i' effects.

(10) *Context: A and B are friends with John since college and know his family quite well, in particular his father, Peter, and his sister, Sue.*
A asks B: 'What's your plan for tonight?'
a. #I am going out with [[Peter]'s son]$_i$
b. I am going out with [John]$_i$ (AVAILABLE)

(11) *Context: A professor of semantics and a professor of syntax are arguing with each other. The professor of semantics is speaking.*
a. #[The professor [of semantics]]$_i$ agrees with [you]$_j$
b. [I]$_i$ agree with [you]$_j$ (AVAILABLE)

(12) *Context: It is common ground that Sue is married to her childhood sweetheart, and that she and her husband have a son.*
a. #Sue's mother talked to [the father of [[her] son]]$_j$
b. Sue's mother talked to [[her] husband]$_j$ (AVAILABLE)

(13) *Context: It is common ground that John is Mary's assistant.*
a. #[[John]$_i$'s boss] gave [[Mary]'s assistant]$_i$ a raise
b. [[John]$_i$'s boss] gave [John]$_i$ a raise (AVAILABLE)

In the next section, I present my solution to the 'i-versus-i' effects. I will argue that the driving force behind these interpretative effects is the presence of an implicature giving

rise to an inference of non-identity. We will see that, on this approach, oddity effects obtain when these inferences of non-identity conflict with interlocutors' contextual assumptions. The resulting theory will be shown to be general enough to subsume the 'i-versus-i' effects under one roof.

5.3 Descriptions with Exhaustivity

5.3.1 Logic of the Proposal

The puzzle we are trying to solve can be restated as follows. The (a)-sentences in (43)-(46) involve a complex description, i.e. α, and sound odd; their (b)-variants involve an alternative, simpler description, i.e. β, and sound impeccable. As we have seen, these contrasts are puzzling for the (a) and (b)-sentences convey in context the same information. Take for instance the pair in (43). Since we know that Mary is the wife of her childhood sweetheart, (43-a) and (43-b) convey the same information, namely that Mary left. Why is it then that only (43-b) sounds fine?

(43) *Context: It is assumed that one of the guests, known to all the interlocutors as 'Mary', married her childhood sweetheart.*

a. #[$_\alpha$ The wife of Mary's childhood sweetheart] left.
b. ✓[$_\beta$ Mary] left

(44) *Context: It is assumed that one of the guests, known to all the interlocutors as 'Mary', married her childhood sweetheart.*

a. #[$_\alpha$ The woman who married her childhood sweetheart] left.
b. ✓[$_\beta$ Mary] left

(45) *Context: A and B are friends with John since college and know her family quite well, in particular his father, Peter.*
A asks B: 'What's your plan for tonight?'

a. #I am going out with [$_\alpha$ Peter's son]
b. ✓I am going out with [$_\beta$ John]

(46) *Context: It is assumed that John is Mary's assistant*

a. #John's boss gave [$_\alpha$ Mary's assistant] a raise
b. ✓John's boss gave [$_\beta$ John] a raise

The starting point of my proposal is the observation that, in general, the (a)-sentences can trigger the implicature that their (b)-alternative is false. For instance, a sentence such as *The wife of Mary's childhood sweetheart left* can trigger the implicature that *Mary didn't leave*, as exemplified in (47). Crucially, upon the computation of this implicature, each of the (a)-sentences above will now have a non-identity entailment. For instance, if *The wife of Mary's childhood sweetheart left* is true and *Mary didn't leave* is true, then it follows that Mary is not the wife of her childhood sweetheart.

(47) **Inferences of Non-Identity as Implicatures**
[$_\phi$ [$_\alpha$ The wife of Mary's childhood sweetheart] left]

a. Excludable Structural Alternative:
[$_\psi$ [$_\beta$ Mary] left]

b. Sentence with its Implicature:
the wife of Mary's childhood sweetheart left, but Mary didn't leave

c. Resulting Entailment: Non-Identity
the wife of Mary's childhood sweetheart is not Mary

In the spirit of Magri (2009, 2010, 2011, 2014), I argue that this implicature is the driving force of the oddness of the (a)-sentences in the above contexts. I illustrate the idea informally in (48) for the case of (43-a).

(48) **Oddity Effects as Contextual Contradictions**

a. The sentence in (43-a) triggers the implicature that Mary didn't leave which corresponds to the negation of its alternative (43-b).

b. But (43-a) is contextually equivalent to (43-b) because it is presupposed that Mary is the wife of her childhood sweetheart.

c. The mismatch between the implicature, (48-a), and the common ground, (48-b), results in a contextual contradiction, hence the oddness of (43-a).

Following Magri, we can dub (48) *Hawkin's reasoning*, as it is close to a proposal by Hawkins (1991). Applied to the case of descriptions, the logic underlying this reasoning can be captured by means of the generalization in (20).

(20) **Odd Descriptions**
Let δ be any description and $\phi(\delta)$ be any sentence. An utterance of $\phi(\delta)$ is odd at a context C if there is a sentence $\phi(\delta')$ s.t. $\phi(\delta')$ is an excludable formal alternative to $\phi(\delta)$, and $\phi(\delta')$ is contextually equivalent to $\phi(\delta)$ in C.

The predictions of this implicature-based approach to descriptions are examined in the remainder of this chapter. We will see in sections 5.3.3 and 5.3.4 that this approach offers an explanation for the generation and distribution of the 'i-within-i' and related effects. But before that, I provide in the next section some independent evidence in favor of the generality of this approach by considering cases that lack the characteristic features of the 'i-within-i' environments, but nonetheless fall under the scope of (20).

5.3.2 Independent Evidence and Basic Applications

Independent support in favor of the present approach comes from the observation that oddity effects are found in cases where two descriptions of equal structural complexity are presupposed to be referentially disjoint but occur in an environment in which substituting one for the other yields contextually equivalent sentences. Before we get to these cases, let us start by looking at the baseline paradigm in (49), which consists of three sentences that are *not* contextually equivalent. I will use this paradigm to review our assumptions about the derivation of implicatures.

(49) **The Brothers Scenario (Baseline Paradigm)**
Context: John and Peter are brothers. Question: 'Who arrived?'

a. John arrived.
   $\rightsquigarrow$ Peter didn't arrive i.e. $\neg$(49-b)

b. Peter arrived.
   $\rightsquigarrow$ John didn't arrive, i.e. $\neg$(49-a)

c. John and Peter arrived.
   $\Rightarrow$ John arrived, i.e. (49-a)
   $\Rightarrow$ Peter arrived, i.e. (49-b)

FACTS: (49-a) $\not\Leftrightarrow_C$ (49-b), (49-a) $\not\Leftrightarrow_C$ (49-c), (49-b) $\not\Leftrightarrow_C$ (49-c)

The first observation is that each of these sentences sounds impeccable in context. The second is that a sentence like (49-a) may trigger the inference that Peter didn't arrive. This inference can be derived as an implicature by negating the sentence in (49-b), which is an excludable formal alternative to (49-a) and which seems relevant to the question under discussion 'Who arrived?'. Of course, the same logic applies the other way around so that (49-b) may trigger the implicature that John didn't arrive. To establish this formally, let me first introduce some basic assumptions about the syntax and semantics of proper names. Following previous proposals (a.o. Recanati, 1993; Larson and Segal, 1995; Geurts, 1997; Elbourne, 2005; Matushansky, 2008), I will treat proper names as definite descriptions decomposable into a (possibly covert) definite article and a predicate, e.g. [~~the~~ John]. For the time being, I will adopt the simplified view that the descriptive content of a proper name such as *John* is something like *who is known as 'John' by the interlocutors*, where the acquaintance relation *to be known as* is intended to cover different forms of naming practices, e.g. *naming*, *calling*, *baptizing*, etc. I will notate this predicate as $\lambda x.$*'John'*(x), where the quotation marks stands for the naming convention of the speaker that is presupposed to be shared by the hearer, (50).

(50) *Lexical Entry for Proper Names*
$[\![\text{John}]\!]^w = \lambda x.$ *'John'*$(x)(w)$
i.e., the set of individuals named/called/etc. 'John' by the interlocutors in w
(a.o. Recanati, 1993; Geurts, 1997; Elbourne, 2005; Matushansky, 2008)

On this analysis, the syntactic and semantic representation of (49-a) are as follows:

(49-a) John arrived
SS: $[_{\phi}\ [_{\text{DP}}\ [+def]$ John$]$ arrived$]$

a. Presupposition tier: there is a unique individual called/named/baptized 'John' by the interlocutors

b. Assertion tier: the individual called/named/baptized 'John' by the interlocutors arrived

We can now verify that (49-b) is an excludable structural alternative to (49-a) (and vice-versa). First, both sentences are equally complex and one is derivable from the other simply by substituting one proper name for the other, as shown in (51).

(51) *Structural Alternative: $\phi \backsim \psi$ and $\psi \backsim \phi$*
(49-a): [$_\phi$ [[+*def*] John] arrived]
(49-b): [$_\psi$ [[+*def*] Peter] arrived]

Second, (49-b) is an excludable assertive alternative to (49-a): there are possible worlds in which the naming conventions for 'John' and 'Peter' are shared by all the interlocutors, and the individual named 'John' arrived (i.e., (49-a) is true) but the individual named 'Peter' didn't (i.e., ¬(49-b) is true). Of course, the same reasoning holds the other way around, i.e. (49-a) is an excludable assertive alternative to (49-b). Since (49-b) is an excludable assertive alternative to (49-a), the meaning of (49-a) can be strengthened by adding the implicature ¬(49-b) to its semantic representation. On the present approach, this implicature is brought about by a covert operator akin to overt 'only', called the exhaustivity operator (notated EXH), which is syntactially mandatory at matrix scope and whose domain is restricted by a contextually assigned relevance predicate $\mathcal{R}$ (see Chapter 2 for discussion). On these assumptions, the strengthened meaning of (49-a) is derived as shown in (52).

(52) **The Brothers Scenario: Optional Implicature**
Context: John and Peter are brothers. Question: 'Who arrived?'
John arrived
SS: $\text{EXH}_{\mathcal{R}}$ [$_\phi$ [[+*def*] John] arrived] $(\phi \not\Rightarrow_C \psi)$
a. $\text{EXCL}_{asr}(\phi) \supseteq \{$[$_\psi$ [[+*def*] Peter] arrived]$\}$
b. $[\![\text{EXH}_{\mathcal{R}}(\phi)]\!] \Rightarrow \lambda w.$('John' arrived in w) $\wedge$ ¬('Peter' arrived in w)
Result: $^{\text{OK}}$John arrived but Peter didn't $C \cap \text{EXH}_{\mathcal{R}}(\phi) \neq \emptyset$

The strengthened meaning of (49-a) in (52) presupposes that the naming conventions for 'John' and 'Peter' are shared by the interlocutors in context, and it asserts that the individual called 'John' arrived but the individual called 'Peter' didn't. Naturally, the meaning of (49-b) can be strengthened in a similar fashion, delivering this time the entailment that the individual named 'John' didn't arrive. Note however that such a meaning strengthening cannot go through in (49-c) since neither (49-a), nor (49-b) are excludable alternatives to (49-c). Finally, note that this implicature remains optional in the context of (49). Typically, if it is more plausible to assume in context that the speaker is ignorant about Peter's arrival, then the alternative *Peter arrived* can be pruned from the domain of the exhaustivity operator $\text{EXH}_{\mathcal{R}}$ so as to avoid a contextual contradiction. This pruning strategy is exemplified by the (a)-sentence in (53). On the other hand, the 'only'-sentence in (b) mimics the output that would be delivered by exhaustification if the relevant alternative were not pruned.

(53) *The Brothers Scenario: 'Who arrived?'*
a. I don't know about Peter, but John arrived.
$\not\Rightarrow$ Peter didn't arrive
b. I don't know about Peter, but $^{\#}$only John arrived.
$\Rightarrow$ $^{\#}$Peter didn't arrive

With this in mind, we can turn to the test paradigm in (54). This paradigm consists of same three sentences as in (49), but these sentences are now contextually equivalent.

(54) **The Siamese Twins Scenario (Test Paradigm)**
Context: John and Peter are conjoined twins. Question: 'Who arrived?'

a. #John arrived.
   $\leadsto$ #Peter didn't arrive, i.e. ¬(54-b)

b. #Peter arrived.
   $\leadsto$ #John didn't arrive, i.e. ¬(54-a)

c. John and Peter arrived.
   ⇒ John arrived, i.e. (54-a)
   ⇒ Peter arrived, i.e. (54-b)

FACTS: (54-a) $\Leftrightarrow_C$ (54-b), (54-a) $\Leftrightarrow_C$ (54-c), (54-b) $\Leftrightarrow_C$ (54-c)

The (a)-sentence and the (b)-sentence now sound odd, while the (c)-sentence still sounds impeccable. The key to understand these contrasts is to observe that the contextual assumption that John and Peter are not just brothers but conjoined twins forces the derivation of the relevant implicatures and impacts on our perception of the resulting representations. In a nutshell, if John and Peter are conjoined twins, one cannot be at one place without the other being at that place too and therefore, if the speaker believes that one of them arrived, he must believe that the other did too. In other words, if the speaker believes that John arrived, it is no longer possible in this context to assume that this speaker is ignorant about Peter's arrival or believes that this event didn't take place, as evidenced by the examples in (55).

(55) *The Siamese Twins Scenario: 'Who arrived?'*

a. #I don't know about Peter, but John arrived.
   ⇒ The speaker ignores whether Peter arrived

b. #Only John arrived.
   ⇒ #Peter didn't arrive

Following Magri's proposal, we assume that, whenever an alternative is contextually equivalent to the prejacent of an occurrence of the exhaustivity operator, the computation of the implicature associated with this alternative is obligatory. As a result, the implicatures that were previously optional in the context in (49) become now mandatory, and the representations resulting from this strengthening are now at odd with common knowledge, as shown in (56). Just as before, the strengthened meaning of *John arrived* delivers the entailment that Peter didn't arrive. But now this entailment contradicts common knowledge and thus the sentence is perceived as odd. Similar observations hold of (54-b) which delivers the mismatching inference that John didn't arrive. Note however that, just as before, this reasoning does not go through in (54-c) since both (54-a) and (54-b) are logically weaker than (54-c).

(56) **The Siamese Twins Scenario: Mandatory Implicature**
Context: John and Peter are conjoined twins. Question: 'Who arrived?'
#John arrived
SS: $\text{EXH}_{\mathcal{R}}$ $[_{\phi}$ [[+*def*] John] arrived] $(\phi \Leftrightarrow_C \psi)$
a. $\text{EXCL}_{asr}(\phi) \supseteq \{[_{\psi}$ [[+*def*] Peter] arrived]$\}$
b. $[\![\text{EXH}_{\mathcal{R}}(\phi)]\!] \Rightarrow \lambda w.$('John' arrived in w) $\wedge \neg$('Peter' arrived in w)
Result: #John arrived but Peter didn't $C \cap \text{EXH}_{\mathcal{R}}(\phi) = \emptyset$

For the sake of clarity, let me emphasize two key assumptions under which the *Hawkin's reasoning* in (56) is expected to obtain on the present view. The first assumption is that, in order for the mismatching implicature in (56) to be generated, the corresponding alternative ψ has to be an excludable *structural* alternative to ϕ. Adopting here the focus-sensitive version of Katzir (2008)'s theory of structural alternatives (see also Katzir, 2007) offered in Fox and Katzir (2009) and Fox and Katzir (2011), the set of structural alternatives $\text{ALT}(\phi)$ to a sentence ϕ is the set of all structures obtained from ϕ by replacing focused constituents within ϕ with constituents that are at most as complex as the original constituents. On this focus-sensitive version of Katzir's proposal, it is expected for instance that, if we modify the question under discussion in (56) so that the subject DP *John* can no longer bear focus in ϕ, the sentence ψ should no longer be in the set of ϕ's structural alternatives because ψ can no longer obtain from ϕ by a substitution within the focus-marked phrase. In these cases, the mismatching implicature in (56) should not be generated and the oddity effects should thus disappear, regardless of whether contextual equivalence obtains. The examples in (57) establish this point.

(57) **Structural Alternatives and Focus**
Context: John and Peter are conjoined twins.
The speaker is looking for John to give him a letter.
a. Did John arrive? $\phi \Leftrightarrow_C \psi$
(i) ϕ: YES_F, John arrived.
(ii) $\text{ALT}(\phi) \not\supseteq \{[_{\psi}\ \text{YES}_F$, Peter arrived]$\}$
(iii) $\text{EXH}_{\mathcal{R}}(\phi) \not\Rightarrow$ Peter didn't arrive
b. Where is John? $\phi \Leftrightarrow_C \psi$
(i) ϕ: John is IN THE KITCHEN_F
(ii) $\text{ALT}(\phi) \not\supseteq \{[_{\psi}$ Peter is $\text{IN THE KITCHEN}_F]\}$
(iii) $\text{EXH}_{\mathcal{R}}(\phi) \not\Rightarrow$ Peter is not in the kitchen
Therefore, $C \cap \text{EXH}_{\mathcal{R}}(\phi) \neq \emptyset$.

The second assumption is that the computation of the mismatching implicature is mandatory in (56), i.e. in the Siamese Twins scenario, because the prejacent ϕ of $\text{EXH}_{\mathcal{R}}$ is contextually equivalent to its excludable structural alternative ψ. I take the contrasts between (49) vs. (54) and between (53) vs. (55) to support this assumption. The example in (58) illustrates further the fact that, when contextual equivalence does not obtain, the corresponding alternatives may be kept or discarded in accordance with the state of the common ground and the state of speakers' internal beliefs.

(58) **Naming Conventions and Contextual Equivalence**
Context: All the interlocutors know the philanthropist named 'John' and the superhero named 'Blurp'. Only some of them know that both names stand for the same individual.
What happened? $\phi \not\Rightarrow_C \psi$
ϕ: [~~the~~ Blurp] arrested the villains.
ψ: [~~the~~ John] arrested the villains.

a. Opinionated Speakers: Pruning Strategy
$[\![\text{EXH}_{\mathcal{R}}\ \phi]\!] \not\Rightarrow_{B_{speaker}} \lambda w.\ \neg(\text{'John' arrested the villains in } w)$

b. Ignorant Speakers: Optional Implicature
$[\![\text{EXH}_{\mathcal{R}}\ \phi]\!] \Rightarrow_{B_{speaker}} \lambda w.\ \neg(\text{'John' arrested the villains in } w)$

With this respect, it is worth emphasizing that the result in (56) can obtain only if the naming convention involved in the relevant alternative is commonly accepted by the interlocutors. Generally speaking, whether this assumption holds or not ultimately depends on the specifics of the speech situation (e.g., register of the conversation) which determines whether it is appropriate for the interlocutors to refer to a given individual by means of a nickname, a proper name, an honorific title, etc. Contextual equivalence and subsequent oddity effects obtain just in case the naming convention at work in the relevant alternative is presupposed to be shared by the interlocutors, as exemplified in (59).

(59) **Naming Conventions in Context**

a. *Casual Situation: The wife of the President, whose name is 'John', is talking to her best friend. The naming convention for 'John' is shared.*
(i) #[the President] is very busy these days
(ii) [~~the~~ John] is very busy these days

b. *Formal Situation: The wife of the President, whose name is 'John', is talking to a journalist. The naming convention for 'John' is not shared.*
(i) [the President] is very busy these days
(ii) [~~the~~ John] is very busy these days (possible accomodation)

To summarize, the comparative study of the paradigms in (49) and (54) provides empirical support in favor of the generalization in (20) and establishes that the oddity effects associated with the use of descriptions are not peculiar to cases where a more complex description competes with a simpler description it is presupposed to co-refer with. Consistent with my introductory remarks (see (61) in Section 5.1), I notice that the pattern of judgments in (54) is not expected under an approach in terms of minimization. First, the oddness of (54-a) and (54-b) is beyond the explanatory scope of such an approach. Next, regardless of whether we treat the conjunction in (54-c) as a DP or TP conjunction, the acceptability of this sentence is not predicted under a minimization approach which would incorrectly favor the sentences in (54-a)/(54-b) which are more minimal and equally informative in context. This problem does not arise on the present approach. In the next section, I turn to the 'i-within-i' effects.

5.3.3 The 'i-within-i' Effects

Source of the 'i-within-i' Effects

The present approach offers a simple solution to the 'i-within-i' puzzle: the source of the 'i-within-i' effects lies in the mandatory computation of a mismatching implicature. To see this clearly, consider again the following example:

(1-a)' *Context: It is commonly known that the individual named 'Mary' married her childhood sweetheart. Question: 'What happened?'*
#[The wife of [Mary]$_i$'s childhood sweetheart]$_i$ left.

This example falls under the scope of our generalization. By (20), (1-a)' is expected to be odd because it is contextually equivalent to the sentence *Mary left*, which is an excludable formal alternative to (1-a)', as shown in (60).

(60) *Excludable Formal Alternative: $\psi < \phi$ and $[\![\phi]\!] \not\Rightarrow [\![\psi]\!]$*
a. The wife of Mary's childhood sweetheart left.
SS: [$_\phi$ [[+*def*] wife (of) [[+*def*] child.sweet. (of) [[+*def*] Mary]]] left]
LF: λw. the wife of 'Mary"s childhood sweetheart left in w
b. Mary left.
SS: [$_\psi$ [[+*def*] Mary] left]
LF: λw. 'Mary' left in w

The alternative ψ obtains from ϕ, i.e. (1-a)', by substituting the subject DP *the wife of Mary's childhood sweetheart* with its subconstituent DP *Mary*. The negation of this alternative is logically consistent with ϕ because there are possible worlds where ϕ is true but ψ is false, i.e. those worlds in which the wife of Mary's childhood sweetheart and Mary are distinct individuals. Since ϕ and ψ are also contextually equivalent, it follows on the present view that the computation of the implicature associated with ψ is mandatory. As shown in (61), the interpretation resulting from this mandatory implicature conflicts with common knowledge: adding the negation of ψ to ϕ now entails that *'Mary' didn't leave*, which is contextually contradictory with ϕ since the wife of Mary's childhood sweetheart is presupposed to be Mary herself.

(61) **The 'i-within-i' Effects: Mandatory Implicatures**
Context: It is commonly known that the individual named 'Mary' married her childhood sweetheart. Question: 'What happened?'
#The wife of Mary's childhood sweetheart left.
SS: $\text{EXH}_{\mathcal{R}}$ [$_\phi$ [[+*def*] wife (of) [[+*def*] child.sweet. (of) [[+*def*] Mary]]] left]
a. $\text{EXCL}_{asr}(\phi) \supseteq \{[_\psi$ [[+*def*] Mary] left]$\}$ $(\phi \Leftrightarrow_C \psi)$
b. $[\![\text{EXH}_{\mathcal{R}}(\phi)]\!] \Rightarrow \lambda w.$(the wife of 'Mary"s child.sweet. left in w)$\wedge\neg$('Mary' left in w)
$[\![\text{EXH}_{\mathcal{R}}(\phi)]\!] \Rightarrow \lambda w.\neg$(the wife of 'Mary"s child.sweet. is 'Mary' in w)
Result: #The wife of Mary's child.sweet. is not Mary

The examples in (62)-(65) illustrate how this analysis generalizes to other 'i-within-i' environments. The (a)-sentences are expected to be perceived as odd just in case

they are contextually equivalent to their (b)-alternative, i.e. just in case α and β are presupposed to have the same denotation. Note that, in the absence of contextual equivalence, the non-identity entailment resulting from the exhaustification of the meaning of the (a)-sentence would remain compatible with common knowledge. The case of indexicals, e.g. (65), will be discussed and analyzed in Section 5.3.4.

(62) a. #$[_\alpha$ $[_\beta$ John$]_i$'s financial advisor's coach$]_i$ is a former Marine
b. $[_\beta$ John$]_i$ is a former Marine
Entailment: #John is not the coach of his financial advisor

(63) a. #Mary met $[_\alpha$ the author of $[_\beta$ D. Brown$]_i$'s books$]_i$
b. Mary met $[_\beta$ D. Brown$]_i$
Entailment: #D. Brown is not the author of his books

(64) a. #John is dating $[_\alpha$ the mother of the son of $[_\beta$ this woman$]_i]_i$
b. John is dating $[_\beta$ this woman$]_i$
Entailment: #The mother of the son of this woman is not this woman

(65) a. #$[_\alpha$ The boss of $[_\beta$ my$]_i$ secretary$]_i$ has a very busy schedule
b. $[_\beta$ I$]_i$ have a very busy schedule
Entailment: #The speaker is not the boss of his secretary

Let us now turn our attention to the classical 'i-within-i' effects, that is to those 'i-within-i' sentences involving free pronouns:

(1-a) *Context: The individual that 'her' is intended to refer to is commonly known to be married to her childhood sweetheart. Question: 'What happened?'*
#The wife of her childhood sweetheart left.

I argue that the logic underlying the classical 'i-within-i' effects is the same as above. To establish this point, I propose to consider how the present proposal applies to these cases on the following two common views on pronouns:

(66) a. Pronouns as Descriptions (a.o. Postal, 1970; Elbourne, 2001, 2005)
(i) LF: $[[+def]\ [F_1\ [\ldots[F_n\ [\text{NP}]]]]]$ left
(ii) PF: $<[+def], F_1, \ldots, F_n>$ ~~NP~~ left
b. Pronouns as Variables (a.o. Heim and Kratzer, 1998)
(i) LF: $[F_1\ [\ldots[F_n\ [\text{pro}_7]]]]$ left
(ii) LF: $<F_1, \ldots, F_n, \text{pro}>$ left

On the 'pronouns as descriptions' view, pronouns are assumed to have the syntactic structure of definite descriptions. On this view, the free pronoun *her* in (1-a) is syntactically decomposable into a definite determiner (i.e., $[+def]$), ϕ-feature specifications (e.g., [SINGULAR], [FEMININE]) and an NP (e.g., *Mary*, *girl*). The difference between these descriptions and genuine definite descriptions (e.g., *the girl*) is thus only superficial: pronouns are definite determiners carrying ϕ-features specifications followed by elided NPs. On these assumptions, the oddness of (1-a) follows from the exact same logic as previously described, as illustrated in (67).

(67) **Classical 'i-within-i' Effects: Pronouns as Descriptions**

a. #$[_\alpha$ The wife of $[_\beta$ her ~~Mary~~$]_i$ childhood sweetheart$]_i$ left.

b. $[_\beta$ She ~~Mary~~$]_i$ left.

Strengthened Meaning of (67-a) in context:

#The wife of Mary's child.sweet left (=Mary), but Mary didn't.

On the 'pronouns as variables' view, pronouns are indexed with a natural number, and their interpretation depends on an assignment function, i.e. a function from numbers to DP meanings.[13] On this view, the free pronoun *her* in (1-a) is an occurrence of a free variable supplemented with ϕ-features specifications. In order for (1-a) to be a complete utterance, the utterance context must determine a variable assignment g that supplies a suitable value for the index on *her*, i.e. a suitable referent compatible with the ϕ-features carried by this pronoun.

(1-a) [[The wife of [her$_7$] childhood sweetheart] left]
LF: λw. the wife of Mary's childhood sweetheart left in w
Therefore, $\textsc{excl}_{asr}$((1-a))$\supseteq${[[she$_7$] left]}

Suppose now that the singular female individual referred to by *her*$_7$ is identified as the woman who married her childhood sweetheart in every possible world that conforms to the shared presuppositions of the interlocutors. Then, we find ourselves in the same situation as before for a contextual contradiction obtains upon exhaustification of the meaning of (1-a).

(68) **Classical 'i-within-i' Effects: Pronouns as Variables**

a. #$[_\alpha$ The wife of $[_\beta$ her$_7]_i$ childhood sweetheart$]_i$ left. $g = [7 \rightarrow Mary]$

b. $[_\beta$ She$_7]_i$ left.

Strengthened Meaning of (68-a) in context:

#The wife of Mary's childhood sweetheart (=Mary) left, but Mary didn't.

To summarize, the present analysis locates the source of the 'i-within-i' effects in the mandatory computation of a mismatching implicature. This analysis offers a uniform approach to the 'i-within-i' effects and an explanatory account of their *raison d'être*.

Distribution of the 'i-within-i' Effects

The distribution of the 'i-within-i' effects is hypothesized to follow from the generalization in (20) which captures the characteristic features of the implicature-based approach to descriptions pursued in this chapter. If this approach is on the right track, then these oddity effects should be absent when the conditions forcing the

[13] Consistent with the syntactic representation offered in (66-b), the interpretation rule for pronouns can be formulated as in (i).

(i) *Interpretation Rule for Pronouns (modeled after Heim and Kratzer, 1998)*
Let α be a pronoun with a numerical index n and features F_1 through F_i, then for all variable assignment g: $[\![\alpha]\!]^g = g(n) \in [\![F_1]\!] \ldots [\![F_i]\!]$. $g(n)$.

derivation a mismatching implicature are not met. I propose here to verify some of these predictions. The first prediction is that the oddity effects should disappear when the sort of alternative normally associated with the mismatching implicature is not in the set of structural alternatives. The example in (69) supports this prediction.

(69) **Structural Alternatives and Focus**
Context: In order for a police officer to interrogate a suspect, the physical presence of the person legally in charge of representing this suspect is required. In the present case, the suspect has decided to advocate on his own behalf and the cops A and B wonder whether they can enter the interrogation room.
A: Are we allowed to come in?
B: ✓Well, [[the suspect]$_i$'s legal representative]$_i$ IS$_F$ in the interrogation room, so we are allowed to come in.

In this context, the interlocutors are trying to figure out whether they are allowed to enter the interrogation room and start interrogating the suspect. By the law, they are allowed to do so only if the person legally in charge of representing the suspect IS in the interrogation room. Since the suspect here has decided to advocate on his own behalf, B's answer is contextually equivalent to *the suspect is in the interrogation room*. Yet this sentence is not a structural alternative to B's answer because the DP *the suspect's legal representative* is not focus-marked (see (57) above). In the absence of such an alternative, no mismatching implicature is generated.

The second prediction is that the 'i-within-i' effects should disappear when the mismatching implicature generating these effects is not mandatory, i.e. in cases where the corresponding alternative is not contextually equivalent to the prejacent of the exhaustivity operator responsible for this implicature. The contrast in (16), repeated below, establishes this point.

(16) **Mandatory Implicatures and Oddity Effects**

a. **Opinionated Speakers: Mismatching Implicatures**
Context: The NYPD are looking for an arms dealer named Smith. Yesterday, they caught his accomplice. Under pressure, Smith's accomplice confesses that Smith is his fence and tell them where he is hiding.
Police Chief: #The mission is to catch the fence of Smith's accomplice.
(i) $\text{EXH}_{\mathcal{R}}[_{\phi}$ the mission is to catch the fence of Smith's accomplice]
(ii) $\text{EXCL}_{asr}(\phi)=\{[_{\psi}$ the mission is to catch Smith]$\}$ $(\phi \Leftrightarrow_C \psi)$
⚠ ψ cannot be pruned from the domain of $\text{EXH}_{\mathcal{R}}$
(iii) $[\![\text{EXH}_{\mathcal{R}}(\phi)]\!] \Rightarrow \lambda w.\ \neg$(the mission is to catch Smith in w)
Therefore, $C \cap [\![\text{EXH}_{\mathcal{R}}(\phi)]\!] = \emptyset$

b. **Uncertain Speakers: Pruning Strategy**
Context: The NYPD are looking for an arms dealer named Smith. Yesterday, they caught his accomplice. Under pressure, Smith's accomplice confesses that he has a fence but denies any connection with Smith. The cops do not exclude the tiny chance that the fence in question be Smith himself and decide to investigate further to clear the matter up.

Police Chief: ✓The mission is to catch the fence of Smith's accomplice.
(i) $\text{EXH}_{\mathcal{R}}[_{\phi}$ the mission is to catch the fence of Smith's accomplice]
(ii) $\text{EXCL}_{asr}(\phi)=\{[_{\psi}$ the mission is to catch Smith]$\}$ $(\phi \not\Rightarrow_C \psi)$
⚠ ψ can be pruned from the domain of $\text{EXH}_{\mathcal{R}}$
(iii) $[\![\overline{\text{EXH}_{\mathcal{R}}(\phi)}]\!] \not\Rightarrow \lambda w.\ \neg$(the mission is to catch smith in w)
Therefore, $C \cap [\![\text{EXH}(\phi)]\!] \neq \emptyset$

In (16-a), Smith's accomplice's statement makes it common ground that the fence of Smith's accomplice is Smith himself. On this assumption of identity, the target sentence is contextually equivalent to the excludable formal alternative *The mission is to catch Smith*. Since this alternative cannot be pruned from the domain of the exhaustivity operator, a mismatching implicature arises. By contrast, in (16-b), the fence of Smith's accomplice is only presumed to be Smith; the interlocutors ignore whether this presumption is true and they know that they are ignorant on this matter. In this context, computing the implicature would deliver a non-identity entailment (i.e., the fence of Smith's accomplice is not Smith) incompatible with the state of ignorance of the interlocutors. Since the relevant alternative is not equivalent to the target sentence, this alternative can be pruned to avoid contextual contradiction. Finally, the present analysis predicts that identity statements shall be free of oddity effects. To explain this prediction, consider the following example:[14]

(70) **Identity Statements: No Oddity Effects**
Context: John takes cooking lessons from his personal chef. As an intensive training, he has to prepare him one to two meals per day.
✓The cook of John's chef is John (himself).

The present analysis offers two ways to account for these cases. First, we can start from the observation that contexts in which a given identity relation can be felicitously asserted, questioned, supported or discredited are contexts in which this identity relation is not common ground to begin with. On this perspective, the context in (70) does not meet the conditions to force an implicature (i.e., no contextual equivalence). Another way to go is simply to observe that the hypothetical inference that would conflict here with common knowledge is not derivable as an implicature because *John is John* is not excludable: for every world w, if the identity statement *the cook of John's chef is John* is true at w, then there is a unique individual named 'John' in w which is identical to himself in w.

[14]Identity statements have often been discussed in the literature on Condition C, for instance (i):

(i) A: Who is the man over there?
B: He is Colonel Weisskopf. (Grodzinsky and Reinhart, 1993)

While these statements have sometimes been considered as exceptions to Condition C, it has also been argued that they might not be pertinent to the issue, since they may not contain referential DPs in post-copular position to begin with (Lasnik, 1976; Hoeksema and Napoli, 1990; Macià Fàbrega, 1997). I shall set aside this open question for now. I notice, however, that the example in (70) is beyond the scope of these considerations.

Bound Pronouns in Nominals — An Explanation

Contra previous proposals, I have claimed in Section 5.2.2 (see (41)-(42)) that the distinction between free vs. bound pronouns plays no decisive role in explaining the distribution of the oddity effects associated with the use of complex descriptions. One of the arguments in favor of this claim is the observation that the contrast between (1-a) vs. (1-b) in (71) disappears once it is made clear in context that the description *the wife of Mary's childhood sweetheart* and the description *the woman who married her childhood sweetheart* are presupposed to have the same denotation as the simpler proper description *Mary*, (72).

(71) *Context: It is known that one of the guests married her childhood sweetheart.*
(1-a): #The wife of her/Mary's childhood sweetheart left. (✗Bound)
(1-b): The woman who married her childhood sweetheart left. (✓Bound)

(72) *Context: It is known that one of the guests, known to all the interlocutors as 'Mary', married her childhood sweetheart.*
(1-a): #The wife of her/Mary's childhood sweetheart left. (✗Bound)
(1-b): #The woman who married her childhood sweetheart left. (✓Bound)

I believe that there is a simple explanation for these discrepancies. On the one hand, all it takes for the strengthened meaning of (1-a) to conflict with common knowledge is that the interlocutors come to assume that the wife of Mary's childhood sweetheart is Mary herself. Whenever this identity assumption is entertained, it comes into conflict with the non-identity entailment delivered by the strengthened meaning of (1-a). In particular, note that the presuppositions of (1-a) entail the presupposition(s) of its alternative *Mary left* since we can infer from an utterance of (1-a) that the naming convention for 'Mary' is shared by the interlocutors. There is a mismatch between $\text{EXH}_{\mathcal{R}}$((1-a)) and C in case the interlocutors assume that the wife of Mary's childhood sweetheart is Mary, e.g. because it is known that only one person is married to her childhood sweetheart, (71), or because this information is common ground, (72).

On the other hand, the contextual conditions for a similar mismatch to arise in (1-b) are much more demanding. In particular, in contrast to what we observe for (1-a), we cannot infer from an utterance of (1-b) that the naming convention for 'Mary' is shared by all the interlocutors. In the absence of any information to the contrary, we can assume that (1-b) is not contextually equivalent to *Mary left* simply because the naming convention for 'Mary' is not in force between the speaker and the hearer. Hence, there is a mismatch between $\text{EXH}_{\mathcal{R}}$((1-b)) and C just in case it is common ground that such a naming convention holds between the interlocutors, and furthermore Mary is assumed to be the woman who married her childhood sweetheart. This is explicitly the case in (72); note however that there is no evidence at all that it is so in (71), hence the contrasts between both contexts.

To summarize, the logic underlying the generation and distribution of the oddity effects associated with the use of complex descriptions — the one captured by the generalization in (20) — is orthogonal to the question of whether these descriptions involve free pronouns/proper names vs. bound pronouns. However, the semantic

composition of these descriptions imposes certain conditions on the common ground which are naturally more or less demanding depending on the richness of their presuppositional content. As we have seen, these differences impact on the conditions required for a contextual contradiction to arise. In run-of-the-mill contexts, there is no reason why an utterance of (1-b) shall give rise to a non-identity entailment for there is no reason *a priori* to believe that an alternative description to *the woman who married her childhood sweetheart* could be felicitously used by the speaker. This is not true however in the case of relational constructions like (1-a) where such an alternative description always offers itself (e.g., *She*/*Mary*).

In the remainder of this chapter, I discuss how the implicature-based *Hawkin's reasoning* underlying the generation of the 'i-within-i' effects extends to other cases of presupposed co-reference outside the restricted area of the 'i-within-i' environment, consistent with the general scope of (20). We will see that the characteristic features of the 'i-within-i' sentences can be teased apart from the very notion of containment.

5.3.4 Extended 'i-versus-i' Effects

The 'i-versus-i' Effects

In the previous section, we have seen how the present approach accounts for the oddity effects triggered by the use of descriptions which contain an alternative description they are presupposed to be co-referential with, i.e. the 'i-within-i' effects. I propose now to take a closer look at cases where such an alternative description exists but is not contained within the description it is presupposed to be co-referential with, i.e. the extended 'i-versus-i' effects. To illustrate, consider the following two examples:

(73) *Context: A and B are friends with John since college and they got to know his family, in particular his father, Peter.*
A's question: What's your plan for tonight?
a. #I am going out with [[Peter]'s son]$_i$
b. I am going out with [John]$_i$

(74) *Context: John is married to a woman; they have a son together.*
What did John do?
a. #John talked to [the mother of [his son]]$_i$
b. John talked to [his wife]$_i$

On our proposal, the oddness of the (a)-sentences is expected for it follows from the exact same logic as before: these sentences have an excludable formal alternative that are contextually equivalent to them, namely the (b)-sentences. Upon exhaustification of their meaning, the implicatures associated with these alternatives are computed, resulting in a representation that conflicts with common knowledge. This process is illustrated in (75) for the example in (74).[15]

[15]Derivationally, the relevant formal alternative, i.e. *John talked to his wife*, obtains by substituting the DP *the mother of his son* with its sub-constituent DP *his son*, and then by substituting within this DP the NP *son* with the NP *wife*.

(75) **Example of 'i-versus-i' Effect, (74-a)**
Context: John is married to a woman; they have a son together.
#John talked to the mother of his son
SS: $\text{EXH}_{\mathcal{R}}$ [$_{\phi}$ John $\lambda 1$ t_1 talked to [the mother of his$_1$ son]]

a. $\text{EXCL}_{asr}(\phi) \supseteq \{[_{\psi}$ John $\lambda 1$ t_1 talked to [his$_1$ wife]]$\}$ $(\phi \Leftrightarrow_C \psi)$

b. $[\![\text{EXH}_{\mathcal{R}}(\phi)]\!]$
$\Rightarrow \lambda w.$(J. talked to the mother of J.'s son in w)$\wedge\neg$(J. talked to the wife of J. in w)
$\Rightarrow \lambda w.\neg$(the mother of J.'s son is J.'s wife in w)

Result: #The mother of John's son is not John's wife

For completeness, note that the directionality of the oddity effects in (73)-(74) is accounted for on the present approach by the notion of structural alternatives which breaks the symmetry between the (a) and the (b)-sentences on structural grounds. That is, the (b)-sentences are formal alternatives to the (a)-sentences, but the converse is not true for the (a)-sentences are structurally more complex than the (a)-sentences.

As with the 'i-within-i' effects, we expect the 'i-versus-i' effects to be absent when the conditions forcing the derivation of a mismatching implicature are not met. The role of focus in determining the set of structural alternatives is exemplified in (76).

(76) **Structural Alternatives and Focus**
Assume the context in (73) supplemented with: A and B have been hired by certain parents to drive home their children after a party.

a. A's question: WHO_F are we picking up next?
ϕ: #?We are picking up [Peter's son]$_F$
$\text{ALT}(\phi) \supseteq \{[_{\psi}$ We are picking up [John]]$\}$

b. A's question: So, WHOSE_F son are we picking up next?
ϕ: ✓We are picking up [Peter]$_F$'s son
$\text{ALT}(\phi) \not\supseteq \{[_{\psi}$ We are picking up [John]]$\}$

Next, the role of contextual equivalence is exemplified in (77). This context minimally differs from this in (73) in that the naming convention for 'John' is no longer presupposed by the speaker to be shared by the addressee. Although we can surmise that this presupposition could still be accommodated, the (a)-sentence and its (b)-alternative are not contextually equivalent, and therefore no oddity effect arises.

(77) **Contextual Equivalence and Oddity Effects**
Context: A is friend with John and knows his family quite well. A's mum, on the other hand, is only familiar with John's father, Peter.
A's mum: What's your plan for tonight? $\phi \not\Leftrightarrow_C \psi$

a. ϕ: I am going out with [Peter's son].

b. ψ: ??I am going out with [John].

Another way to illustrate the role of contextual equivalence is to embed the descriptions above under a modal like *would*, as in (78). Since we are not formally equipped to handle these cases, my remarks here will be informal.

(78) *Context: It is common ground that John is Peter's son.*

a. ϕ: Sue would do anything for [Peter's son]. $\phi \not\Leftrightarrow_C \psi$

b. ψ: Sue would do anything for [John].
Possible Strengthened Meaning for ϕ:
Sue would do anything for Peter's son
but Sue would not do anything for John
$\approx$ if John were not Peter's son, she wouldn't do anything for him

First of all, note that contextual equivalence does not obtain in (78): even if it is common ground that John is Peter's son, the fact that Sue would do anything for Peter's son does not logically or contextually entail that she would do anything for John. There are possible worlds in which John is not Peter's son and, in these worlds, Sue would not do anything for John. Since there is no contextual equivalence, the computation of the implicature $\neg\psi$ remains optional. For the very same reason, the interpretation resulting from the computation of this implicature is also unproblematic. The result is in fact quite interesting since it says that in all the (counterfactual) worlds in which John is not Peter's son, Sue wouldn't do anything for John. This sounds like a plausible reading for (78-a).

Finally, let me emphasize here again the role of the presuppositions attached to the use of names in establishing contextual equivalence. Consider for these purposes the following example:[16]

(79) **Naming Conventions**
Context: The speaker's mother is known to all to be the individual named 'Pascale'. Yet this naming convention is not shared by the speaker himself who calls his mother 'mom'.

a. ϕ: [My mom]$_i$ baked a cake. $\phi \not\Leftrightarrow_C \psi$

b. ψ: [Pascale]$_i$ baked a cake.

The contextual assumption that the mother of the speaker is the individual named 'Pascale' is not enough for contextual equivalence to obtain. What's missing here (compare for instance with (72)) is the additional presupposition that the naming convention for 'Pascale' is shared by all the interlocutors. This example is interesting with this respect because it provides us with a case in which the relevant naming convention is shared by all the participants but the speaker. In such a case, it seems that the other interlocutors may also be more likely to adopt the perspective of the speaker and refer to individual named 'Pascale' as 'your mother', although they would typically just say 'Pascale' in the absence of the speaker (and not, say, 'Paul's mother'). I surmise at this point that these observations may extend to more expressions used to refer to close relatives, but I should leave these considerations for future works.

[16] I shall thank my mom here for kindly reminding me from time to time that there is no such naming convention between the two of us.

The Case of Indexicals

It was pointed out in Schlenker (2005b,a) and by many others that the use of non-indexical descriptions referring to the speaker or the addressee give rise to oddity effects very similar to those we have investigated in this chapter. The basic observation is that two people talking to each other may not normally refer to themselves in the conversation using proper or common descriptions, as illustrated by the paradigm in (80) from Schlenker (2005b).[17]

(80) **Oddity Effects with Participant-Referring Expressions**
Context: John, who is the syntax professor, is speaking to Mary, who is the semantics professor.

a. (i) #John is happy.
(ii) I am happy.
b. (i) #John's mother is happy.
(ii) My mother is happy.
c. (i) #Mary is happy.
(ii) You are happy.
d. (i) #Mary's mother is happy.
(ii) Your mother is happy.
e. (i) #The semantics professor is happy.
(ii) #The syntax professor is happy.
(data from Schlenker, 2005b, (16))

Intuitively, upon hearing a sentence like *John is happy*, we understand that John is neither the speaker nor the addressee of this utterance. If it were the case, then we would have expected the speaker to say *I am happy* or *You are happy*, that is to use an indexical expression. Hence, all the (i)-sentences above sound odd in a context where John is known to be the speaker and Mary the addressee. As mentioned in Schlenker (2005b), these observations do not just hold of individual-denoting terms, but also of time expressions and locatives, (81). For instance, indexical reference to the time of utterance is acceptable, but non-indexical reference sounds odd. The same pattern of judgments replicate with locatives. The sentence *It is raining in Paris* is an odd thing to say if the interlocutors are in Paris (it becomes good if one is speaking to someone who doesn't know where the speaker is located).

(81) *Context: uttered at 6:50 in Paris*

a. (i) #Peter is at home at 6:50.
(ii) Peter is at home now.
b. (i) #It is raining in Paris.
(ii) It is raining here.

I argue that the contrasts in (80)-(81) are to be accounted for along the same lines as these previously studied in this chapter. Since the contextual equivalence between the (i) and (ii)-sentences above shall be obvious, the core of my argumentation will

[17]This is also true if one is holding a conversation with himself or with his Socratic daemon.

focus here on establishing that the (ii)-sentences are indeed excludable structural alternatives to the (i)-sentences. The first step towards this end is to start by making explicit our assumptions about the interpretation of indexical expressions. As it is common, I will make use for these purposes of the notion of utterance context (or 'context of use' in Stalnaker's sense).[18]

Following Kaplan, Stalnaker and others, let us take an utterance context to be a quintuple $\langle \mathrm{w}, \mathrm{t}, \mathrm{x}, \mathrm{y}, \mathrm{z} \rangle$ in which x makes an utterance in world w at time t in location z addressed to y. Hence defined, an utterance context can be thought of as a point of reference specifying the information needed for interpreting indexical expressions: the world in which the utterance takes place, the time at which it occurs, the individual who makes it, the individual(s) it is addressed to, and the place at which it occurs. When 'c' stands for such a quintuple, we will write 'w_c', 't_c', 's_c', 'a_c' and 'l_c' to refer to its 1st, 2nd, 3rd, 4th and 5th coordinates. Following these clarifications, we can characterize the semantic content of indexical expressions like 1st and 2nd person pronouns by appealing to the relevant coordinates of the utterance context:

(82) *Indexical Semantics for 1st and 2nd Person Pronouns*

a. 1st Person Pronoun (i.e., 'I', 'me')
$[\![\{\text{1st, sg}\}]\!]^{c,w,g} = s_c$

b. 2nd Person Pronoun (i.e., 'you', 'your')
$[\![\{\text{2nd, sg}\}]\!]^{c,w,g} = a_c$

On this theoretical perspective, the meaning of a sentence is now a function from utterance contexts to intensions. Intensions are defined the same way as before, i.e. they are functions from possible worlds to truth-value. A concrete illustration of this set-up is offered in (83). First, the semantics of the language assigns to the sentence in (83) a meaning, (83-a). This meaning is then applied to an utterance context c_1 to yield an intension, (83-b). Finally, this intension is applied to a world of evaluation $w_@$ to yield the truth-conditions of (83), (83-c).

(83) I disagree with you.
SS: $[_{\phi \mathrm{P}}$ {1st, sg}] disagree with $[_{\phi \mathrm{P}}$ {2nd, sg}]
$c_1 = \langle \mathrm{w}_@, 01/06/2017/1\text{pm}, \text{john}, \text{mary}, \text{boston} \rangle$

a. $[\![(83)]\!] = \lambda c.\lambda w.\ \mathrm{s}_c$ disagrees with a_c in w (meaning)

b. $[\![(83)]\!]^{c_1} = \lambda w.$ john disagrees with mary in w (intension)

c. $[\![(83)]\!]^{c_1, w_@} = 1$ iff john disagrees with mary in $w_@$ (extension)

[18] We will now have two notions of context, i.e. the context set and the utterance context. Despite some terminological similarity, it is important to have in mind that these two notions model different kinds of information. On the one hand, the context set (notated with capital C) is the set of possible candidates for the actual world, i.e. those possible worlds that an utterance might be true in for all the discourse participants assume (believe or pretend to believe) for the purposes of the conversation. On the other hand, what we might call the 'objective' context of utterance contains all the informations pertaining to the particular situation in which an utterance occurs (e.g., identity of the discourse participants, place and time of utterance) and which might be unknown to the discourse participants themselves. In an attempt to reduce any equivocation between these two uses of context, I will use lower case c to stand for the utterance context construed in this way as a point of reference.

With this in mind, let us go back to the contrasts in (80) and compare the structures and meanings of sentences like *John is happy*, *I am happy* and *You are happy*:

(84) John is happy.

a. $[_{\phi P}$ {3rd, sg, masc} $[_{DP}$ [+*def*] John]] $is_{\{3rd,\ sg\}}$ happy

b. $[\![(84)]\!] = \lambda c.\lambda w.$ the person named 'John' is happy in w

(85) I am happy

a. $[_{\phi P}$ {1st, sg}] $am_{\{1st,\ sg\}}$ happy

b. $[\![(85)]\!] = \lambda c.\lambda w.$ s_c is happy in w

(86) You are happy

a. $[_{\phi P}$ {2nd, sg}] $are_{\{2nd,\ sg\}}$ happy

b. $[\![(86)]\!] = \lambda c.\lambda w.$ a_c is happy in w

First, note that (85) and (86) are structurally simpler formal alternatives to (84). These alternatives are derivable from (84) by deleting in the subject DP everything but the ϕ-features relevant to form a 1st or 2nd person pronoun (i.e., person and number), and then by substituting every mismatching occurrence of the 3rd person feature with an occurrence of the appropriate person feature (i.e., 1st/2nd person). Second, $[\![(85)]\!]$ and $[\![(86)]\!]$ are both logically non-weaker than $[\![(84)]\!]$. Suppose for instance a possible utterance context c in which s_c = *peter* and a_c = *luke*, and a possible world w such that *the person named 'John' is happy* is true in w, but *peter is happy* and *luke is happy* are false in w. Then, $[\![(84)]\!]^{c,w}$ is true but both $[\![(85)]\!]^{c,w}$ and $[\![(86)]\!]^{c,w}$ are false. Hence, (85) and (86) are excludable alternatives to (84).[19] The first consequence that follows from these observations is that, upon exhaustification of the meaning of (84), both alternatives can be excluded consistently, giving rise to the non-identity entailments that the individual named 'John' is neither the speaker, nor the addressee of the utterance context, as shown in (87).

(87) **Implicatures with Indexicals: Non-identity Entailments**
John is happy
SS: $\text{EXH}_{\mathcal{R}}$ $[_{\phi}$ $[_{\phi P}$ {3rd, sg, masc} $[_{DP}$ [+*def*] John]] $is_{\{3rd,\ sg\}}$ happy]

[19] For completeness, I notice that this fact is independent of whether we treat proper descriptions as rigid or as non-rigid expressions. To illustrate, suppose for instance an utterance context c such that s_c = *john*. On the present analysis, proper descriptions are treated as world-dependent expressions: $[\![[\sout{\text{the}}\ \text{John}]]\!]^{c,w}$ presupposes that there is a unique individual named by the interlocutors in c as 'John' and denotes the individual in w named by the interlocutors in c as 'John'. As a result, $[\![(84)]\!] \not\Rightarrow [\![(85)]\!]$ (meaning) and $[\![(84)]\!]^c \not\Rightarrow [\![(85)]\!]^c$ (intension). Suppose now that we treat proper descriptions as rigid expressions as in (i). Then, (84) and (85) express the same proposition in c, i.e. $\lambda w.$ john is happy in w, but it is still the case that $[\![(84)]\!] \not\Rightarrow [\![(85)]\!]$ because there are possible utterance contexts c' in which the individual *john* is not the speaker in c'.

(i) World-Independent Definite Descriptions: $[\![(84)]\!] \not\Rightarrow [\![(85)]\!]$

a. $[\![(84)]\!] = \lambda c.\lambda w.$ john is happy in w

b. $[\![(85)]\!] = \lambda c.\lambda w.$ s_c is happy in w

a. $\text{EXCL}(\phi)=\left\{ \begin{array}{l} [_{\psi}\ [_{\phi\text{P}}\ \{\text{1st, sg}\}]\ \text{am}_{\{\text{1st, sg}\}}\ \text{happy}], \\ [_{\chi}\ [_{\phi\text{P}}\ \{\text{2nd, sg}\}]\ \text{are}_{\{\text{2nd, sg}\}}\ \text{happy}] \end{array} \right\}$

b. $[\![\text{EXH}_{\mathcal{R}}(\phi)]\!]$
$\Rightarrow \lambda c.\ \lambda w.$('John' is happy in w)$\wedge\neg$(s_c is happy in w)$\wedge\neg$(a_c is happy in w)
$\Rightarrow \lambda c.\ \lambda w.$('John' is neither s_c nor a_c in w)

The second consequence is that, whenever a description like *John/Mary* or *the professor of syntax/semantics* etc. is presupposed to be co-referential with the speaker or the addressee of the utterance context, the computation of these implicatures will now result in contextual contradictions, (88)-(89), hence the oddity effects in (80).

(88) *Context: It is common ground that the speaker, i.e. john, is named 'John'.*
a. #[John]$_i$ is happy.
b. [I]$_i$ am happy.
Entailment: #'John' is not the speaker

(89) *Context: It is common ground that the addressee, i.e. mary, is named 'Mary'.*
a. #[Mary]$_i$ is happy.
b. [You]$_i$ are happy.
Entailment: #'Mary' is not the addressee

This line of analysis extends at no additional cost to time and locative indexicals. Intuitively, unless the speaker has no idea what day of the week it happens to be or where she/he happens to be, the (a)-sentences in (90)-(91) should sound odd because of the mismatching implicatures they give rise to. The derivation of these implicatures proceed as in a way similar as above by appealing to the time (t_c) and location (l_c) coordinates of the utterance context.

(90) *Context: the utterance occurs on Monday in the morning*
a. #John will stop by [on Monday]$_i$ in the afternoon.
b. John will stop by [today]$_i$ in the afternoon.
Entailment: #the utterance does not occurs on Monday

(91) *Context: the utterance takes place at 15 Virginia Street*
a. #John will be heading [to 15 Virginia street]$_i$ after the colloquium.
b. John will be heading [here]$_i$ after the colloquium.
Entailment: #the utterance does not take place in the vicinity of 15 Virginia street

Finally, as in the case of non-indexical expressions, we expect these oddity effects to disappear when contextual equivalence can be avoided. In support of this expectation, I provide the examples in (92)-(94). In each of these examples, certain informations pertaining to the utterance context of the target sentences (e.g., identity of the speaker, location of the speaker) are not common ground. In these contexts, the use of indexicals sounds quite infelicitous while the use of their non-indexical counterparts becomes unproblematic.

(92) *Context: John is calling his doctor out of working hours. He decides to leave a message on his voice mailbox.*

a. ??Hello Dr Jones. It's me calling. $(a) \not\Rightarrow_C (b)$

b. Hello Dr Jones. It's John calling.
$\not\Rightarrow$ 'John' is not the speaker

(93) *Context: Mary is looking for John. She decides to call him to know where he is and where they should meet. John is speaking on the phone:*

a. ??I am waiting for you here. $(a) \not\Rightarrow_C (b)$

b. I am waiting for you at 15 Virginia street.
$\not\Rightarrow$ the utterance does not take place in the vicinity of 15 Virginia Street

(94) *Context: A group of friends is traveling in the US. They agreed that they would share common expenses. To keep track of the expenses, each of them indicates on a whiteboard who bought what, when and where. John writes:*

a. ??I bought a can of baked beans today, here. $(a) \not\Rightarrow_C (b)$

b. John bought a can of beans on July 18, in Somerville, MA.
$\not\Rightarrow$ 'John' is not the speaker
$\not\Rightarrow$ the utterance does not occur on July 18
$\not\Rightarrow$ the utterance does not take place in the vicinity of Somerville, MA

To summarize, sentences involving non-indexical expressions which are presupposed to refer to the interlocutors or to the time/place of utterance naturally compete with sentences involving the indexical-counterparts of these expressions. As we have seen, these alternative sentences are excludable and structurally simpler alternatives to the sentences they compete with. Whenever contextual equivalence obtains, these sentences are predicted on the present analysis to give rise to mismatching implicatures.

Sentence-Internal Crossing-reference

To conclude this section, I would like to get back to the oddity effects generated by sentence-internal crossing-reference:[20]

(95) *Context: It is common ground that John is Mary's assistant.*

a. #[[John]$_i$'s boss] gave [Mary's assistant]$_i$ a raise.

b. [[John]$_i$'s boss] gave [John]$_i$ a raise.
Mismatching Implicature: #John's boss didn't give John a raise

(96) *Context: It is common ground that John is the President.*

a. #[[The President]$_i$'s wife] told [John]$_i$ to clam down.

b. [[John$_i$'s wife] told [John]$_i$ to clam down.
Mismatching Implicature: #John's wife didn't tell John to calm down

[20]These effects were originally uncovered in the literature on referential circularity and discussed for sentences involving multiple pronouns. In Section 5.2.2, I have shown that these effects are in fact orthogonal to the use of pronominal forms and replicate with genuine definite descriptions. I refer to Section 5.2 for a presentation of the core data and a discussion of the empirical problems encountered by the Referential Circularity view.

(97) *Context: It is common ground that John is Peter's son.*

a. #[John]$_i$'s uncle] asked [Peter's son]$_i$ to leave.

b. [John]$_i$'s uncle] asked [John]$_i$ to leave.

Mismatching Implicature: #John's uncle didn't ask John to leave

To the best of my knowledge, there exists no account in the literature of the oddness of the (a)-sentences, which are beyond the descriptive scope of the 'i-within-i' Condition (i.e. neither description contains the other) and beyond the explanatory scope of the Referential Circularity view (i.e., neither descriptions involve anaphoric expressions). On our approach, on the other hand, the oddness of these sentences is to be treated on a par with that of the 'i-within-i' sentences: just like the 'i-within-i' sentences, these sentences involve two distinct descriptions which are presupposed to be co-referential. Consistent with our generalization, each of the (a)-sentences has an excludable formal alternative, namely the corresponding (b)-sentence, which it is contextually equivalent to, and thus each of them can be shown to give rise to an implicature that contradicts common knowledge. The derivation of these implicatures is similar in essence to that of the mismatching implicatures associated with the 'i-within-i' sentences (see for instance (61)). This line of explanation further extends to the disjointness and oddity effects associated with minimally different cases involving pronoun binding:

(98) *Context: Mary is the biggest fan of her favorite singer.*

a. #[[Mary]$_i$'s favorite singer] snubbed [his biggest fan]$_i$

b. [[Mary]$_i$'s favorite singer] snubbed [Mary]$_i$

Mismatching Implicature: #Mary's favorite singer didn't snub Mary

(99) *Context: John's ex-girlfriend bumped into John at the supermarket.*

a. #[[John]$_i$'s ex-girlfriend] bumped into [her ex-boyfriend]$_i$

b. [[John]$_i$'s ex-girlfriend] bumped into [John]$_i$

Mismatching Implicature: #John's ex-girlfriend didn't bump into John

(100) *Context: John and Mary just met their idol*

a. #[[John and Mary]$_i$'s idol] insulted [the two people that she met]$_i$

b. [[John and Mary]$_i$'s idol] insulted [John and Mary]$_i$

Mismatching Implicature: #J. and M.'s idol didn't insult J. and M.

If we assume that the pronouns in (98)-(100) are bound, e.g. if we assume something along the lines of Rule I (Grodzinsky and Reinhart, 1993), then the (a)-sentences are better described in terms of presupposed co-valuation (see Heim, 1998, 2007). Suppose for instance that the pronoun *his* in (98) is bound by the subject DP *Mary's favorite singer*. Then, what we have in this case is that the semantic value assigned to *his* by the assignment function is such that *his biggest fan* has the same denotation as *Mary*. This is illustrated informally below.

(98-a) [Mary's favorite singer] $\lambda 1$ t_1 snubbed [his$_1$ biggest fan]

$\Leftrightarrow$ Mary's favorite singer [λx. x snubbed [x's biggest fan]]

$\Leftrightarrow$ [Mary]$_i$'s favorite singer snubbed [Mary's favorite singer's biggest fan]$_i$

Putting aside these technical considerations, the judgments for these sentences are the same as above. Upon hearing a sentence like (98), we spontaneously understand that Mary is not the biggest fan of her favorite singer and, whenever it is assumed that Mary in fact is, (98) sounds odd. These facts are immediately accounted for on the present analysis which captures these cases of co-valuation in terms of contextual equivalence and predicts the strengthened meaning of each of the (a)-sentences in (98)-(100) to entail the negation of their contextually equivalent (b)-alternative. As a follow-up to these observations, let me point out another empirical argument in favor of this analysis. Consider the following sentence which is based on (98):

(101) Every singer that Mary likes snubbed his biggest fan.
SS: $[_{\phi}$ [every singer that Mary likes] $\lambda 1$ t_1 snubbed [his_1 biggest fan]]
Meaning: every singer x s.t. M. likes x snubbed x's biggest fan

In this sentence, the pronoun *his* is bound by the universal DP *every singer that Mary likes*. On this construal, (101) is true just in case, for every singer that Mary likes, this singer snubbed his biggest fan. Consider now the interpretation resulting from the exhaustification of the meaning of this sentence:[21]

(102) $\text{EXH}_{\mathcal{R}}$ $[_{\phi}$ [every singer that Mary likes] $\lambda 1$ t_1 snubbed [his_1 biggest fan]]
$\text{EXCL}_{asr}(\phi) \supseteq \{[_{\psi}$ [every singer that Mary likes] $\lambda 1$ t_1 snubbed [Mary]]$\}$
Strengthened Meaning:
$\text{EXH}_{\mathcal{R}}(\phi) \Rightarrow \phi \wedge \neg$(every singer x such that Mary likes x snubbed Mary)
$\Rightarrow$ Mary is not the biggest fan of every singer she likes
$\not\Rightarrow$ Mary is not the biggest fan of a singer she likes

On our analysis, the strengthened meaning of (101) entails that not every singer that Mary likes snubbed Mary. If this result is on the right track, then the strengthened meaning of (101) should be incompatible with a situation in which Mary is the biggest fan of every singer she likes (i.e., if every singer that Mary likes snubbed his biggest fan but not all them snubbed Mary, then Mary cannot be the biggest fan of every singer she likes). However, the strengthened meaning of (101) should be compatible with a situation in which Mary is the biggest fan of at least one of the singers she likes (i.e., it is possible that Mary be the biggest fan of a singer, that this singer snubbed her but that another singer that she likes didn't). The contrast in (103) shows that this prediction is empirically borne out.

(103) a. Mary is the biggest fan of every singer she likes. Unfortunately for her, last time she went to a music festival, ...
#every singer that she likes snubbed his biggest fan (namely Mary).
b. Mary is the biggest fan of one of the singers she likes. Unfortunately for her, last time she went to a music festival, ...
✓every singer that she likes snubbed his biggest fan (including Mary).

[21]For simplicity, I only focus here on the alternative that is relevant to our purposes, i.e. *every singer that Mary likes snubbed Mary*. Of course, (101) has further excludable formal alternatives such as *every singer snubbed his biggest fan* or *Every singer that Mary likes snubbed his fan*.

The distribution of the 'i-versus-i' sentences also depends upon contextual considerations and focus-marking. The role of contextual equivalence is exemplified in (104) and (105): embedding *the President* or *his biggest fan* under a modal like *would* breaks contextual equivalence, and oddity effects disappear. The implicatures delivered by meaning strengthening in these environments are compatible with common knowledge, e.g. Mary's favorite singer would never dare snub his biggest fan but he would dare snub Mary, if only Mary were not his biggest fan.

(104) John is the President and...

a. #John's wife told the President to calm down
$\Leftrightarrow_C$ John's wife told John to calm down

b. ✓John's wife would do anything for the President
$\not\Leftrightarrow_C$ John's wife would do anything for John

(105) Mary is the biggest fan of her favorite singer and ...

a. #Mary's favorite singer snubbed his biggest fan.
$\Leftrightarrow_C$ Mary's favorite singer snobbed Mary

b. ✓Mary's favorite singer would never dare snub his biggest fan.
$\not\Leftrightarrow_C$ Mary's favorite would never dare snub Mary

To illustrate the role of focus-marking, I will consider here cases of presupposed covaluation involving pronoun binding. To explain the bulk of the idea, consider first the following minimal pair:

(106) a. ??[John's ex-girlfriend]$_i$ bumped into [her ex-boyfriend]$_i$

b. [John's ex-girlfriend]$_i$ bumped into [John]$_i$

In run-of-the-mill contexts, the (i)-sentence should be perceived as slightly odd in comparison to its (ii)-alternative. I propose that it is so because, in evaluating such minimal pairs, we tend to come up with an implicit question under discussion that makes the two target descriptions focus-marked, e.g. *What happened?* (broad focus) or *Who bumped into whom?* (narrow focus on both subject and object). It is possible however to break this symmetry by explicitly formulating a question such as *Who bumped into her ex-boyfriend?*, where only the subject bears focus. We now expect answers of the form 'α bumped into her ex-boyfriend', where only α is focus-marked. If simplification is only possible in focus-marked constituents, then the (ii)-alternative above should no longer be a structural alternative to the (i)-sentence and thus the (i)-sentence should now be fine. The contrast in (107) supports this analysis.

(107) **Assessing the Role of Focus**

a. WHO$_F$ bumped into WHOM$_F$?
ϕ: #[JOHN'S EX-GIRLFRIEND]$_F$ bumped into [HER EX-BOYFRIEND]$_F$
ALT(ϕ) $\supseteq$ {[$_\psi$ [JOHN'S EX-GIRLFRIEND]$_F$ bumped into [JOHN]$_F$}

b. WHO$_F$ bumped into her ex-boyfriend?
ϕ: ✓[JOHN'S EX-GIRLFRIEND]$_F$ bumped into her ex-boyfriend
ALT(ϕ) $\not\supseteq$ {[$_\psi$ [JOHN'S EX-GIRLFRIEND]$_F$ bumped into [John]}

I surmise that the main observations that I have made in this section about sentence-internal crossing-reference also hold at the discourse level. Typically, the kind of contrasts observed in (95)-(97) replicate across-sentences, (108), in a way predicted by the present analysis. In (108), the only obvious way for the (b)-sentence to not qualify as a structural alternative would be to assume a question like 'WHOSE_F son looks like a zombie?'. This question however does not relate to the rest of the discourse in a coherent fashion. It is possible on the other hand to formulate such a discourse-coherent question in (109), i.e. WHOSE_F *son looks like his father?*, and we see that the contrast then fades away. I will leave these suggestive results for future study.

(108) [John]$_i$ stopped by the house today ...
#WHOSE_F son/$^{\checkmark}\text{WHO}_F$ looks like a zombie?
a. #[Peter's son]$_i$ really looks like a zombie these days.
b. [John]$_i$ really looks like a zombie these days.

(109) [John]$_i$ stopped by the house today ...
$^{\checkmark}\text{WHOSE}_F$ son/$^{\checkmark}\text{WHO}_F$ looks like his father?
a. [Peter's son]$_i$ really looks like his father.
b. [John]$_i$ really looks like his father.

To summarize, we have seen that the 'i-versus-i' and the 'i-within-i' sentences should be considered as two sides of the same coin. I have argued that these sentences sound odd because the use of two distinct descriptions presupposed to be co-referential (or co-valued) results upon exhaustification in the inference that the denotation of these two descriptions should also be distinct, thus leading to a contextual contradiction.[22]

[22]For completeness, I mention here that the empirical unification offered by the implicature-based approach to descriptions substantially differs from the one previously suggested in the literature on referential circularity. Typically, sentences of (i-a), akin to the classical Bach-Peters sentence in (i-b), have often been treated on a par with the 'i-versus-i' sentences we have just analyzed.

(i) a. *Every body who said [that Fred proved it$_i$]$_j$ agrees [that Mike denied it$_j$]$_i$
b. [The student who deserves it$_i$]$_j$ will get [the reward he$_j$ works for]$_i$

On our view, the deviance of (i-a) is not to be accounted for in terms of a mismatching implicature but in terms of the interpretability condition on free pronouns that we formulated in (31). Consistent with the indexing in (i-a), the underlying structure of (i-a) should be as in (ii) where the two occurrences of *it* have been replaced with the clausal antecedents they are each assumed to stand for. By (31), the antecedence relations represented in (ii) are ill-formed because a free pronoun cannot have as an antecedent a syntactic phrase it is a subpart of.

(ii) *Every boy who said [that F. proved [M. denied it$_j$]]$_j$ agrees [M. denied [that F. proved it$_i$]]$_i$

By contrast, note that the underlying structure of (i-b) represented in (iii) (omitting irrelevant detail) flies under the radar of (31) since both pronouns can be bound.

(iii) $^{\checkmark}$The s. [PRO$_1$ who t$_1$ deserves [the r. he$_1$ works for]] $\lambda 2$ t$_2$ will get [the r. he$_2$ works for]
$\approx$ the student x s.t. x deserves the r. that x works for will get the r. that x works for

5.4 Synthesis

I have started this chapter by challenging the common idea that the source of the disjoint reference 'i-within-i' effects lies in a problem of referential circularity. I have shown in substance that this hypothesis falls short of an explanation when it comes to 'i-within-i' environments involving non-anaphoric descriptions and consequently fails to even up the descriptive power of the stipulative 'i-within-i' Condition it was intended to derive and replace. In an attempt to tease apart possible compositional issues related to circular readings from the 'i-within-i' puzzle *per se*, I have proposed to recast the ban against circularity in terms of an interpretability condition on free pronouns, (31). I have provided some independent evidence in favor of this condition and discussed how it relates to existing views on the underlying structure of (free or donkey) pronouns.

(31) **Interpretability Condition on Free Pronouns**
Let ϕ be any parse tree and π be any pronoun occurring freely in ϕ, i.e. π is not bound in ϕ. A subpart α of ϕ qualifies as an antecedent for π only if π is not a subpart of α.

As an alternative account, I have put forward the idea that the source of the 'i-within-i' effects lies in the mandatory computation of a mismatching implicature. A sentence like *The wife of Mary's childhood sweetheart left* delivers upon exhaustification of its meaning the implicature that *Mary didn't leave* and subsequently the non-identity entailment that Mary is not the wife of her childhood sweetheart. In the spirit of Magri (2009, 2011, 2014), I have argued that the computation of this implicature is mandatory in cases where the alternative it associates with cannot be pruned from the domain of the relevant exhaustivity operator, i.e. in contexts where this alternative is contextually equivalent to the prejacent of the exhaustivity operator. In such cases, the strengthened meaning of these sentences always results in a representation that conflicts with common knowledge, hence their oddness.

Through several study cases, I have provided empirical evidence that the logic underlying the generation of these interpretative effects is not peculiar to the restricted area of the 'i-within-i' environment but applies in full generality throughout the language, consistent with the scope of our proposal. Crucially, I have underlined at different places the role played by the notion of focus-marking and contextual equivalence in predicting (and mostly tempering) the distribution of these effects. I have proposed that the constellation of odd descriptions investigated in this chapter be subsumed under the generalization in (20) which embodies the main features of the implicature-based approach to descriptions that I have advocated for.

(20) **Odd Descriptions**
Let δ be any description and $\phi(\delta)$ be any sentence. An utterance of $\phi(\delta)$ is odd at a context C if there is a sentence $\phi(\delta')$ s.t. $\phi(\delta')$ is an excludable formal alternative to $\phi(\delta)$, and $\phi(\delta')$ is contextually equivalent to $\phi(\delta)$ in C.

Appendix A

Mandatory (Embedded) Implicatures

A.0.1 Mandatory Implicatures and Context Mismatch

It is argued in Chapter 2 that, once the grammatical approach to implicatures is equipped with a suitable theory of presupposition projection, it can account for the generation and behavior of anti-presuppositions, which can be then conceived as presuppositional implicatures. My goal in this Appendix is to explain in further detail how the kind of effects illustrated in (1)-(5) can be accounted for on such a theory.

(1) $C \subseteq$ *there is only one sun*
   a. #A sun is shining.
   b. The sun is shining.

(2) $C \subseteq$ *there is only one sun*
   a. #The suns are shining.
   b. The sun is shining.

(3) $C \subseteq$ *John has exactly one father*
   a. #John's father that is brown-haired arrived yesterday.
   b. John's father arrived yesterday.

(4) $C \subseteq$ *John has exactly two parents*
   a. #John talked to all his parents.
   b. John talked to both his parents.

(5) $C \subseteq$ *2+2 equals 4 and John just proved it*
   a. #John believes that 2+2 equals 4.
   b. John knows that 2+2 equals 4.

To account for these effects, I propose to elaborate on Magri's proposal that the (a)-sentences above are odd because the context in which they are uttered makes the computation of their implicatures mandatory, which ultimately results in a representation that conflicts with common knowledge. Specifically, Magri proposes to locate the source of these mandatory implicatures in the contextual equivalence of the alternatives. This result is achieved is by means of the following two axioms:

(6) **Magri's Axioms**

a. The prejacent of the exhaustivity operator is relevant.

b. If two propositions are contextually equivalent, then they pattern alike w.r.t. relevance, namely they are both relevant or else both irrelevant.

from Magri (2010, p.38), Magri (2011, (89))

Magri suggests that Axiom (6-a) might be directly related to Grice (1975)'s 'Maxim of Relevance': by virtue of being dominated by a sentence that has been asserted, the prejacent ϕ can be assumed to be relevant. Axiom (6-b), on the other hand, follows from the assumption that relevance is a contextual notion and thus is closed with respect to contextual equivalence: if two sentences ϕ and ψ are contextually equivalent, then either both are relevant or else both are irrelevant. Recall now that, in order for a scalar alternative ψ to be considered in implicature reasoning, ψ must be relevant. By the Axioms in (6), we have it that, whenever an excludable alternative ψ is contextually equivalent to the prejacent of the exhaustivity operator, ψ will be relevant and therefore ψ will necessarily be included in implicature reasoning. In such cases, the computation of the implicature associated with ψ is thus mandatory. To illustrate, consider the following examples involving asserted implicatures:

(7) $C \subseteq$ *the professor gave the same grade to every student*
#The professor gave an A to some students.

a. $\text{EXH}_{\mathcal{R}}$ [$_{\phi}$ the professor gave an A to some students]

b. $\text{EXCL}_{asr}(\phi) \supseteq \{[_{\psi}$ the professor gave an A to ALL students$]\}$

c. $\text{EXH}_{\mathcal{R}}(\phi) \Rightarrow$ #the professor didn't give an A to all students

(8) $C \subseteq$ *John has three children of the same gender*
#John has two sons.

a. $\text{EXH}_{\mathcal{R}}$ [$_{\phi}$ John has two sons]

b. $\text{EXCL}_{asr}(\phi) \supseteq \{[_{\psi}$ John has THREE sons$]\}$

c. $\text{EXH}_{\mathcal{R}}(\phi) \Rightarrow$ #John doesn't have THREE sons

(9) $C \subseteq$ *John Mary and Sue talked all together*
#John just told Mary or Sue that he was leaving.

a. $\text{EXH}_{\mathcal{R}}$ [$_{\phi}$ John just told Mary or Sue that he was leaving]

b. $\text{EXCL}_{asr}(\phi) \supseteq \{[_{\psi}$ John just told Mary AND Sue that he was leaving$]\}$

c. $\text{EXH}_{\mathcal{R}}(\phi) \Rightarrow$ #John didn't tell Mary AND Sue that he was leaving

Magri's proposal accounts for the oddness of these sentences. By Axiom (6-a), each of the ϕ-sentences are relevant. Since each of the ϕ-sentences is contextually equivalent to its ψ-alternative, it follows from Axiom (6-b) that their ψ-alternatives are also relevant. Since the ψ-alternatives are relevant, they cannot be pruned from the domain of quantification of $\text{EXH}_{\mathcal{R}}$ and therefore the implicatures associated with these alternatives are computed. In each case, the representation delivered by the computation of the relevant implicature blatantly contradicts our contextual assumptions, hence their pragmatic infelicity. I believe that it is important with this respect to emphasize that, although the oddity effects in (7)-(9) depends upon the generation

of a mismatching implicature, these effects are not peculiar to implicatures. As far as I can tell, the sentences in (7)-(9) are perceived as odd the same way contextually contradictory statements are generally perceived as odd, as exemplified in (10).[1]

(10) a. The professor gave the same grade to every student. For the record, I think that #he gave an A to some but not all students.
b. John has three children of the same gender: #two sons and one daughter.
c. I don't know whether it is raining, but #John knows that it is raining.
d. Only John came in and #so did Mary.

For completeness, it is worth emphasizing that Magri's proposal still leaves room for implicature 'suspension'. Typically, in a context where the speaker would be known to be ignorant as to whether a professor gave the same grade to some or all his students, an utterance of *The professor gave an A to some students* is expected to be felicitous for, in the absence of contextual equivalence, its *all*-alternative can be pruned from the set of alternatives to avoid a contradiction in context (i.e., that the speaker believes that the professor didn't give the same grade to all his students).

Magri has explicitly suggested that this line of explanation, although mostly discussed for asserted implicatures, can extend to anti-presuppositions (see in particular Magri, 2009, 2.4, p. 61-67). Yet Magri has left open certain technical questions regarding the exact procedure whereby speakers evaluates, based on Axiom (6-b), whether an excludable alternative can or cannot be pruned from the set of alternatives. The first question is simply a clarification question regarding the general definition of contextual equivalence appealed to in the formulation of (6-b). One straightforward way to spell-out what has got to be the case on Magri's proposal is to follow the standard view that contextual equivalence is evaluated relative to a context that satisfies the presupposition of whatever sentence is uttered, as proposed in (11).

(11) **Contextually Equivalent Alternatives (Static Version)**
Let ϕ be any utterance and ψ be any excludable alternative to ϕ.
For any context C such that $C \subseteq \delta om([\![\phi]\!])$, ϕ is contextually equivalent to its alternative ψ in C iff $\{w \in C : [\![\phi]\!](w) = 1\} = \{w \in C : [\![\psi]\!](w) = 1\}$.

This formulation acknowledges that there is a natural asymmetry in the treatment of the presuppositions of ϕ and of its alternative ψ: the equivalence between ϕ (uttered) and ψ (not uttered) is evaluated relative to a context C that satisfies ϕ's

[1] These effects can be thought of as resulting from a basic principle of conversation demanding an utterance to update the common ground in an effective way. Intuitively, an utterance of ϕ at a context C meets this requirement only if (a) ϕ does not suffer from presupposition failure in C and (b) ϕ is neither already entailed by C (i.e., $\phi \cap C \neq C$), nor incompatible with what has already been established in C (i.e., $\phi \cap C \neq \emptyset$). One way to rule out the latter cases all at once is to require utterances to be contextually contingent, as proposed in (i).

(i) **Extended Assertability Condition**
An utterance of ϕ is felicitous at a context C only if for (a) every $w \in C$, $[\![\phi]\!](w) \in \{0, 1\}$, and (b) for some $w, w' \in C$, $[\![\phi]\!](w) \neq [\![\phi]\!](w')$.

presupposition, that is the presuppositions of EXH's prejacent. This asymmetry is a direct consequence of the fact that ϕ, unlike its alternative ψ, is uttered and, as such, must obey the same felicity conditions as any utterance (i.e., Stalnaker's assertability condition). Equivalently, (11) could be reformulated by saying that the set of contextually equivalent alternatives to a sentence ϕ at a context C are computed on the assumption that the plain meaning of ϕ does not suffer from presupposition failure in C to begin with. The presuppositions of ϕ's alternatives, on the other hand, do not directly impose any pre-condition on the state of C. This clarification allows us for instance to better understand cases like (3): whenever it is common ground that John has a unique father *and* ϕ's presupposition is satisfied, it follows that ϕ and its ψ-alternative are contextually equivalent. As a result, the computation of the mismatching presuppositional implicature associated with ψ is mandatory.

(3) $C \subseteq$ *John has a unique father and* ϕ*'s presuppositions* $\phi \Leftrightarrow_C \psi$
#John's father that is brown-haired arrived yesterday.
a. $\text{EXH}_{\mathcal{R}}$ [$_\phi$ John's father that is brown-haired arrived yesterday]
b. $\text{EXCL}_{prs}(\phi) \supseteq \{[_\psi$ John's father arrived yesterday]$\}$
c. $\text{EXH}_{\mathcal{R}}(\phi) \Rightarrow$ #John hasn't a unique father

The second question left open by Magri pertains to the assessment of contextual equivalence in the case of embedded presuppositional and asserted implicatures: how is contextual equivalence to be computed at embedded levels? In the following, I explore the idea that the set of contextually equivalent alternatives to a sentence ϕ is computed based on the local context relative to which ϕ is interpreted.

A.0.2 Embedded Implicatures and Contextual Equivalence

Dynamic Effects

We have implicitly assumed so far that the set of contextually relevant alternatives to a sentence ϕ was determined relative to a 'global' context satisfying ϕ's presuppositions. In the following, I investigate the possibility to integrate this static characterization of contextually equivalent alternatives to a dynamic approach to interpretation. To understand why such a move is desirable, consider the following minimal pair:

(12) *Global Context: open regarding the number of papers every student wrote*
a. #Every student has exactly two papers and each of them submitted ALL his papers to a journal.
b. Every student has exactly two papers and each of them submitted BOTH his papers to a journal.

Speakers have a clear intuition that *all* and *both* compete in these examples: the (a)-sentence conveys that every student has only two papers but succeeded in submitting more than two of his papers to a journal, which is obviously contradictory. This example closely resembles those we have examined above. Nonetheless, it presents some interesting difference in that the piece of information that seems to force and

conflict with the relevant anti-duality presupposition does not come from the global context itself but from the asserted content of the first conjunct. Yet our analysis so far does not predict this anti-presupposition to be mandatory. The two major options available to us at this point are shown in (13) and (14).

(13) *C: open regarding the number of papers every student wrote*
EXH$_{\mathcal{R}}$[$_{\phi}$ every S has exactly two Ps and each S submitted all his Ps]
ALT(ϕ)$\supseteq${[$_{\psi}$ every S has exactly two Ps and each S submitted BOTH his Ps]}
a. ψ is contextually equivalent to ϕ in C, hence ψ is relevant; but
b. ψ and ϕ are also logically equivalent, hence ψ is not excludable.

(14) *C: open regarding the number of papers every student wrote*
[every S has exactly two Ps and EXH$_{\mathcal{R}}$[$_{\phi}$ each S. submitted all his Ps]]
ALT(ϕ)$\supseteq${[$_{\psi}$ each S submitted BOTH his Ps]}
a. ψ is logically non-weaker than ϕ, hence ϕ is excludable; yet
b. ψ is not contextually equivalent to ϕ in C.

Option (13) relies on the occurrence of the exhaustivity operator at the root of the conjunction. At this level, the prejacent ϕ is contextually equivalent to its alternative ψ; however, at this level, ψ is also semantically equivalent to ϕ, and thus ψ is not excludable. Hence, this option does not not allow us to derive an implicature. Option (14) is the mirror-image of (12) in that the alternative ψ is now excludable but it is not contextually equivalent to ϕ relative to C. Hence, this option does not account for the mandatoriness of the implicature we are trying to account for.

What I would like so suggest is that option (14) is in fact on the right track and that, at the level where the equivalence between ϕ and its alternative ψ is evaluated, both sentences have in fact the same contextual contribution. Specifically, I propose that the set of contextually equivalent alternatives to a sentence ϕ is computed locally based on the local context relative to which ϕ is interpreted. To formalize this intuition, I will appeal to a dynamic theory of interpretations that makes use of the notion of local contexts (e.g. Karttunen, 1974; Heim, 1983; Van der Sandt, 1992; Schlenker, 2009); specifically, I will follow the Context-Change Potential approach offered in Heim (1983). I believe however that nothing substantial hinges upon this choice and that the main results presented in the following can be achieved by other means, including by defining contextual equivalence within a larger sentence.

As far as the notation is concerned, I will write the Context-Change Potential (CCP) of a sentence ϕ as $[\phi]$ and the result of applying the CCP of ϕ to a context set C as $C[\phi]$. The partial CCP of a simple clause is defined in (15): an update $C[\phi]$ of C with a simple clause ϕ is defined whenever C satisfies ϕ's presupposition and, whenever it is defined, updating C with ϕ outputs the C-worlds in which the assertive content of ϕ is true.[2]

[2]If we were to use the familiar device of notating presuppositions by subscripts as we have done before, we could define the CCP of a simple presuppositional clause ϕ_{π} at a context C as that partial function $C[\phi_{\pi}]$ that is defined if and only if all the worlds in C are π-worlds and, whenever defined, discards all the worlds in C that are not ϕ-worlds.

(15) *Partial CCP for Simple Clauses*
$C[\phi]$ is defined iff $C \subseteq \delta om([\![\phi]\!])$. Whenever defined, $C[\phi] = C \cap [\![\phi]\!]$.

The CCP of a simple sentence like *Mary's son left* applied to a context C is defined whenever C entails that Mary has a unique son; whenever defined, the update of C outputs the set of worlds in C in which Mary's son left is true, thus adding the information that Mary's son left to C. The CPP of its negative counterpart, *Mary's son didn't leave*, goes the other way around, (16): whenever C entails that Mary has a unique son, the update of C proceeds in this case by discarding from C the set of worlds in which Mary's son left is true.

(16) *Partial CCP for Negation*
$C[\neg\phi]$ is defined iff $C \subseteq \delta om([\![\phi]\!])$. Whenever defined, $C[\neg\phi] = C \setminus C[\phi]$.

Let us now turn to the dynamic interpretation of the propositional operator we are presently interested in, namely conjunction. The CCP for conjunction is as follows:

(17) *Partial CCP for Conjunction*
$C[\phi \wedge \psi]$ is defined whenever $C \subseteq \delta om([\![\phi]\!])$ and $C[\phi] \subseteq \delta om([\![\psi]\!])$.
Whenever defined, $C[\phi \wedge \psi] = (C[\phi])[\psi]$.

A crucial part of the dynamic semantics of conjunction is that the local context for the second conjunct ψ, let us call it C', corresponds to the update of the global context C with the first conjunct ϕ, that is $C' = C \cap [\![\phi]\!]$. Note that ϕ's presupposition must be satisfied in C, since C is ϕ's 'local' context, but ϕ's presupposition need only be satisfied in its local context C'. Naturally, ϕ's presuppositions can be satisfied locally simply by virtue of being satisfied globally. The intuition underlying this dynamic approach to conjunction can be exemplified by means of the following examples:

(18) *Context: open as to whether John has a son*
a. John has a (unique) son and John's son is a graduate student.
b. #John's son is a graduate student and John has a son.

(19) *Context: open as to whether it is raining*
a. It is raining and John knows that it is raining.
b. #John knows that its raining and it is raining.

The (a)-sentences sound natural while the (b)-sentences sound oddly redundant. A dynamic treatment of conjunction can account for such an asymmetry. In the (b)-sentences, the second conjunct is interpreted relative to a local context C' that already entails its propositional content, and thus updating C' with this proposition has no effect on C', hence its redundancy. By contrast, in the (a)-sentences, the second conjunct is informative and, since its presuppositions need not be satisfied prior to the computation of its local context, the first conjunct can be construed as informative as well. Note that, in cases where the second conjunct would carry informative presuppositions that are not entailed by the first conjunct, its presuppositions could still be satisfied locally by adjusting instead the global context.

Following these clarifications, we can get back to the contrast in (12). In interpreting the sentence in (12-a), we will now have two contexts to look at in the course of the derivation: the global context C, which is open regarding the number of papers every student wrote, and the local context C' resulting from the update of C with the first conjunct, which will contain the information that every student has exactly two papers. The key observation stated in (20) is that the prejacent ϕ_{all} of the exhaustivity operator embedded in the second conjunct is contextually equivalent to its presuppositional alternative ψ_{both} relative to C'. If we assume that the set of contextually equivalent alternatives is determined locally, that is in C', then the computation of the anti-presupposition associated with ψ_{both} is predicted to be mandatory. Strengthening the meaning of ϕ_{all} by adding the anti-presupposition that not every student has exactly two papers outputs a proposition whose presuppositions are impossible to satisfy in C' since $C' \cap \delta om([\![\text{EXH}_{\mathcal{R}}\ \phi_{all}]\!]) = \emptyset$. As a result, the update of C' with the exhaustified meaning of the second conjunct is undefined in (20), resulting in a presupposition failure that cannot be repaired.

(20) **Equivalence in Local Contexts and Mandatory Implicature**
C: open regarding the number of papers every student wrote
#Every S has exactly two Ps and each S submitted all his Ps
SS: every S has exactly two Ps and $\text{EXH}_{\mathcal{R}}[_{\phi}$ each S. submitted all his Ps]
$C' = C \cap [\![$every S has exactly two Ps$]\!]$
a. $[\![\phi_{all}]\!] = \lambda w$. each S submitted all his Ps in w
b. $[\![\phi_{both}]\!] = \lambda w$. each S has two Ps in w: each S submitted all his Ps in w
FACTS: $\phi_{both} \in \text{EXCL}_{prs}(\phi_{all})$ and $\psi_{both} \Leftrightarrow_{C'} \phi_{all}$

What does this analysis predict in cases where the second conjunct carries some informative presupposition that is not entailed by the first conjunct but does entail the presupposition of an excludable alternative to the first conjunct? To take a concrete example, consider the following telling contrast:

(21) *C: open regarding whether Mary killed someone*
a. #[$_{\phi}$ John believes that Mary is a murderer] and [$_{\psi}$ he knows that she killed the victim with a knife]
b. [$_{\phi}$ John knows that Mary is a murderer] and [$_{\psi}$ he knows that she killed the victim with a knife]

Once again, we have a clear intuition that the (a)-sentence is odd because of some competition between *believe* and *know*, but this time in the first conjunct ϕ. The oddness of this sentence can be shown to follow from the mandatory computation of an anti-presupposition within the first conjunct. As we have seen above, in order for the update of C with a sentence $\phi \wedge \psi$ to be defined, it must be that $C[\phi] \subseteq \delta om([\![\psi]\!])$. In the present case, in order for $C[\phi]$ to entail that Mary killed the victim with a knife, this information must be accommodated at the level of C so that $C \subseteq \delta om([\![\psi]\!])$ and consequently $C[\phi] \subseteq \delta om([\![\psi]\!])$. Upon global accommodation, the computation of the implicature associated with the *know*-alternative to ϕ is expected to be mandatory:

(22) **Global Accommodation and Mandatory Implicature**
C^0*: open regarding whether Mary killed someone*
SS: $\text{EXH}_{\mathcal{R}}[_{\phi}$ J believes that M is a murderer] and $[_{\psi}$ J knows that ...]
$C = C^0 \cap \delta om([\![\psi]\!])$

a. $[\![\phi_{believe}]\!]$=λw. J believes that M is a murder in w
b. $[\![\phi_{know}]\!]$=λw. M is a murderer in w: J believes that M is a murder in w

FACTS: $\phi_{know} \in \text{EXCL}_{prs}(\phi_{believe})$ and $\psi_{know} \Leftrightarrow_C \phi_{know}$

The context C corresponds to the context resulting from the accommodation of ψ's presuppositions in C^0. As such, C contains the information that Mary killed the victim with a knife and therefore entails that Mary is a murderer, that is the presupposition of ϕ_{know}. It follows that the prejacent $\phi_{believe}$ of the exhaustivity operator is contextually equivalent to its presuppositional alternative ϕ_{know} in C. Hence, the computation of the anti-presupposition associated with ϕ_{know} becomes mandatory, resulting in a presupposition failure since $C \cap \delta om([\![\text{EXH}_{\mathcal{R}}\ \phi_{believe}]\!]) = \emptyset$. On this analysis, the oddness of the (a)-sentence is immediately accounted for.

This analysis makes three interesting predictions regarding the distribution of mandatory implicatures in conjunctive sentences. The first prediction is that if any conjunct ϕ has a presupposition π which, together with the other conjunct ψ, entails a presuppositional alternative ψ_{alt} to ψ, then the computation of the anti-presupposition associated with ψ_{alt} should be mandatory and the sentence should be thus perceived as odd. This symmetry property is exemplified in (23)-(24).

(23) a. #John talked both his students and decided to give them all an A.
b. #John talked to all his students and decided to give them both an A.

(24) a. #John talked to Mary's son and he asked her sons to behave.
b. #John talked to Mary's sons and he asked her son to behave.

To explain, consider for instance the two sentences in (23). In each of these sentences, one of the conjuncts, call it ϕ_{both}, has a presupposition π that the other conjunct lacks. In order for the global context C to be in the domain of the CCP of the whole sentence, this presupposition must be met in C. It is so if this presupposition is entailed by C prior to utterance, or else because C has been adjusted to accommodate π. Regardless of whether ϕ_{both} comes first or second, it follows that the other conjunct, call it ψ_{all}, will be contextually equivalent in its local context to its alternative ψ_{both}. Upon exhaustification of the meaning of ψ_{all}, the presuppositional implicature $\neg\pi$ will be obligatorily computed, generating a presupposition failure.

Since this symmetry property is assumed to follow from the projective behavior of presuppositions, the second prediction is that it should not be observed in the case of asserted implicatures. Specifically, in the case of asserted implicatures, the position of a sentence in a conjunct — the point at which it is incremented to the dynamic representation — should impact on the evaluation of its (locally) contextually equivalent alternatives. The paradigm in (25)-(26) provides some support in favor of this prediction. The critical contrast is in (25); the presuppositional sentences in (26) are provided as a direct point of comparison.

(25) *Context: open regarding the number of students John has*

a. #John assigned all of his students the same grade and he gave some of his students an A.

b. John assigned some of his students the same grade and he gave all his students an A.

(26) *Context: open regarding the number of students John has*

a. #John assigned both his students the same grade and he gave all his students an A.

b. #John assigned all of his students the same grade and he gave both his students an A.

The oddness of (25-a) is to be accounted for along the same lines as (12-a): the computation of the implicature associated with the *all*-alternative of the second conjunct is mandatory because contextual equivalence locally obtains, resulting in a contradiction. In contrast to (25-a), my informants found (25-b) acceptable; V. Rouillard suggested to me the contrast in (27), which clearly establishes this point. This contrast teaches us that, although the meaning of the first conjunct might be strengthened on a first reading, it is still possible re-parse this sentence and prune the *all*-alternative from the set of excludable alternatives to the first conjunct in order to avoid the threat of a contradiction. Crucially, it is impossible to do so in (25-a) or in (26).

(27) Every professor but John gave a different grade to each of his students.

a. #John assigned all of his students the same grade and, what's more, he gave some of his students an A.

b. John assigned some of his students the same grade and, what's more, he gave all his students an A.

The last prediction is that the results established in (20) should replicate when conjunctive sentences are embedded under other propositional operators (assuming that these operators also receive a suitable dynamic treatment). The examples in (28) and (29) establish this point using disjunction and *if... then* conditional, respectively.

(28) a. Either John has no laptops,
or he has two laptops and uses them both/#all.

b. Either John has two laptops and uses them both/#all,
or he doesn't have any laptop at all.

(29) a. If John works in computer science,
then he has two laptops and uses them both/#all.

b. If John has two laptops and uses them both/#all,
then he works in computer science.

It is beyond the scope of this discussion to discuss the possible options regarding the dynamic interpretation of *or* and *If... then* (we can simply assume here the Heimian CCPs for disjunction and conditional). For the time being, I will only observe that none of these sentences presuppose that John has exactly two laptops for these sen-

tences presuppose nothing at all. Nonetheless, these sentences can give rise to the exact same oddity effects as before. The presence of these effects is expected on the present analysis. In all these sentences, the presuppositions of the *both*-conjuncts are satisfied locally, i.e. in the local context resulting from the update of the global context with the first conjunct. Since these presuppositions are satisfied locally, it naturally follows that the *all*-conjuncts are locally equivalent to their logically weaker *both*-alternatives. Therefore, the same presuppositional implicatures as before are predicted to be generated, with no possible way to escape oddness.

Let me take stock. We have seen that integrating Magri's proosal into a dynamic approach to interpretation has two advantages. First, it provides a fully-fledged theory of the oddity effects associated with mandatory implicatures. Second, it allows us to match the syntactic distribution of the exhaustivity operator (which can be embedded and operate locally) to the levels of representation at which contextual equivalence can be evaluated. For any given occurrence of $\text{EXH}_{\mathcal{R}}$ in a given representation, the set of contextually equivalent alternatives to its prejacent can be now defined as follows:

(30) **Contextually Equivalent Alternatives (Dynamic Version)**
Let ϕ be any sentence and C be the local context relative to which ϕ is interpreted. Whenever $C \subseteq \delta om([\![\phi]\!])$:
$\text{EQUIVALENT}(\phi, C) = \{\psi \in \text{EXCL}(\phi) : \ C[\phi] = C[\psi]\}$

Contextually equivalent alternatives to a sentence ϕ are those excludable alternatives ψ such that, in the local context C relative to which ϕ is interpreted, updating C with ψ delivers the same output as updating C with ϕ. I take this dynamic characterization of the set of contextually equivalent alternatives to a sentence ϕ to determine the set of alternatives that cannot be pruned from the domain of $\text{EXH}_{\mathcal{R}}$ upon exhaustification of ϕ's meaning, consistent with Magri's original proposal.

More Dynamic Effects: Universals and Indefinites

I have illustrated so far the predictions of this proposal for conjunctive sentences. In the following, I would like to extend this line of investigation a little bit further by considering constructions involving universals and indefinites. What I hope to show is that the present approach is general enough to account for the puzzling distribution of presuppositional and asserted implicatures in these constructions. Our starting point is Percus (2006)'s discovery that universal sentences like (31-a) also exhibit anti-presuppositional effects, even though they carry identical presuppositions and are semantically equivalent to their presuppositional competitors, (31-b).

(31) a. #Everyone with exactly two students assigned the same exercise to all of his students.
b. Everyone with exactly two students assigned the same exercise to both of his students. (from Percus, 2006, (20))

As Percus (2006) observed, the oddness of (31-a) is puzzling since, under standard theories of presupposition projection, (31-a) and (31-b) have the same presuppositions.

Specifically, since the presupposition triggered by *both* in (31-b) projects universally, the presupposition of (31-b) amounts to the tautology that everyone with exactly two students has exactly two students, and therefore (31-b) and (31-a) have the same definedness conditions. In sum, (31-a) and (31-b) are truth-conditionally equivalent. So where does the competition between (31-a) and (31-b) come from?

Singh (2009) offers an interesting solution to Percus (2006)'s puzzle. In substance, Singh suggests that the constraint responsible for the competition between (31-a) and (31-b) does not just apply at the root, but is also active in embedded positions where a presuppositional difference can be detected: the meaning of the constituent in the scope of *every* in (31-a) is presuppositionally weaker than this of its embedded *both*-alternative in (31-b). As Singh observes, a natural way to capture this presuppositional difference at embedded levels is thus to allow the competition between (31-a) and (31-b) to be evaluated locally. To achieve these results, Singh (2009) proposed to '*retain the original character of Maximize Presupposition as a principle that discriminates between LFs based on the definedness conditions they impose on the context of evaluation*', but to take advantage of a theory that employs local contexts to allow *Maximize Presupposition* to be checked locally.

The present approach is in line with Singh (2009)'s proposal: the context that is relevant for evaluating the competition between a (possibly embedded) sentence ϕ and some presuppositional alternative ψ to ϕ is the local context relative to which ϕ is interpreted. I have suggested however that this mode of evaluation extends to all excludable alternatives, presuppositional or assertive, and allows us to determine whether an implicature will be or not obligatorily computed. What I would like to do in the following is to explain how this more general use of local contexts provides a uniform account of the distribution of oddity effects in constructions involving universals and indefinites.

For these purposes, I will assume that the CCP of universal and indefinite sentences are as stated and exemplified in (32-a) and (32-b), respectively. To facilitate the discussion, I will assume for the time being that indefinites are quantifying, and treat indices on quantificational DPs (e.g., *every* α, *some* α) as modifying the assignment function under which the scope constituent of the relevant quantifiers is interpreted. The CCP for clauses interpreted under modified assignments is given in (32-c).[3] These specifications are essentially for ease of exposition and, to the best knowledge, are immaterial to the main results I will report on.

(32) a. **CCP for Universals**
$C[(Every\ \alpha)_i\ \beta] = \{w \in C :$ for every individual a,
if $w \in C[\alpha(a)]$, then $w \in (C[\alpha(a)])[\beta^{[a/i]}]\}$

Example: C[(every student)$_1$ t$_1$ left]=
$\{w \in C :$ for every individual a, if $w \in C \cap (\lambda w.\ a\ is\ student\ in\ w)$,
then $w \in (C \cap (\lambda w.\ a\ is\ student\ in\ w)) \cap (\lambda w.\ a\ left\ in\ w)\}$

[3]It is implicitly assumed that quantificational DPs undergo some movement in the course of the syntactic derivation and that their scope constituent keeps track of the position(s) they moved from, here indicated using traces with identical indices (traces are treated as bound-variables). The way indices are interpreted here mimics the effect of usual λ-binders without predicate abstraction.

b. **CCP for Indefinites**
$C[(A(n)\ \alpha)_i\ \beta] =$
$\{w \in C :$ for some individual a, $w \in (C[\alpha(a)])[\beta^{[a/i]}]\}$

Example: C[(a student)$_1$ t$_1$ left]=
$\{w \in C :$ for some individual a,
$w \in (C \cap (\lambda w.\ a\ \textit{is student in}\ w)) \cap (\lambda w.\ a\ \textit{left}\ w)\}$

c. **CCP for Modified Assignments**
$C[\phi^{[a/i]}]$ is defined iff $C \subseteq \delta om([\![\phi]\!]^{g[i\to a]})$.
Whenever defined, $C[\phi] = C \cap [\![\phi]\!]^{g[i\to a]}$.

With this in mind, let us get back to the Percus-minimal-pair in (31), which we will schematically represent as $((\textit{every}\ \alpha)_i\ \phi_{all})$ and $((\textit{every}\ \alpha)_i\ \phi_{both})$. On the present analysis, the local context in which the scope ϕ_{all} of (31-a) is interpreted corresponds to the set of worlds $w \in C$ such that, for every individual x who has exactly two students in w, x has exactly two students in w. The CCP of ϕ_{all}, namely $[\phi_{all}^{[x/i]}]$ is thus gonna be to add to the local context C the information that, for each individual x who has exactly two students, x assigned the same exercise to each of x' students. The key observation here is that updating C with ϕ_{all} will have the exact same effect on C as updating C with its alternative ϕ_{both} since every x who assigned the same exercise to each of x' students has exactly two students. In other words, we have it that ϕ_{all} and its alternative ϕ_{both} are contextually equivalent in ϕ_{all}'s local context C, that is $C[\phi_{all}^{[x/i]}] = C[\phi_{both}^{[x/i]}]$. Since the embedded position at which ϕ_{all} occurs is a position at which the exhaustivity operator is present and since $\phi_{both} \in \textsc{equivalent}(\phi_{all}, C)$, it follows that in computing the strengthened meaning of ϕ_{all}, i.e. $\textsc{exh}_{\mathcal{R}}(\phi_{all})$, the local presuppositional implicature that 'x does not have exactly two students' will be mandatory, resulting in a presupposition failure (the anti-presupposition can be roughly paraphrased as *every professor who have exactly two students does not have exactly two student*). The crucial step of this reasoning is synthesized in (33).

(33) **Percus-Sentences and Mandatory Implicatures**
#Every professor with exactly two students gave all his students an A
SS: [[every [P with exactly two Ss]$_1$ $\textsc{exh}_{\mathcal{R}}$ [$_{\phi_{all}}$ t$_1$ gave all his$_1$ Ss an A]]
Local Context of ϕ_{all}:
$C \subseteq \lambda w.\ x$ is a professor with exactly two students in w, where $x \in D_e$
a. $[\![\phi_{all}]\!]^{g[1\to x]} = \lambda w.\ x$ has Ss in w: x gave each of x's Ss an A in w
b. $[\![\phi_{both}]\!]^{g[1\to x]} = \lambda w.\ x$ has exactly two Ss in w: x gave each of x's Ss an A in w
Facts: $\phi_{both} \in \textsc{excl}_{prs}(\phi_{all})$ and $\psi_{all} \Leftrightarrow_C \phi_{both}$

On this analysis, the minimal pair in (31) has the same essential features as the minimal pair we started with in (12): they are cases in which two sentences S_1 and S_2 have the same presuppositions at the root, but have some embedded sentence ϕ_1 and ϕ_2 such that $\phi_2 \in \textsc{excl}(\phi_1)$, and ϕ_1 and ϕ_2 have the same CCP in ϕ_1's local context. These cases are precisely those in which we predict the computation of the implicature associated with ϕ_2 to be mandatory, and the cases in which this implicature will necessarily result in a contextual contradiction. We expect therefore the predictions

we have made in the previous section regarding the case of conjunction to be verified in the case of universal sentences and, as we shall see, in the case of indefinite sentences. The first prediction is that, in universal sentences, presuppositional implicatures should be symmetric: if any argument α of *every* (i.e., either the restrictor or the scope) has a presupposition π which, together with the other argument β entails a presuppositional alternative to α, then the computation the anti-presupposition associated with this alternative should be mandatory and the sentence should be thus perceived as odd. The examples in (34) establish this point.

(34) *Presuppositional Implicatures: Symmetry Property with Universals*

a. #Every professor who assigned the same exercise to all his students gave both his students an A.

b. #Every professor who assigned the same exercise to both his students gave all his students an A.

c. #Every man who talked to a son of Mary told her son to clam down.

d. #Every man who talked to Mary's son told a son of Mary to clam down.

e. #Every man who talked to Mary's sons told her son to clam down.

f. #Every man who talked to Mary's son told her sons to clam down.

The explanation for these cases is the same as the one we gave for (23)-(24). Consider a pair like (34-c)-(34-d) for example. These two sentences are truth-conditionally equivalent and have the same definite presupposition, i.e. Mary has a unique son. In these cases, in order for the update of the global context C with either of these sentences to be defined, C must entail that Mary has a unique son (either this information is already common ground or this information is accommodated globally in C). As a result, regardless of whether the indefinite DP *a son of Mary* occurs in the restrictor or the scope of *every*, the sub-sentence in which it occurs will be contextually equivalent to its definite alternative in its local context.

The second prediction is that, based on the CCP of indefinites, we expect the exact same observations to hold of indefinite sentences. It is so because the CCP of indefinites amounts roughly to the CCP of conjunction: it is a sequence of two sentences which are interpreted as if they were conjoined by 'and' (from Heim, 1983, p.403). These expectations are empirically borne out. (35) provides an example of an indefinite Percus-sentence.

(35) *Percus-Sentences with Indefinites*

a. #A man who had exactly two hats gave all his hats to John.

b. A man who had exactly two hats gave both his hats to John.

On our analysis, the oddness of the (a)-sentence follows from the same implicature reasoning as previously described, (36).

(36) **Percus-Sentences with Indefinites and Mandatory Implicatures**
SS: [a [man who has two hats]$_1$ EXH$_{\mathcal{R}}$ [$_{\phi_{all}}$ t$_1$ gave all his$_1$ hats to John]]
Local Context of ϕ_{all}:
$C \subseteq \lambda w.\ x$ had exactly two hats in w, for some $x \in D_e$

a. $[\![\phi_{all}]\!]^{g[1\to x]} = \lambda w.\ x$ had hats in w: x gave each of x's hats in w
b. $[\![\phi_{both}]\!]^{g[1\to x]} = \lambda w.\ x$ had exactly two hats in w: x gave each of x's hats in w

FACTS: $\phi_{both} \in \text{EXCL}_{prs}(\phi_{all})$ and $\psi_{all} \Leftrightarrow_C \phi_{both}$

The examples in (37), based on (34), show that presuppositional implicatures are also symmetric in indefinite sentences, as expected.

(37) *Presuppositional Implicatures: Symmetry Property with Indefinites*

a. #A professor who assigned the same exercise to all his students gave both his students an A.
b. #A professor who assigned the same exercise to both his students gave all his students an A.
c. #A man who talked to a son of Mary told her son to clam down.
d. #A man who talked to Mary's son told a son of Mary to clam down.
e. #A man who talked to Mary's sons told her son to clam down.
f. #A man who talked to Mary's son told her sons to clam down.

The third and last prediction is that asserted implicatures should not be symmetric in these constructions, exactly as we have seen in the case of conjunction, (25). Specifically, if an argument α of a universal or an existential quantifier Q has some assertive component which, together with the other argument β entails an assertive alternative to α, then the computation of the asserted implicature associated with this alternative shall be mandatory *only if α is in the restrictor of Q*. The fact that oddity effects arise when α is in the restrictor of Q has already been observed in Schlenker (2012) (attributing the example to E. Chemla). An example of a Schlenker-Chemla sentence is given in (38). For completeness, we can now add to these sentences their indefinite variants, (39).

(38) a. #Every professor who gave the same grade to each of his students gave an A to some of them.
b. Every professor who gave the same grade to each of his students gave an A to all of them. (based on Schlenker, 2012, (58))

(39) a. #A professor who gave the same grade to each of his students gave an A to some of them.
b. A professor who gave the same grade to each of his students gave an A to all of them.

On our proposal, the oddness of the Schlenker-Chemla sentences directly result from the computation of a mandatory, yet mismatching implicature, as shown below:

(40) **Schlenker-Chemla Sentences and Mandatory Implicatures**
SS: [[every [P who gave ...]$_1$ EXH$_{\mathcal{R}}$ [$_{\phi_{all}}$ t$_1$ gave an A to some of them]]
Local Context of ϕ_{all}: where $x \in D_e$
$C \subseteq \lambda w.\ x$ is a professor who gave the same grade to each of x's students,
a. $[\![\phi_{some}]\!]^{g[1\to x]} = \lambda w.\ x$ gave an A to some of x's students in w
b. $[\![\phi_{all}]\!]^{g[1\to x]} = \lambda w.\ x$ gave an A to all of x's students in w
FACTS: $\phi_{some} \in \text{EXCL}_{asr}(\phi_{all})$ and $\psi_{some} \Leftrightarrow_C \phi_{all}$

Here comes the second and more interesting part of the prediction: these oddity effects should disappear when *some* occurs in the scope of the relevant quantifiers. We can directly test this hypothesis by switching within the Schlenker-Chemla sentences the position of *each/all* and *some* so that *some* now occurs in the scope of *every/a*. The fact that speakers find all the sentences in (41) acceptable supports this prediction.

(41) *Asserted Implicatures: No Symmetry (Universal and Indefinites)*
[Context: suppose that there are 20 professors, each of which has 20 students. When they grade papers, each professor gives a grade on a scale from 1 to 20 to each of his student (from 'very bad' to 'very good'). To establish a clear-cut ranking, they usually give a different grade to each of their 20 students. Yet it happens that two papers are of equal quality and, in such cases, both papers get the same grade. This time, only 16 professors gave a different grade to each of their students. Hearing the news, the principal rushes to check the records. Looking at the grades, he says:]
Holy crap,...
a. Every professor who gave some of his students the same grade gave all/each of his students a 20.
b. A professor who gave some of his students the same grade gave all/each of his students a 20.
c. One of the professors who gave some of his students the same grade gave all/each of his students a 20.

At the root, the plain meaning of these sentences is truth-conditionally equivalent to their *all*-alternatives. If a/every professor who gave some of his students the same grade gave all his students a 20, then a/every professor who gave all his students the same grade gave them all a 20, and conversely. However, at the point the restrictor of the quantifier is incremented, speakers only have access to the information in the global context and, in this context, the proposition 'x gave some of his students the same grade' does not have the same CCP as its *all*-alternative 'x gave all of his students the same grade'. In the absence of such an equivalence, the *some-but-not-all* asserted implicature is not mandatory and thus can be suspended to avoid a contextual contradiction that would other result upon the incrementation of the scope constituent. This last example concludes our refinement of Magri's proposal.

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix B

Parthood and Partitivity

I introduce in this Appendix the mereological notions (and ontological assumptions) that are used in Chapter 4 to discuss the properties of the part-whole relation at work in partitive constructions. For our purposes, we can restrict our attention to parthood relations for unstructured parts, i.e. parts that may slice up the whole in arbitrary ways. A good starting point is to observe that the notion of parthood for unstructured parts stands for a partial ordering — a reflexive, transitive and antisymmetric relation (where $\leq$ symbolizes the part-of relation):

(1) a. Reflexivity: $\forall x\ [x \leq x]$
i.e., *everything is part of itself*
b. Transitivity: $\forall x \forall y \forall z\ [x \leq y \wedge y \leq z \rightarrow x \leq z]$
i.e., *any part of any part of a thing is itself part of that thing*
c. Antisymmetry: $\forall x \forall y\ [x \leq y \wedge y \leq x \rightarrow x = y]$
i.e., *two distinct things cannot be part of each other*

Formally, the notion of parthood can be captured with various axioms (for a thorough review, see Champollion and Krifka, 2014). One possibility is to start with $\leq$ as a partial order; this gives us an order-theoretic perspective (i.e., a classical extensional mereology). On this perspective, the part-of relation is taken as the primitive relation and the three properties in (1) are then used as axioms to constrain parthood to be a partial order. The 'proper-part' relation can be then defined so as to restrict parthood to non-equal pairs. Another common approach is to start out with the join operation (i.e., mereological sum) and then derive from it the relations of interest; this gives us a lattice-theoretic perspective. It is this perspective that I will pursue here.[1] On this perspective, we may start out with the notion of join semi-lattice. A join semi-lattice is defined as a structure $\langle \mathrm{D}, \oplus \rangle$, where D is a set of entities, and $\oplus$ is a two-place operation on elements of D, called join, with the following properties:

[1]This perspective is also the one adopted in Barker (1998) which I discuss in Chapter 4. It is worth emphasizing however that nothing substantive follows from this expository choice. To a large extent, this choice is merely a question of choosing a suitable primitive notion. One could just as well frame a mereological theory by taking the proper-part relation as a primitive. In particular, note that it is a fundamental theorem of lattice theory that the lattice-theoretic conception generates similar structures as the order-theoretic conception (cf. Grätzer, 2002; Landman, 1991).

(2) a. $\forall x \in D\ [x \oplus x = x]$ (idempotent)
b. $\forall x, y \in D\ [x \oplus y = y \oplus x]$ (commutative)
c. $\forall x, y, z \in D\ [x \oplus (y \oplus z) = (x \oplus y) \oplus z]$ (associative)

Given join, we can then define the part-of relation ($\leq$) on D as in (3). The idea is that an entity a is part of an entity b if and if only joining a and b does not add anything to b.

(3) $\forall x, y \in D\ [x \leq y \leftrightarrow x \oplus y = y]$ (part-of relation)

The definition of the proper-part relation ($<$) obtains from (3) as usual by excluding cases of identity, (4): an entity a is a proper part of an entity b if and only if a is a part of b distinct from b. Hence, $a \oplus b$ is a proper part of $a \oplus b \oplus c$, but $a \oplus b$ is not a proper part of $a \oplus b$ because $a \oplus b = a \oplus b$.

(4) $\forall x, y \in D\ [x < y \leftrightarrow x \leq y \wedge \neg(x = y)]$ (proper-part relation)

To complete this basic characterization of parthood structures, we impose the Remainder Principle in (5). This principle ensures that, whenever an entity has a proper part, it has more than one proper part, thus excluding structures with 'too few' parts, e.g. a structure where one entity has a solitary proper part. This principle also ensures that whenever an entity a has a proper part b, there is no more than one thing x disjoint from b such that $b \oplus x = a$, thus excluding structures with 'too many' parts. Given (5) and our definition of parthood in (3), the axioms of reflexivity, transitivity and antisymmetry in (1) follow as theorems.

(5) Remainder Principle (Unique separation):
$\forall x, y \in D\ [x < y \leftrightarrow \exists! z \in D_e[\neg[z \otimes x] \wedge z \oplus x = y]]$
where '$\otimes$' is the overlap relation: $\forall x, y \in D\ [x \otimes y \leftrightarrow \exists z \in D_e[z \leq x \wedge z \leq y]]$

The models I will consider are all based on a domain of entities D which realizes a complete join semi-lattice corresponding to the closure under $\oplus$ of (the union of) two separate ontological domains, the count and the mass domain. The count domain contains individuals of ordinary sort like (e.g., *john*, *the book on my desk*), while the mass domain contains quantities of matter (e.g., *water*, *wood*). The two domains are related by a materialization function μ such that, for any individual x in the count domain, $\mu(x)$ is the stuff or quantities of matter that this x consists of. For instance, if x is a ring, then $\mu(x)$ is the quantity of metal that makes up the substance of x. Crucially, $\mu(x)$ must be a homomorphism preserving the structure of $\oplus$: for all $x, y \in D$, $\mu(x \oplus y) = \mu(x) \oplus \mu(y)$. Following Link (1983), a.o., I assume that both the mass and the count domain have the algebraic structure of a join semi-lattice, with the essential difference between the two being that the sub-lattice representing the mass domain is non-atomic (i.e., portions of matter are in principle infinitely divisible), whereas the sub-lattice representing the count domain is atomic (i.e., minimal units are atoms). For the count domain, this conceptualization amounts to particular kind of lattice, namely a complete atomic join semi-lattice with the bottom null element removed (see Link (1998) as well as Landman (1991) for details), as in Figure B-1.

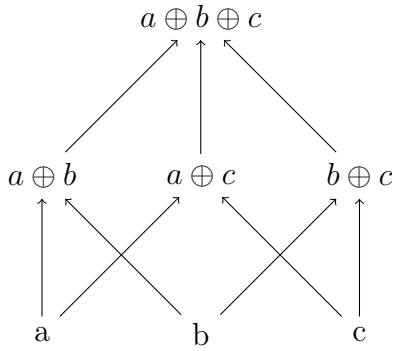


Figure B-1: Example of a complete *atomic* join semi-lattice with the bottom null element removed. The arrows represent the $\leq$ relation. This lattice is isomorphic to the powerset of the set of atomic individuals (i.e., $\{a, b, c\}$) minus the empty set.

In a nutshell, the join semi-lattice in Figure B-1 is *complete* because the domain of individuals is closed under $\oplus$: for each two elements $x, y \in D$, the join $x \oplus y$ is defined and $x \oplus y \in D$. Hence, if $john \in D$ and $mary \in D$, so is $john \oplus mary$.[2] It is also *atomic* because all atomic parts of the sums that are in the domain are part of the domain themselves: for each element $x \in D$, if there is an individual y such that $y \leq x$, then $y \in D$. In other words, if $john \oplus mary \in D$, then so is $john$ and $mary$. Our intended models of parthood for the count domain can be thus identified as those models that are based on a sublattice isomorphic to $\langle \mathcal{P}(\text{Atoms(D)}) - \emptyset, \oplus \rangle$, where Atoms(D) is the set of atomic individuals in D (i.e., those entities that only have themselves as a part).

With this in mind, let me restate the research question Chapter 4 is concerned with. It is generally assumed that the preposition *of* appearing in partitive constructions (e.g. *two of the associates*, *half of the cheese*) is the phonological exponent of some partitive relation whose interpretation is responsible for the partitivity requirement exhibited by these constructions. There is no consensus, however, regarding the kind of 'part' relation it corresponds to and, consequently, regarding the semantic strength of the partitivity requirement it imposes. In principle, two options offer themselves: partitive *of* can stand for the part-of relation or for the proper-part relation, both of which can generalize over individual or material parts depending on whether they apply to an element of the count or the mass domain.

(6) a. $[\![\text{of}_{\text{PART}}]\!](y)(x) = 1$ if and only if $x \leq y$ (partitivity)
b. $[\![\text{of}_{\text{PART}}]\!](y)(x) = 1$ if and only if $x < y$ (proper partitivity)

For our present purposes, the critical difference between (6-a) and (6-b) will concern cases of identity. Since the part-of relation is reflexive (i.e., everything is part of

[2]Since completeness implies that all subsets of D have a join (in finite domains), I follow here the standard versions of classical extensional mereology used in philosophy and semantic theory by restricting the admissible algebraic structures to those that have no 'null individual', i.e. an individual which belongs to all other individuals. The resulting structure, e.g. Figure B-1, is often described as a complete lattice *with the bottom element removed*.

itself), identity always qualifies as a case of partitivity. By contrast, the proper-part relation restricts parthood to non-equal pairs (i.e., nothing is a proper part of itself) so that identity and proper partitivity are mutually exclusive. In Chapter 4, I argue that of_{PART} has the semantics in (6-a), contra the proper partitivity view on partitives developped in Barker (1998) which hypothesizes that of_{PART} has the semantics in (6-b).

Appendix C

Binding within agentive-like nominals

My proposal to account for pronoun binding in agent/holder-denoting nominals is to assume that agent nominalizers like *-er* have a syntax and semantics similar to that of a Voice head (Kratzer, 1996). Given the usual order of composition, this implies that, like Voice, agent nominalizers must combine directly with a bare VP (noted $\sqrt{\text{V}}$P) and assign an agent or holder theta-role to the syntactic element occupying the specifier position of the nominal phrase they project (noted nP), as shown in (1).[1]

(1) the builder/owner of his house
[$_{\text{DP}}$ the [$_{\text{nP}}$ PRO$_1$ [$_{\text{n'}}$ [$_{\text{n}}$ -er] [$_{\sqrt{\text{VP}}}$ build-/own- (of) his house]]]]

Agentive suffixes can usually express a variety of relationships. This is that case of English *-er* which can be used to derive either agent-denoting nouns (e.g., *builder*) or state-denoting nouns (e.g., *owner*, but also *Londiner*, *nine-grader*, etc). For our purposes, we can simply assume that *-er* can have either of the meanings in (2) as a function of the aktionsart of the verb it attaches to.

(2) a. $[\![\text{-er}]\!] = \lambda P_{\langle \text{s,t} \rangle}.\lambda x_e.\ \exists s\ [holder(x)(s)\ \&\ P(s)]$ (State-denoting noun)
b. $[\![\text{-er}]\!] = \lambda P_{\langle \text{s,t} \rangle}.\lambda x_e.\ \exists e\ [agent(x)(e)\ \&\ P(e)]$ (Agent-denoting noun)

On this analysis, the internal structure of a DP like *every owner of his house* is predicted to allow the embedded pronoun *his* to receive a bound reading, as shown in (3); this LF obtains from the representation in (1) by an additional movement of the nP-internal subject, i.e. PRO, followed by a re-analysis of its index as a λ-binder.

(3) LF: [$_{\text{DP}}$ every [$_{\text{nP'}}$ PRO λ_1 [$_{\text{nP}}$ t$_1$ -er [$_{\sqrt{\text{VP}}}$ own- (of) his$_1$ house]]]]
a. $[\![\sqrt{\text{V}}\text{P}]\!]^g = \lambda s_s.\ [own(g(1)'s\ house)(s)]$
b. $[\![\text{nP}]\!]^g = \exists s\ [holder(g(1))(s)\ \&\ own(g(1)'s\ house)(s)]$
c. $[\![\text{nP'}]\!]^g = \lambda x_e.\exists s\ [holder(x)(s)\ \&\ own(x's\ house)(s)]$
d. $[\![\text{DP}]\!]^g = \lambda P_{\langle \text{e,t} \rangle}.\ \forall x[[\exists s[holder(x)(s)\ \&\ own(x's\ house)(s)]] \rightarrow P(x)]$

[1]This proposal is similar in spirit to Baker and Vinokurova (2009)'s and shares with it a number of predictions. In particular, it predicts agentive nominalizing morphology to attach to the same kinds of verbs that active and passive voice markers can and to be in complementary distribution with voice morphology (active/passive).

which reads as 'for any property of individuals P, for every individual x, if x owns x's house, then x has the property P'

A direct prediction following from this analysis is that agentive nominals should also differ from common nouns with respect to the kind of quantifier scope interactions permitted by the constructions they are involved in. Specifically, the present analysis predicts that, whenever a quantificational phrase embedded within a definite DP involving an agentive nominal (e.g., *the photographer of every star*) needs to raise at LF for interpretative purposes, it can raise to a position either below (surface-scope reading) or above (inverse-scope reading) the definite determiner, thus giving rise to a scope ambiguity. By contrast, no ambiguity is expected when the relevant definite DP involves instead a common noun (e.g., *the photograph of every star*); in this case, in the absence of any alternative DP-internal landing site, the quantificational phrase should only be able to raise to a position above the definite determiner, giving rise to an inverse-scope reading only. These predictions are empirically borne out:

(4) a. Joe met the photographer of every (Hollywood) star.
Readings: ✓every>the, ✓the>every
b. Joe bought the photograph of every (Hollywood) star.
Readings: ✓every>the, *the>every

(5) a. Joe invited the producer of each theatre company of the area.
Readings: ✓each>the, ✓the>each
b. Joe attended the show of each theatre company of the area.
Readings: ✓each>the, *the>each

Unsurprisingly, the (a)- and (b)-sentences in (4)-(5) can have an inverse-scope reading (i.e., every/each>the). However, in contrast to the (b)-sentences, the (a)-sentences can also receive a surface-scope reading (i.e., the>every/each). On this reading, the sentence in (4-a) expresses the thought that Joe met a guy who is the photographer of all the Hollywood stars; note by contrast that the sentence in (4-b) cannot express the thought that Joe bought some picture on which all the Hollywood stars are posing. These interpretative contrasts are further evidenced by the minimal pairs in (6)-(7) whose construal is intended to force the surface-scope reading we are looking for.

(6) a. Joe met Peter Smith, the photographer of every Hollywood star. (✓the>every)
b. #Joe bought this item, the photograph of every Hollywood star. (*the>every)

(7) a. That man is the photographer of every Hollywood star. (✓the>every)
b. #That picture is the photograph of every Hollywood star. (*the>every)

These contrasts are directly accounted for under the present analysis which predicts sentences of (4-a) to allow both an inverse-scope and a surface-scope reading, as shown in (8-a) and (8-b), respectively. Crucially, note that the availability of the surface-scope reading, i.e. (8-b), falls out from the same assumption that accounts for the possibility of pronoun binding in these constructions: derived nominals, unlike common nouns, do have an internal subject.

(8) **Possible LFs for (4-a)**

a. Inverse-scope reading: every>the
[$_{DP}$ every star] λ_1 Joe met [$_{DP}$ the PRO λ_2 t_2 -er photograph- of t_1]
≈ for every star, Joe met the person who photographs this star

b. Surface-scope reading: the>every
Joe met [$_{DP}$ the PRO λ_2 [$_{DP}$ every star] λ_1 t_2 -er photograph- of t_1]
≈ Joe met the person who photographs every star

These data provide further evidence for a principled distinction between common nouns vs. agentive nominals, and strengthen the view that this distinction is to be grounded into the absence vs. presence of a syntactic subject slot. This distinction offers a more fine-grained description of the licensing conditions on pronoun binding in nominals which is fully consistent with previous observations.

THIS PAGE INTENTIONALLY LEFT BLANK

Bibliography

Adger, D. (2011). Bare resumptives. Resumptive pronouns at the interfaces 5, 343.

Adger, D. and G. Ramchand (2005). Merge and move: Wh-dependencies revisited. Linguistic Inquiry 36(2), 161–193.

Baker, M. C. and N. Vinokurova (2009). On agent nominalizations and why they are not like event nominalizations. Language 85(3), 517–556.

Barker, C. (1991). Possessive descriptions. University microfilms international.

Barker, C. (1998). Partitives, double genitives and anti-uniqueness. Natural Language & Linguistic Theory 16(4), 679–717.

Barker, C. (2011). Possessives and relational nouns. Semantics: An international handbook of natural language meaning 2, 1109–1130.

Bartsch, R. (1973). The semantics and syntax of number and numbers. Syntax and semantics 2, 51–93.

Beaver, D. (1995). Presupposition and assertion in dynamic semantics. Ph. D. thesis, University of Edinburgh.

Beaver, D. and E. Krahmer (2001). A partial account of presupposition projection. Journal of Logic, Language and Information 10(2), 147–182.

Belnap, N. D. (1982). Questions and answers in montague grammar. In Processes, beliefs, and questions, pp. 165–198. Springer.

Bennett, M. (1979). Questions in Montague grammar, Volume 100. Indiana University Linguistics Club.

Bochvar, D. A. (1939). On a three valued calculus and its application to the analysis of contradictories.

Brisson, C. M. (1998). Distributivity, maximality, and floating quantifiers. Ph. D. thesis, Citeseer.

Brody, M. (1982). On circular readings. Mutual knowledge, 133–146.

Champollion, L. and M. Krifka (2014). Mereology. Cambridge handbook of semantics. Cambridge University Press. http://ling. auf. net/lingbuzz/002099.

Chemla, E. and B. Spector (2011). Experimental evidence for embedded scalar implicatures. Journal of semantics 28(3), 359–400.

Chierchia, G. (2004). Scalar implicatures, polarity phenomena, and the syntax/pragmatics interface. Structures and beyond 3, 39–103.

Chierchia, G. (2006). Broaden your views: Implicatures of domain widening and the logicality of language. Linguistic inquiry 37(4), 535–590.

Chierchia, G. (2010). Mass nouns, vagueness and semantic variation. Synthese 174(1), 99–149.

Chierchia, G., D. Fox, and B. Spector (2008). The grammatical view of scalar implicatures and the relationship between semantics and pragmatics. Unpublished manuscript.

Chierchia, G., D. Fox, and B. Spector (2012). Scalar implicature as a grammatical phenomenon. Semantics: An International Handbook of Natural Language Meaning 3, 2297–2331.

Chomsky, N. (1965). Aspects of the theory of syntax. Cambridge: MIT Press.

Chomsky, N. (1981). Lectures on binding and government. Dordrecht: Foris.

Chomsky, N. (1993a). Lectures on government and binding: The Pisa lectures. Number 9. Walter de Gruyter.

Chomsky, N. (1993b). A minimalist program for linguistic theory. the view from building 20: Essays in linguistics in honor of sylvain bromberger, ed. by kenneth hale and samuel jay keyser, 1-52.

Cinque, G. (2003). The dual source of adjectives and xp- vs. n-raising in the romance dp. Talk presented at NELS 35.

Clifton Jr, C. and C. Dube (2010). Embedded implicatures observed: A comment on geurts and pouscoulous (2009). Semantics and pragmatics 3(7), 1.

de Swart, H. and D. Farkas (2010). The semantics and pragmatics of plurals. Semantics and pragmatics 3, 6–1.

Del Gobbo, F. (2003). Appositives at the Interface. Ph. D. thesis, University of California, Irvine.

Elbourne, P. (2001). E-type anaphora as np-deletion. Natural Language Semantics 9(3), 241–288.

Elbourne, P. D. (2005). Situations and individuals, Volume 90. MIT Press Cambridge.

Fox, D. (2007). Free choice and the theory of scalar implicatures. In Presupposition and implicature in compositional semantics, pp. 71–120. Springer.

Fox, D. and M. Hackl (2006). The universal density of measurement. Linguistics and Philosophy 29(5), 537–586.

Fox, D. and R. Katzir (2009). A note on the characterization of alternatives for implicature and focus. In Presuppositions and implicatures: Proceedings of the MIT-Paris workshop, Volume 60, pp. 101–110.

Fox, D. and R. Katzir (2011). On the characterization of alternatives. Natural Language Semantics 19(1), 87–107.

Fox, D. and B. Spector (2009). Economy and embedded exhaustification.

Franke, M. (2011). Quantity implicatures, exhaustive interpretation, and rational conversation. Semantics and Pragmatics 4, 1–1.

Gajewski, J. and Y. Sharvit (2012). In defense of the grammatical approach to local implicatures. Natural language semantics 20(1), 31–57.

Gajewski, J. R. (2005). Neg-raising: Polarity and presupposition. Ph. D. thesis, Massachusetts Institute of Technology.

George, B. (2008a). A new predictive theory of presupposition projection. In Proceedings of SALT, Volume 18, pp. 358–375.

George, B. (2008b). Presupposition repairs: a static, trivalent approach to predicting projection. UCLA MA thesis.

Geurts, B. (1997). Good news about the description theory of names. Journal of semantics 14(4), 319–348.

Geurts, B. (2007). Really fucking brilliant. Theoretical Linguistics 33(2), 209–214.

Golan, Y. (1993). Node crossing economy, superiority and d-linking. Ms., Tel Aviv University.

Grätzer, G. (2002). General lattice theory. Springer Science & Business Media.

Grice, H. P. (1975). Logic and conversation. Syntax and Semantics 3, 41–58.

Grodzinsky, Y. and T. Reinhart (1993). The innateness of binding and coreference. Linguistic inquiry 24(1), 69–101.

Groenendijk, J. and M. Stokhof (1985). On the semantics of questions and the pragmatics of answers. Semantics: Critical Concepts in Linguistics, 288.

Groenendijk, Jeroenand Stokhof, M. (1984). Studies on the semantics of questions and the pragmatics of answers. Doctoral Dissertation, University of Amsterdam.

Haïk, I. (1984). Indirect binding. Linguistic Inquiry 15(2), 185–223.

Hawkins, J. A. (1991). On (in) definite articles: implicatures and (un) grammaticality prediction. Journal of linguistics 27(2), 405–442.

Heim, I. (1982). The semantics of definite and indefinite noun phrases.

Heim, I. (1983). On the projection problem for presuppositions. Formal semantics–the essential readings, 249–260.

Heim, I. (1991). Artikel und definitheit [articles and definiteness]. Semantik: Ein internationales Handbuch der Zeitgenössischen forschung, 487–535.

Heim, I. (1994). Interrogative semantics and karttunen?s semantics for know. In Proceedings of IATL, Volume 1, pp. 128–144.

Heim, I. (1998). Anaphora and semantic interpretation: A reinterpretation of reinhart's approach. MIT Working Papers in Linguistics 25, 205–246.

Heim, I. (2007). Forks in the road to rule i. In Proceedings of the 38th Annual meeting of the North East Linguistic Society (NELS).

Heim, I. (2008). Features on bound pronouns. Phi theory: Phi-features across modules and interfaces, 35–56.

Heim, I. and A. Kratzer (1998). Semantics in generative grammar, Volume 13. Blackwell Oxford.

Higginbotham, J. (1982). Some remarks on binding theory and logical form. mimeograph, MIT, Cambridge, Massachusetts.

Higginbotham, J. (1983). Logical form, binding, and nominals. Linguistic inquiry 14(3), 395–420.

Higginbotham, J. (1987). On the varieties of cross-reference. In Papers from the 1987 GLOW Conference, Volume 27, pp. 123–142.

Higginbotham, J. and R. May (1981). Crossing, markedness, pragmatics. In Proceedings of the 1979 GLOW Conference.

Higginbotham, J. and B. Schein (1989). Plurals. In Proceedings of the North Eastern Linguistics Society, Volume 19, pp. 161–75.

Hoeksema, J. (1984). Partitives. Ms., University of Groningen.

Hoeksema, J. and D. J. Napoli (1990). A condition on circular chains: A restatement of i-within-i. Journal of Linguistics 26(02), 403–424.

Horn, L. (1984). Toward a new taxonomy for pragmatic inference: Q-based and r-based implicature. Meaning, form, and use in context: Linguistic applications, 11–42.

Ionin, T. and O. Matushansky (2005). 1001 nights: The syntax and semantics of complex numerals. Ms., University of Southern California, Los Angeles, and Université Paris 8.

Ionin, T., O. Matushansky, and E. G. Ruys (2006). Parts of speech: Toward a unified semantics for partitives. In Proceedings of NELS, Volume 36, pp. 357.

Jackendoff, R. (1968). Possessives in english. Studies in transformational grammar and related topics 2551.

Jackendoff, R. (1977). X-bar Syntax: A study of phrase structure. Cambridge: MIT Press.

Jacobson, P. (1979). The Syntax of Crossing Reference Sentences. Indiana University Linguistics Club.

Jacobson, P. (1991). Functional questions, paycheck pronouns, and variable binding. In ASL/LSA Conference, Linguistic Society of America Summer Institute, Santa Cruz.

Jacobson, P. (1992). Bach-peters sentences in a variable-free semantics. In Proceedings of the Eighth Amsterdam Colloquium, pp. 283–302.

Jacobson, P. (1994). i-within-i effects in a variable free semantics and a categorial syntax. In Proceedings of the Ninth Amsterdam Colloquium, Institute for Logic, Language, and Computation, University of Amsterdam.

Jullens, J. (1983). Over het pronominale er. Tabu Groningen 13(1), 26–34.

Karttunen, L. (1974). Presupposition and linguistic context. Theoretical linguistics 1(1-3), 181–194.

Katzir, R. (2007). Structurally-defined alternatives. Linguistics and Philosophy 30(6), 669–690.

Katzir, R. (2008). Structural competition in grammar. Ph. D. thesis, Massachusetts Institute of Technology.

Keenan, E. L. (1971). Two kinds of presupposition in natural language.

Keenan, E. L. and J. Stavi (1986). A semantic characterization of natural language determiners. Linguistics and philosophy 9(3), 253–326.

Kratzer, A. (1996). Severing the external argument from its verb. In Phrase structure and the lexicon, pp. 109–137. Springer.

Kratzer, A. (2009). Making a pronoun: Fake indexicals as windows into the properties of pronouns. Linguistic Inquiry 40(2), 187–237.

Krifka, M. (1986). Nominalreferenz und zeitkonstitution: Zur semantik von massentermen, pluraltermen und aspektklassen. munich, germany (published 1989): Wilhelm fink.

Krifka, M. (1989). Nominal reference, temporal constitution and quantification in event semantics. Semantics and contextual expression 75, 115.

Ladusaw, W. A. (1982). Semantic constraints on the english partitive construction. In Proceedings of WCCFL, Volume 1. Stanford University.

Landman, F. (1991). Structures for semantics.

Larson, R. K. and F. Marušič (2004). On indefinite pronoun structures with aps: Reply to kishimoto. Linguistic Inquiry 35(2), 268–287.

Larson, R. K. and G. Segal (1995). Knowledge of meaning: An introduction to semantics.

Lasersohn, P. (1998). Events in the semantics of collectivizing adverbials. In Events and grammar, pp. 273–292. Springer.

Lasnik, H. (1976). Remarks on coreference. Linguistic Analysis.

Lasnik, H. (1989). On the necessity of binding conditions. In Essays on anaphora, pp. 149–167. Springer.

Le Bruyn, B. (2007). Partitivity in natural language. ESSLLI 2007, 35.

Leahy, B. (2016). On presuppositional implicatures. Topoi 35(1), 83–91.

Leffel, T. J. (2014). The semantics of modification: Adjectives, nouns, and order. Ph. D. thesis, New York University.

Levinson, S. C. (1987). Minimization and conversational inference. In International Conference on Pragmatics, pp. 61–129. Benjamins.

Link, G. (1983). The logical analysis of plurals and mass terms. In Meaning, Use and Interpretation of Language, pp. 302–323. Berlin: de Gruyter.

Link, G. (1998). Algebraic semantics in language and philosophy.

Löbner, S. (1985). Definites. Journal of semantics 4(4), 279–326.

Macià Fàbrega, J. (1997). Natural language and formal languages. Ph. D. thesis, Massachusetts Institute of Technology.

Mackenzie, I. (2004). Topics in spanish syntax. Lecture notes, University of Newcastle Upon Tyne.

Magri, G. (2009). A theory of individual-level predicates based on blind mandatory scalar implicatures. Natural language semantics 17(3), 245–297.

Magri, G. (2010). A theory of individual-level predicates based on blind mandatory scalar implicatures.

Magri, G. (2011). Another argument for embedded scalar implicatures based on oddness in downward entailing environments. Semantics and Pragmatics 4, 6–1.

Magri, G. (2014). An account for the homogeneity effects triggered by plural definites and conjunction based on double strengthening. Pragmatics, Semantics and the Case of Scalar Implicatures, 99–145.

Matushansky, O. (2008). On the linguistic complexity of proper names. Linguistics and philosophy 31(5), 573–627.

McCawley, J. (1968). D. 1968. the role of semantics in a grammar.

McCawley, J. D. (1988). The syntactic phenomenon of english (vol. 2). Chicago: UCP.

Morzycki, M. (2008). Nonrestrictive modifiers in nonparenthetical positions. Adverbs and adjectives: Syntax, semantics and discourse 19, 101–122.

Narita, H. (1986). The nature of the double genitive. Descriptive and applied linguistics 19, 193–206.

Nickel, B. (2010). Generically free choice. Linguistics and Philosophy 33(6), 479–512.

von Fintel, K. (1997). Bare plurals, bare conditionals, and only. Journal of Semantics 14(1), 1–56.

von Fintel, K. (2004). Would you believe it? the king of france is back! (presuppositions and truth-value intuitions).

Nouwen, R. (2010). A note on the projection of nominal appositives. Formal Approaches to Semantics and Pragmatics: Japanese and Beyond. Springer.

Percus, O. (2006). Antipresuppositions. Theoretical and empirical studies of reference and anaphora: Toward the establishment of generative grammar as an empirical science 52, 73.

Postal, P. M. (1970). On coreferential complement subject deletion. Linguistic Inquiry 1(4), 439–500.

Potts, C. (2005). The logic of conventional implicatures. Number 7. Oxford University Press.

Recanati, F. (1993). Direct reference: From language to thought.

Reinhart, T. (1998). Wh-in-situ in the framework of the minimalist program. Natural language semantics 6(1), 29–56.

Romoli, J. (2012). Soft but strong. Neg-raising, soft triggers, and exhaustification. Ph. D. thesis, Harvard University.

Rooth, M. (1985). Association with focus.

Rooth, M. (1992). A theory of focus interpretation. Natural language semantics 1(1), 75–116.

Ruys, E. (1994). A global economy analysis of weak crossover. Linguistics in the Netherlands 11(1), 223–234.

Sauerland, U. (2003). A new semantics for number. In Semantics and Linguistic Theory, Volume 13, pp. 258–275.

Sauerland, U. (2004). Scalar implicatures in complex sentences. Linguistics and philosophy 27(3), 367–391.

Sauerland, U. (2008). Implicated presuppositions. The discourse potential of underspecified structures, 581–600.

Sauerland, U., J. Anderssen, and K. Yatsushiro (2005). The plural is semantically unmarked. Linguistic evidence, 413–434.

Sauerland, U. and K. Yatsushiro (2004). A silent noun in partitives. In Proceedings of NELS, Volume 34, pp. 505–516.

Schlenker, P. (2005a). Minimize restrictors!(notes on definite descriptions, condition c and epithets). In Proceedings of Sinn und Bedeutung, Volume 9, pp. 385–416.

Schlenker, P. (2005b). Non-redundancy: Towards a semantic reinterpretation of binding theory. Natural Language Semantics 13(1), 1–92.

Schlenker, P. (2009). Local contexts. Semantics and pragmatics 2, 3–1.

Schlenker, P. (2010). Supplements within a unidimensional semantics i: Scope. In Logic, language and meaning, pp. 74–83. Springer.

Schlenker, P. (2012). Maximize presupposition and gricean reasoning. Natural Language Semantics 20(4), 391–429.

Schwarzschild, R. (1992). Together as a non-distributivity marker. In Proceedings of the 8th Amsterdam Colloquium, Institute for Logic, Language, and Computation, University of Amsterdam.

Schwarzschild, R. (2002). The grammar of measurement. In Proceedings of SALT, Volume 12, pp. 225–245.

Selkirk, E. (1977). Some remarks on noun phrase structure. Academic Press.

Shin, K. Y. (2007). Partitive structures. ProQuest.

Singh, R. (2009). Maximize presupposition! and informationally encapsulated implicatures. In Proceedings of Sinn und Bedeutung, Volume 13, pp. 513–526.

von Fintel, K. (1999). Npi licensing, strawson entailment, and context dependency. Journal of semantics 16(2), 97–148.

von Fintel, K. (2001). Counterfactuals in a dynamic context. Current Studies in Linguistics Series 36, 123–152.

Spector, B. (2003). Scalar implicatures: Exhaustivity and gricean reasoning. In Proceedings of the ESSLLI, Volume 3, pp. 277–288.

Spector, B. (2006). Aspects de la pragmatique des opérateurs logiques. Ph. D. thesis, Paris 7.

Spector, B. (2007). Aspects of the pragmatics of plural morphology: On higher-order implicatures. In Presupposition and implicature in compositional semantics, pp. 243–281. Springer.

Spector, B. (2014). Global positive polarity items and obligatory exhaustivity. Semantics and Pragmatics 7(11), 1–61.

Stalnaker, R. (1970). Pragmatics. Semantics of Natural Language, Reidel, Dordrecht, 380–397.

Stalnaker, R. (1978). Assertion. In P. Cole, ed., Syntax and Semantics 9: Pragmatics, 315?332.

Stalnaker, R. C. (2004). Assertion revisited: On the interpretation of two-dimensional modal semantics. Philosophical Studies 118(1-2), 299–322.

Stowell, T. (1982). Subjects across categories. Linguistic Review (The) Utrecht 2(3), 285–312.

Sudo, Y. (2012). On the semantics of phi features on pronouns. Ph. D. thesis, Massachusetts Institute of Technology.

Sweet, H. (1898). A New English Grammar, Logical and Historical. Clarendon Press, Oxford.

Umbach, C. (2006). Non-restrictive modification and backgrounding. In Proceedings of the Ninth Symposium on Logic and Language, Volume 152159. Budapest: Hungarian Academy of Sciences.

Van der Sandt, R. A. (1992). Presupposition projection as anaphora resolution. Journal of semantics 9(4), 333–377.

Van Rooij, R. and K. Schulz (2004). Exhaustive interpretation of complex sentences. Journal of logic, language and information 13(4), 491–519.

Vergnaud, J.-R. (1974). French relative clauses. Ph. D. thesis, Massachusetts Institute of technology.

Von Stechow, A. (2002). Binding by verbs: Tense, person and mood under attitudes. In Proceedings of NELS, Volume 33, pp. 379–403.

Webelhuth, G. (1995). Government and binding theory and the minimalist program: principles and parameters in syntactic theory, Volume 13. Wiley-Blackwell.

Williams, E. S. (1982). The np cycle. Linguistic Inquiry, 277–295.

Zamparelli, R. (1998). A theory of kinds, partitives and oflz possessives. Possessors, predicates and movement in the determiner phrase 22, 259.

Zwarts, F. (1976). Over de disjunctie conditie op anafora.