FOCUS AND RECONSTRUCTION EFFECTS IN *WH*-PHRASES

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by

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A mi padre,

a ma mare.

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Even though I have been looking forward to writing the acknowledgments of my dissertation, composing this part has turned out to be one of the most difficult tasks of the writing process. Many people, in my personal and academic life, deserve to be thanked for their help, support, encouragement and criticism in the past years. I feel unable to do them justice --or even to come close to doing them justice-- at this moment. It is my intention to write true acknowledgments in the near future.

ABSTRACT

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This dissertation investigates the semantics and LF-representation of *wh*-phrases by attending to two phenomena: the effect of Focus in *wh*-phrases and reconstructed readings of *wh*-phrases.

First, I exploit the semantics of Focus to show how certain peculiarities of Sluicing follow without the need for special LF-operations, contrary to Chung-Ladusaw-McCloskey (1995). I claim that remnant *wh*-phrases in a sluiced interrogative clause usually bear focal stress and I define a set of alternative semantic values for a focused *wh*-Determiner. From this, two consequences follow: the remnant *wh*-phrase has to contrast with its correlate in the antecedent clause --which derives the restriction on possible correlate phrases-- and the denotation of the Sluicing clause and the denotation of the antecedent clause have to be identical in certain respects --which derives the inheritance of content and islands cases.

Second, I turn to the question of whether reconstructed readings of *how many* phrases and *which* phrases derive from Syntactic Reconstruction (SynR) or from Semantic Reconstruction (SemR).

I present two challenges for the SemR account of reconstructed scope readings of *how many* phrases. First, numerous examples are provided that show that Principle C Connectivity correlates with reconstructed scope readings, a fact which is predicted under the SynR approach and unexpected under the SemR view. Second, I investigate reconstructed scope readings of *how many* phrases in VP Phonological Reduction and

argue that they cannot be derived within the SemR line without generating unwelcome results.

Two lines have been pursued in the literature to capture functional readings of *which* phrases: the choice function approach (Reinhart (1993, 1997)), which involves SynR of the restrictor of the *which*-phrase, and the skolem function approach (Engdahl (1986)), which amounts to SemR. Again, it is shown that Principle C Connectivity correlates with the embedding needed for the variable to get bound, which supports the SynR approach. However, I present two problems for the current implementation of the choice function SynR line: local presupposition accommodation readings are wrongly excluded, and intensional readings cannot be derived from transparent *which* phrases. I propose a new architecture of choice functions that derives these new data.

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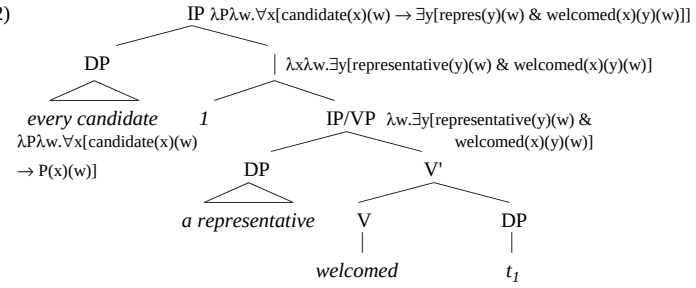
INTRODUCTION

Ever since the advent of Formal Semantics as a recognized linguistic field --stemming mainly from the seminal work of Richard Montague--, researchers have devoted considerable attention to the nature of questions. This dissertation is intended as a small contribution towards a better understanding of some particular aspects concerning the interpretation of *wh*-phrases in questions. I investigate both the syntactic structures feeding interpretation --namely, what in current syntactic theory is called "Logical Form" (LF, henceforth)-- and the resulting interpretations themselves.

A few general assumptions need to be laid out. For the mapping from LF to semantic interpretation, I mainly follow the framework presented in Heim-Kratzer (1998). In particular, indices of syntactic movement on moved constituents are intrepreted as λ-abstraction operators that bind the variable introduced by the trace of movement. The tree under (2) exemplifies the LF-representation for the universal>>existential reading of (1). Note that, after moving the DP *every candidate*, its movement index *1* is rebracketed and adjoined to the sister node. The semantic interpretation is provided next to the relevant nodes:

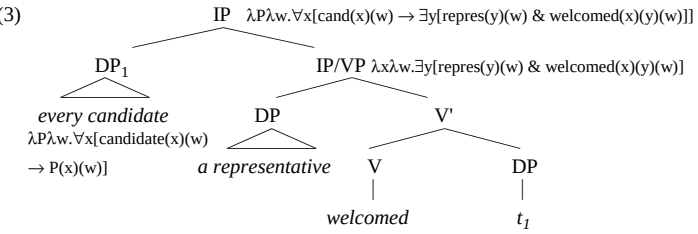
(1) A (possibly different) representative welcomed every candidate.

(2)



For space and simplicity reasons, though, I will use abridged LF-representations where this rebracketing of movement indices will not be spelled out. Thus, in the forthcoming chapters, LF-trees like the one in (2) will be compressed into the more compact shape in (3). The semantic interpretation corresponding to the constituent containing the index and the sister node will be placed next to the sister node itself:

(3)



As for the semantics of questions, I assume --following the main idea in Hamblin (1973), Karttunen (1977) and many others-- that a question denotes, in a given world w, the set of propositions of a certain shape that are possible answers to that question. For example, the question in (3a) expresses the function from worlds to set of propositions given under (3b):[1]

(3) a. Who went to the garden?

b. $\lambda w \lambda p.\exists x \in D_e\ [p = \lambda w'.\text{go-to-garden}(x)(w')]$

Let us now turn to the content of this dissertation. I will tackle three issues concerning the LF-representation and semantic interpretation of *wh*-phrases in questions: their

[1] The different treatments of *wh*-phrases in the various approaches will be presented and discussed later in this dissertation, mainly in chapter 3. Here I just introduce the core idea about the semantic of questions.

position at LF, the semantic type of the variable bound by the question operator, and the semantic effect of Focus on *wh*-Determiners.

The first issue is the position of *wh*-phrases and their subparts at LF. For *how many* phrases, it is assumed that the *wh*-phrase splits into a truely interrogative part --*how* or *wh*, asking for an individual that is number-- and the rest of the *wh*-phrase, the pied pied material *t-many N'*. Since this pied pied material is a Quantificational NP (QuNP, henceforth) by itself, it may interact with other quantifiers and operators embedded in the question. An example of this interaction is given in (4). The question (4) has a reading where *t-many* has scope outside *have to* --reading (4a)-- and a reading where it has scope under the modal --reading (4b):

(4) How many books do you have to review by next week?
   a. Wide reading of *t-many*: "For what number n: there are n-many particular books x such that you have to review x by next week."
   b. Narrow reading of *t-many*: "For what number n: it has to be the case that there are (any) n-many books that you review by next week (e.g., in order to keep with your overall schedule and get everything done by the end of the month)."

The LF-representation of this scope interaction is the subject of chapter 2. More concretely, the chapter investigates which is the LF-position of the pied pied material in the narrow reading (4b).

A similar issue arises with *which* phrases. A *which* phrases does not contain an entire pied pied QuNP, but its N' restrictor may include a variable that needs to be bound by an embedded operator. This is the case of the example (5), where the pronoun *his* is bound by the deeply embedded QuNP *every boy*. Again, the question arises where the N' restrictor *friend of his* stands at LF. This is the subject of the sections 2, 3 and 5 of chapter 3.

(5) Q: Which friend of his_1 does Eva think every boy_1 should invite?
   A: His_1 best friend.

The second theme of this dissertation involves the semantic type of the variable bound by the question operator. Compare (6) with the preceding example (5):

(6) Q: Which professor did Bart invite?
   A: Tom.

It seems reasonable to assume that (6Q) asks for the identity of an individual (hence, the question operator binds a variable of individual type e). But what about (5)? The felicitous answer (5A) gives the means to identify not just one individual, but one individual for each boy. That is, (5Q) is asking for a function such that, for each boy or for each boy's set of friends, it selects or identifies a particular individual. The semantic type and characteristics of this function are explored in section 4 of chapter 3.

The third and last topic that this dissertation covers is the semantic effect of Focus on *wh*-Determiners. This is the subject of chapter 1. The chapter is devoted to study an elliptical construction, Sluicing, which elides an entire embedded interrogative clause leaving exclusively the *wh*-phrase as remnant, as exemplified under (7):[2]

(7) a. Somebody called Susan, but I don't know who {called Susan}.
   b. Ana visited Paris. I wonder when {Ana visited Paris}.

[2] All through this dissertation, curly brackets introduce elliptical material.

Sluiced *wh*-phrases may have an antecedent or correlate in the preceding clause (*somebody* in (7a)) or may not (as in (7b)). We are interested in two peculiarities concerning the sluiced *wh*-phrase and its antecedent: (i) in the cases where there is an overt antecedent, some constraints apply to the kind of DP that the antecedent may be; and (ii), whereas sluiced *wh*-phrases with overt antecedents are insensitive to islands, sluiced *wh*-phrases without antecedent are sensitive to islands, as much as non-sluiced *wh*-phrases are.

In chapter 1, I propose to derive these two characteristics from the semantic effect of Focus on *wh*-Determiners. I define the semantics of the Determiners *which* and *how many* as Focus alternatives to each other and explain the aforementioned facts as the result of the interaction of the felicity conditions of Focus with other pragmatic and discourse constraints.

CHAPTER 1

THE ROLE OF FOCUS IN SLUICING

1.1 Introduction

Sluicing is the ellipsis of a whole embedded question except for the *wh*-phrase. Let us look at the examples under (1)-(2), where the (b)-examples are the sluiced versions of the (a)-examples.

(1) a. Somebody just left --guess who just left.
b. Somebody just left --guess who. Ross (1969:252)

(2) a. He is writing, but you can't imagine what / where / why he is writing.
b. He is writing, but you can't imagine what / where / why. Ross (1969:252)

The clause containing the sluiced interrogative is preceded (or, sometimes, followed)[3] by another clause from which the elided material can be (syntactically or semantically) recovered, namely *Somebody just left* in (1b) and *He is writing* in (2b). I will call these clauses **ANT**(ecedent)**-clauses**. Also, in the full-fledged version of the sluicing example (1b), the interrogative clause differs from the ANT-phrase in just one phrase: we find the *wh*-phrase *who* instead of the overt Determiner Phrase (DP) *somebody*. The phrase in the ANT-clause that corresponds to the sluiced *wh*-phrase will be called **ANT**(ecedent)-**phrase** or **correlate**.

Two main lines have been pursued to interpret sluiced --and, in general, elided-- material. The first strategy is to consider that the missing linguistic material is never present in the syntactic derivation of the sentence. Under this analysis, the interpretation

[3] This is to account for the possibility of backwards Sluicing. See footnote 15 in this chapter.

of the sluices in (1) and (2) as full questions is made possible either by pragmatics --in the same way that pragmatics allows for a full question interpretration of the bare *wh*-phrase in (3) (Ginzburg 1992)--, or by considering that the silent Inflectional Phrase (IP) consists of a silent proform anaphorically related to a previous IP (Hardt (1993) for VP-Ellipsis).

(3) Coffee sounds good. When? (="When shall we have coffee?")

Ross (1969:253) provides an argument that undermines this type of analysis for Sluicing: sluiced *wh*-phrases in German are assigned the case that they would have in the corresponding full-fledged question, as shown in (4). As Chung-Ladusaw-McCloskey (1995:§6.2) point out, it is not clear how a purely pragmatic/semantic resolution of Sluicing would derive this lexical idiosyncrasy if the responsible lexical item is never present in the structure.[4]

(4) a. Sie wissen nicht, wem / *wen er schmeicheln will.
They know not whom-Dat / *whom-Acc he flatter want
"They don't know who he wants to flatter"
b. Er will jemandem schmeicheln, aber sie wissen nicht wem / *wen.
He wants somebody-Dat flatter, but they know not whom-Dat / *whom-Ac.
"He wants to flatter someone, but they don't know who."

The second line proposes that the elided material is syntactically present at the level of representation where interpretation applies. As in other types of ellipsis, two

[4] Ross (1969:253-261) and Levin (1982:594-603) argue extensively against a particular version of this "bare *wh*-phrase" strategy. Their criticism targets an analysis where the sluiced *wh*-phrase is not embedded under an interrogative CP but is directly subcategorized for by the matrix verb. Their arguments do not extend to the version of this theory sketched above. As for examples like (3), Chung-Ladusaw-McCloskey agree that pragmatic inferencing is at issue, but they argue that this procedure only helps with relatively conventionalized fragments.

alternative implementations of this view have been pursued in Sluicing too: the deletion approach and the copy or reconstruction approach.

Under the deletion approach (Ross 1969, Rosen 1976), the linguistic material is present in the underlying representation; a rule deletes it at surface representation (S-Str in Ross and Rosen; Phonetic Form in the current minimalist syntactic framework). This approach is attractive because it allows for a (partially) unified account of Phonological Reduction phenomena: ellipsis is taken as an extreme case of deaccenting, where the targeted segments are not just destressed but completely deleted at surface level. The VP-Reductions in (5) illustrate the two phenomena:

(5) a. VP-Ellipsis:
Ariadna came to the party, and Monica did, too.
b. VP-Deaccenting:[5]
Ariadna came to the party, and Monica *came to the party*, too.

In the copy or reconstruction approach (Williams 1977, Levin 1982, Chung-Ladusaw-McCloskey 1995), instead, the IP node corresponding to the elided material is generated empty. It is later "filled" with linguistic material, before interpretation applies. One such approach is Chung-Ladusaw-McCloskeys' (CLM, henceforth), which contributes very important data and yields wider empirical coverage than any of its competitors in the "bare *wh*-phrase" line, in the deletion approach or in the copy approach.

CLM collect or discover some peculiar characteristics of Sluicing. In this chapter, I will concerned with the following:

[5] Deaccented material is written in italics.

(i) Restriction on **possible antecedent phrases**. CLM note that, in contrast to the grammatical example (1) with an indefinite antecedent, the examples (6) and (7), which display a name and a Quantificational DP as antecedent phrases respectively, are ungrammatical.

(6) *? I know that Meg's attracted to Harry, but they don't know (to) who(m).
(CLM 1995:(28a))

(7) * Each of the performers came in. We were sitting so far back that we couldn't see who {came in}. (CLM 1995:(30b))

(ii) Inheritance of content. The sluiced *wh*-phrase seems to "inherit" the restriction imposed by the N' of the ANT-phrase. For example, as Ginzburg (1992) notes, the sluiced interrogative clause in (8) finds a better paraphrase in (8a) than in (8b). The same judgment holds for (9):

(8) John likes some students, but I don't know who. (CLM 1995:(56))
a. I don't know who of the students / which students John likes.
b. I don't know who / which person John likes.

(9) We should put them (somewhere) in the dinning room but it's not clear where.
(CLM 1995:(51d))
a. It's not clear where in the dinning room we should put them.
b. It's not clear where / in which place we should put them.

(iii) Sensitivity to strong islands. Sluicing with an overt indefinite antecedent and Sluicing with an implicit indefinite antecedent behave differently with respect to islands.

On the one hand, as Ross notices, sluiced interrogative clauses with overt antecedents are immune to islands (and ECP), contrary to their full-fledged versions:[6]

(10) a. Sandy was trying to work out which students would be able to solve a certain problem, but she wouldn´t tell us which one.
b. ?* Sandy was trying to work out which students would be able to solve a certain problem, but she wouldn´t tell us which one she was trying to work out which students would be able to solve. (CLM 1995:(79a)-(80a))

On the other hand, CLM present the following observation, which they attribute to Chris Albert: sluices with implicit indefinite antecedents are sensitive to islands (and ECP), as their full-fledged versions are.

(11) a. * Sandy was trying to work out which students would speak, but she refused to say who to / to who(m). (CLM 1995:(102a))
b. * Sandy was trying to work out which students would speak, but she refused to say who she was trying to work out which students would speak to.

CLM propose an LF algorithm specific to Sluicing and to no other kind of ellipsis to derive these facts. In their account, three LF operations are in charge of copying a syntactic structure into the empty slot and making the resulting LF representation interpretable. From the design of each of these LF operations, the peculiarities described above follow. CLM's Sluicing operations are the following:

[6] Ross does not say that sluiced *wh*-phrases are immune to islands, but rather that island violations in sluiced material result in a milder ungrammaticality than island violations in overt material (p. 276ff). Levin (1982:603ff) and CLM, though, provide impeccable examples of Sluicing across islands.

(12) **IP-Recycling**: Copy the ANT-IP into the empty IP at LF.

(13) **Merger**: merge the ANT-phrase and the *wh*-phrase so that the semantic restriction on the domain of quantification of the Q-operator is determined both by the content of the ANT-phrase and the content of the *wh*-phrase.

(14) **Sprouting**: "sprout" or realize a trace in order to complete a *wh*-chain (i.e., when there was no overt ANT-phrase).

The aim of this chapter is to derive those three peculiarities of Sluicing from independent factors, without having to postulate a special LF mechanism for Sluicing different from the analysis of other types of ellipsis. I will pursue a deletion approach that allows us to maintain the same Recoverability Conditions for Sluicing (and IP-deaccenting) as for VP-Reduction and that derives the characteristics (i)-(iii) from independently motivated factors.

The key point of the analysis will be the presence of a Focus feature in the sluiced *wh*-word. I claim that, in the same way as, in VP-ellipsis, part of the explicit material in the ellipsis clause is highlighted with contrastive focal intonation, the left-over *wh*-word in Sluicing usually receives focal intonation too, though a special pronunciation, involving deaccenting of (at least) the whole *wh*-phrase, is also possible. I will show that judgments about ANT-phrases are determined by whether or not the *wh*-word receives focus stress, and, more concretely, that the ANT-phrase restrictions that CLM (partially) describe occur only in Sluicing with Focus and turn out to be opposite as soon as the sluiced *wh*-phrase is deaccented. Inheritance of content will be also shown to follow from the semantics of Focus/Background and the notion of partial answer. Finally, several factors will be argued to play a role in the (in)sensitivity of Sluicing to strong islands: besides the

felicity conditions imposed by the Focus/Background structure, the necessarily narrowest scope of implicit indefinite NPs and the availability of E-type pronouns determines the puzzling facts about islands.

This chapter is organized as follows. In section 2, I present the analysis of VP-Reduction that I adopt here (Rooth 1992, 1997; Fiengo-May 1994; Tomioka (in prep.)) and that I will extend to Sluicing. We will see that Focus --as treated in Rooth (1985, 1992, 1995) or in Schwarzschild (1996, 1997a,b)-- plays a central role in this approach to Phonological Reduction. Then, I will devote sections 3, 4 and 5 to each of the aforementioned peculiarities of Sluicing, namely, to the restriction on possible ANT-phrases, to the inheritance of content effects and to the island (in)sensitivity, respectively. Section 6 summarizes the conclusions.

1.2 The Role of Focus in VP-Reduction

There is a link between Phonological Reduction and Focus, insofar as, when reduction occurs, part of the remnant material is most naturally uttered with focal intonation.[7] In this section, we will see that two characteristics of Ellipsis and Deaccenting follow from the presence of Focus: first, the focused remnant and its antecedent need to have parallel scope in their respective clauses; second, the focused remnant needs to contrast in semantic content with its antecedent.

[7] See Rooth (1992b:14) for a brief discussion of this issue. One could go further, like Schwarzschild (1997a), and suggest that focus stress vs. lack of focus stress is determined by the information flow of the discourse: novel material is focused, whereas known, given material is not focused. From this, the correlation between reduced contituents and focused remnants follows as an epiphenomenon: provided that a sentence adds some new information, some element in it will carry focus intonation; since only constituents providing given information can be phonologically reduced, focus stress will appear in (part of) the remnant material.

1.2.1 Scope Parallelism between Antecedent and Remnant

Let us examine the scope parallelism relation first.

As proposed in Fiengo-May (1994), the recoverability condition governing VP-Ellipsis is double. First of all, the elided VP has to be syntactically identical to the antecedent VP at LF, as (15) dictates:

(15) LF-condition on VP-Ellipsis:

A VP may be elided only if it is LF-equivalent to another VP in the discourse, up to different indices.[8]

A second condition is needed in order to account for a well-known observation: if the two VPs do not contain exactly the same indices (e.g. because they contain sloppy pronouns or different traces of movement), the binders of those indices must have parallel scope. The example (16) illustrates this parallelism requirement for binders of sloppy pronouns (Sag 1976), and the example (20) illustrates it for QR-movement of Quantificational NPs (Hirschbühler 1982, Fox 1995, Tomioka 1995):

(16) Norma told Beth_1's boyfriend to give her_1 a dime, and Judy told Lois's boyfriend to.

a.√ Strict reading: {to give Beth a dime}. (Sag 1976)

b. √ Sloppy reading with respect to to Lois: {to give Lois a dime}.

c. * Sloppy reading with respect to Judy: {to give Judy a dime}.

[8] Besides variability in indices, Fiengo-May allow for some variability in the shape of coindexed expressions: a coindexed pronoun can take the place of a name or a trace in the elided VP. This license is known as vehicle change (see their chapter 6). A semantic alternative to this first condition is explored in Rooth (1997).

(20) Exactly three boys admire every professor, and exactly three girls do, too.

a. "There are exactly three boys that admire every professor, and there are exactly girls that admire every professor too."

b. "For every professor, there are exactly three boys that admire him/her, and, for every professor, there are exactly three girls that admire him/her too."

c. * "There are exactly three boys that admire every professor and, for every professor, there are exactly three girls that admire him/her."

d. * " For every professor, there are exactly three boys that admire him/her, and there are exactly three girls that admire every professor."

In Fiengo-May, this parallelism condition is implemented in purely structural, syntactic terms: the pattern of indices in the ANT-clause and in the ellipsis clause has to be isomorphic.[9] However, Rooth (1992b) argues against this approach in view of examples like (21), where the sloppy reading is available even though the sloppy Subjects *Mary* and *Sue* are not in isomorphic syntactic positions:

(21) First John told Mary I was bad-mouthing her, and then Sue heard I was. (Rooth 1992b:30))

a. Sloppy reading: "John told Mary I was bad-mouthing Mary and then Sue heard I was bad-mouthing Sue".

Rooth proposes that the required parallelism is semantic and that it is related to the felicity conditions of Focus. He implements this idea within the focus theory developed in Rooth (1985, 1992a, 1995): a set of focus alternatives --the Focus semantic value of of β, $[[.]]^f$-- is defined, and one of these alternatives is required to be expressed or implied in

[9] For a technical formulation of Fiengo-May's indexical dependency condition, see their pp. 52ff and 95ff.

the previous discourse. Rooth's recursive definition of Focus semantic value is given under (22), and his Focus semantic condition for VP-Reduction is provided under (23):[10]

(23) Definition of Focus semantic value:

(i) If α is a non-focused lexical item, then $[[\alpha]]^f = \{ [[\alpha]] \}$.

(ii) If α is a focused lexical item, then $[[\alpha]]^f = D_\sigma$, where σ is the type of $[[\alpha]]$.

(iii) If the node α has the daughters β and γ (order irrelevant), and there are types σ and τ such that $<\sigma,\tau>$ is the type of $[[\beta]]$ and σ is the type of $[[\gamma]]$, then $[[\alpha]]^f = \{x \in D_\tau: \exists y,z [y \in [[\beta]]^f \ \& \ z \in [[\gamma]]^f \ \& \ x=y(z)]\}$

(24) **Focus semantic condition**:

There must be LF-constituents α and β dominating the ANT-VP and the reduced VP respectively such that the ordinary semantic value of α belongs to (or implies a member of) the focus semantic value of β.

I give the Focus semantic value of the second conjunct of the examples (20) and (21) below.[11] Note how the Focus semantic condition proposed by Rooth is met in each of these examples. In the case of (20), the proposition denoted by the ANT-clause belongs to the set of alternatives generated by the Focus only if the Quantificational NPs have parallel scope. In the example (21), the Focus condition is satisfied via implicational

[10] Fiengo-May (p. 100, fn 6) present a potential counterexample to Rooth's Focus semantic condition, given in (i). This example is reminiscent of other potential counterexamples --like (ii), mentioned in Rooth--, where the ANT-proposition does not imply a focus alternative to the second proposition. Rooth (1992b:§7) envisages a possible avenue to solve this problem --giving more room to pragmatic inferencing and accommodation in order to fulfill the felicity conditions imposed by Focus (i.e., by the squiggle operator)--, but he leaves open how this idea should be exactly executed.
(i) First John told Mary I was bad-mouthing her. Then Sue behaved as though I was {bad-mouthing Sue}.
(ii) He_1 bit her_2, and then she_2 punched him_1. (attributed to Bierwisch)

[11] From this point on, focused material will be written in CAPITALS.

bridging: the ANT-proposition implies a proposition in the set of alternatives of the ellipsis clause.

(20) Exactly three boys admire every professor, and exactly three GIRLS do, too.

(25) Set of Focus alternatives for the $\exists >> \forall$ reading of second conjunct of (20):

$[[[\textit{exactly three GIRLS}_1 [\textit{every professor}_2 [t_1 \textit{ admire } t_2]]]]]^f$

$= \{p: \exists Q_{<e,st>} [p= \lambda w.\exists_3 x(Q(x)(w) \ \& \ \forall y (\text{professor}(y)(w) \rightarrow \text{admire}(y)(x)(w)))]\}$

= {that there are exactly three women that admire every professor, that there exactly three boys that admire every professor, that there are exactly three men that admire every porfessor, ...}

(26) Checking Focus Condition for (20):

a. The proposition "that there are exactly three boys that admire every professor" $\in$ $[[[\textit{exactly three GIRLS}_1 [\textit{every professor}_2 [t_1 \textit{ admire } t_2]]]]]^f$.

b. The proposition "that, for every professor, there are exactly three boys that admire him/her" $\notin$ $[[[\textit{exactly three GIRLS}_1 [\textit{every professor}_2 [t_1 \textit{ admire } t_2]]]]]^f$

(21) First John told Mary I was bad-mouthing her, and then SUE heard I was.

(27) Set of Focus alternatives for the sloppy reading of the second conjunct of (21):

$[[\textit{SUE}_2 \textit{ heard I was bad-mouthing her}_2]]^f$

$= \{p: \exists x_e [p= \lambda w.x \text{ heard in } w (\lambda w'.\text{bad-mouth}(x)(I)(w'))] \}$

= {that Sue heard I was bad-mouthing Sue, that Mary heard I was bad-mouthing Mary, that Peter thought I was bab-mouthing Peter, ...}

(28) Checking Focus Condition for (21):

The proposition "that John told Mary I was bad-mouthing Mary" implies the proposition "that Mary heard I was bad-mouthing Mary", which is a member of [[*SUE*$_2$ *heard I was bad-mouthing her*$_2$]]^f.

The same results are achieved if we use Schwarzschild's (1997a,b) Focus/ Background theory to account for this scope parallelism. Schwarzschild proposes that non-focused material needs to be given in the previous discourse, as stated in (29). (30) spells out the conditions that make an utterance "given".

(29) **Givenness Condition**:

If a syntactic node is not Focus marked, it has to be given in the discourse.[12]

(30) An utterance U counts as given iff it has a salient antecedent A and (modulo ∃-type shifting) A entails [or implies] the result of replacing Focus marked parts of U with existentially bound variables of the same semantic type.[13]

In (31) and (32), I illustrate how this Givenness condition applies to the examples (20) and (21) respectively. In the first example, the focused Noun *girls* is replaced with a variable Q of the same semantic type (<e,st>), which is then bound by ∃-closure. The proposition denoted by the second clause in (20) after this substitution has to be "given" (entailed or implied) in the previous discourse. This requirement enforces the desired

[12] A whole constituent may be Focus marked even if only part of it receives focal stress. See Selkirk (1995), Truckenbrodt (1995) and Wold (1995) for Focus Projection (i.e., for the relation between focal stress and semantic Focus marking). For the purposes of this chapter, though, we can equate stressed material with Focus marked material.

[13] Since entailment is only defined for propositions, ∃-type shifting is needed when givenness is checked for non-clausal nodes. The addition "or implies" is mine and is aimed to account for Rooth's implicational bridging examples.

scope parallelism between the Quantificational NPs of the antecedent and ellipsis clause, as shown in (31). In the second example, the focused name *Sue* is of type e and, thus, the existentially closed variable that replaces it is, too. The resulting proposition is implied by the previous clause. Hence, the semantic scope parallelism between the binders of the sloppy pronouns is derived, too.

(20) Exactly three boys admire every professor, and exactly three GIRLS do, too.

(31) Checking Givenness for the ∃>>∀ reading of second conjunct of (20):

a. The antecedent proposition "that there are exactly three boys that admire every professor" entails $\lambda w.\exists Q_{<e,st>}\exists_3 x[Q(x)(w) \& \forall y\ (professor(y)(w) \rightarrow admire(y)(x)(w))]$

b. The antecedent proposition "that, for every professor, there are exactly three boys that admire him/her" does not entail or imply $\lambda w.\exists Q_{<e,st>}\exists_3 x[Q(x)(w) \& \forall y\ (professor(y)(w) \rightarrow admire(y)(x)(w))]$

(21) First John told Mary I was bad-mouthing her, and then SUE heard I was.

(32) Checking Givenness for the sloppy reading of the second conjunct of (21):

The antecedent proposition "that John told Mary I was bad-mouthing Mary" implies $\lambda w.\exists x_e$ [heard ($\lambda w'$.bad-mouth(x)(I)(w')) (x) (w)]

1.2.2 Contrast between Antecedent and Remnant

A second characteristic of elliptical constructions that follows from the semantics of Focus is the following: focused material in remnants has to contrast semantically with the

corresponding portion of the antecedent phrase. This is shown by the contrast in the VP-ellipsis example (33) and, independently of ellipsis, in (34):

(33) a. Rosa_1 wanted to come to the U.S., but she_1 $\text{WON'T}_{\text{F-marked}}$.

b. # Rosa_1 wanted to come to the U.S., but $\text{SHE}_{1\ \text{F-marked}}$ $\text{WON'T}_{\text{F-marked}}$.

(34) a. Rosa likes chocolate, and $\text{JOSE}_{\text{F-marked}}$ likes chocolate, too.

b. * Rosa likes chocolate, and $\text{JOSE}_{\text{F-marked}}$ likes $\text{CHOCOLATE}_{\text{F-marked}}$, too.

In Schwarzschild's terminology, non-focused material has to be new, not given in the previous discourse. The utterances (33b) and (34b) are odd because they have focal stress on material whose denotation is already given in the previous sentence, namely on she_1 (=Rosa) and on *chocolate*.

To account for this fact, Schwarzschild proposes the contraint in (35), which he views as an instance of Grice's Maxim of Quantity (limit the felicity conditions of your utterance as much as possible) (1996a:26).

(35) **Avoid Focus Constraint**: (Avoid F)

Focus-mark as little as possible, without violating Givenness (or Rooth's Focus condition).

Let us see this constraint at work with the example (34). First, we see that Avoid F is satisfied in (34a), since sparing the Focus marking of *Peter* would make the fulfillment of Rooth's Focus condition --as shown in (36)-- and of Schwarzschild's Givenness requirement --as in (37)-- impossible:

(34) a. Rosa likes chocolate, and JOSE likes chocolate, too.

(36) Checking felicity of Focus in Rooth:

√ Focus Condition:

[[*Mary likes chocolate*]] $\in$ [[*PETER likes chocolate*]]^f

√ Avoid Focus Principle:

[[*Mary likes chocolate*]] $\notin$ [[*Peter likes chocolate*]]^f

(37) Checking felicity of Focus in Schwarzschild:

√ Givenness Condition:

[[*Mary likes chocolate*]] entails $\lambda w.\exists x_e$[like(chocolate)(x)(w)]

√ Avoid Focus Principle:

[[*Mary likes chocolate*]] does not entail λw.like(chocolate)(j)(w)

If we turn now to (34b), we can see that the utterance is unfelicitous precisely because the focal stress (or Focus marking) on *chocolate* is not necessary for the Focus condition and the Givenness condition to be met. That is, even if we do not focus this constituent, those two conditions are satisfied, as (38) and (39) show:

(34) b. * Rosa likes chocolate, and JOSE likes CHOCOLATE, too.

(38) Checking felicity of Focus in Rooth:

√ Focus Condition:

[[*Mary likes chocolate*]] $\in$ [[*PETER likes CHOCOLATE*]]^f

* Avoid Focus Principle:

[[*Mary likes chocolate*]] $\in$ [[*PETER likes chocolate*]]^f

(39) Checking felicity of Focus in Schwarzschild:

√ Givenness Condition:

[[*Mary likes chocolate*]] entails $\lambda w.\exists x_e y_e$[like(y)(x)(w)]

* Avoid Focus Principle:

[[*Mary likes chocolate*]] entails $\lambda w.\exists x_e$[like(chocolate)(x)(w)]

In sum, Avoid F dictates that unnecessary Focus stress (or Focus marking) has to be avoided. Hence, focal stress in a constituent yields an utterance felicitous only if that constituent provides new information, that is, only if it contrasts in meaning with its antecedent in the ANT-clause.[14]

To summarize this section 2, we have seen that part of the remnant material in VP-Ellipsis (and, in general, in other elliptical constructions) usually receives focal intonation. Structures containing focused constituents are subject to two types of requirements: first, a background condition requires the non-focused material to be entailed or implied by the previous discourse (Rooth's Focus condition or Schwarzschild's Givenness condition); second, a novelty condition requires the focused portion to be novel (Avoid F). These are all felicity conditions for Focus, no matter whether the focused constituent is a remnant in an ellipsis construction or not. From them, two characteristics of focused (remnant) constituents follow:

(40) a. The focused remnant and its antecedent must have parallel scope in their respective clauses.

[14] Rooth builds this contrastiveness requirement directly into the semantic of Focus (namely, into the semantics of the squiggle operator). I choose Shwarzschild's Avoid F Constraint over Rooth's strategy since it yields a more elegant account of the minimality of Focus, both with multiple foci --as noted by Schwarzschild-- and with the choice of the smallest possible focused constituent --as shown by Truckenbrodt (1995).

b. The focused remnant must contrast in meaning with its antecedent.

In the next sections, I will make crucial use of these two charactistics of focused remnants in order to explain the observed peculiarities of Sluicing.

1.3 Restriction on Possible Antecedent Phrases

1.3.1 Chung-Ladusaw-McCloskey's (1995) Data and Analysis

As I mentioned above, CLM observe that not all kinds of DPs are licit ANT-phrases for a sluice. They note that there exists an asymmetry between weak indefinite DPs and *wh*-phrases, on the one hand, and names and quantificational DPs, on the other: weak indefinite DPs and *wh*-phrases are licit ANT-phrases for a sluice, whereas names and quantificational DPs are not. The relevant data from which this genaralization is drawn are given in (41) through (44); the generalization itself is sketched in (45).

(41) Indefinite DP as ANT-phrase:

Joan ate dinner with someone, but I don't know with who.

(42) *Wh*-phrase as ANT-phrase:

We know how many papers this reviewer has read, but we don't know which ones.

(43) Name as ANT-phrase:

*? I know that Meg's attracted to Harry, but they don't know to who.

(44) Quantificational NP as ANT-phrase:

a. * Each of the performers came in. We were sitting so far back that we couldn't see who.

b. * She has read most books, but we don't know which ones.

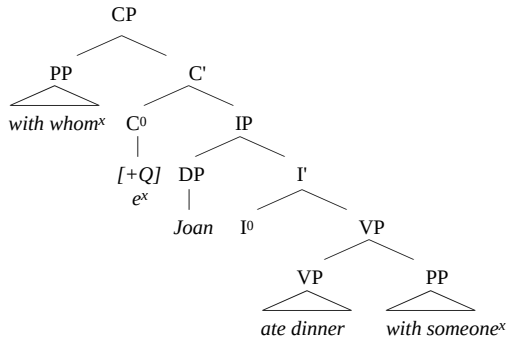
(45) CLM's empirical generalization on ANT-phrases:

Good ANT-phrases	Bad ANT-phrases
weak indefinites: (41)	names: (43)
wh-phrases: (42)	quantificational NPs: (44)

As we saw, CLM propose a purely syntactic algorithm to build interpretable LFs for sluiced interrogatives. One of their LF-operations is IP-Recycling, repeated in (46) and illustrated in (47):

(46) **IP-Recycling**: Copy the ANT-IP into the empty IP at LF.

(47) Joan ate dinner with someone, but I don't know with whom.



From this operation plus the (standard) ban against vacuous quantification, the facts about ANT-phrases are derived. Let us see how. As in any interrogative clause, the Q-operator in C^0 has to bind a variable in order to avoid vacuous quantification.[15] Since, instead of the t_{wh}, we have the antecedent phrase copied along within the recycled IP, the antecedent phrase needs to provide this free variable. CLM assume that only weak indefinites and *wh*-phrases are interpreted as open formulae providing a free variable at LF --following Kamp(84)/Heim(82) framework--, whereas names and Quantificational NPs do not introduce a free variable. This assumption renders the desired empirical coverage: Q-binding succeeds when the antecedent phrase is an indefinite or a *wh*-phrase; it results in vacuous quantification otherwise.[16]

1.3.2 Revision of the Data

1.3.2.1 Further Data on Good and Bad ANT-Phrases

A broader set of data will show that the facts about ANT-phrases are not as captured by the generalization in (45). In the examples (48) and (49), we have a weak indefinite and a *wh*-phrase as ANT-phrases respectively; yet, sluicing is ungrammatical. On the other hand, names and quantificational DPs functioning as ANT-phrases do not result in ungrammaticality in (50)-(51), unexpectedly too.

[15]CLM use Karttunen's denotations for interrogatives clauses, that is, sets of propositions. I understand that the semantic contribution of the Q-operator they present is double. On the one hand, it turns proposition denoting expressions into question denoting expressions, much like Karttunen's (1977) Proto-Question Rule (p. 13). On the other hand, it is in charge of binding the free variable (the trace) left by *wh*-movement within the IP, which was done by a separate rule --*Wh*-Quantification Rule, p. 19-- in Karttunen. This second aspect of the Q-operator's semantics is the crucial one for their argumentation on good and bad ANT-phrases.

[16] Although they do not say explicitly so, CLM probably assume that strong indefinite DPs are interpreted as open formulae too, since those are perfect ANT-phrases for Sluicing:
(i) She's read one of these books, but I don't know which one.

(48) Indefinite NP as ANT-phrase:

* I know that four students came to the party, but they don't know HOW MANY.

(49) *Wh*-phrase as ANT-phrase:

a.* We know how many papers this reviewer has read, but they don't know HOW MANY.

b.* We know which papers this reviewer has read, but they don't know WHICH ones.

(50) Name as ANT-phrase:

I know that Joan, Pat, Sam and Paul danced the first tango, but I don't know WHO with WHO.[17]

(51) Quantificational NP as ANT-phrase:

a. She has read most books, but we don't know EXACTLY which ones.[18]

[17] Examples (50) and (51b) are not cases of gapping for two reasons. First, VP-ellipsis and Sluicing can occur in embedded clauses, as Reinhart-Rooth (1986:4) point out, but gapping can happen only in matrix clauses (Hankamer 1971:19, Johnson 1996:21):
(i) Alfonse stole the emeralds and Muggsy the pearls.
(ii) * (I think) Alfonse stole the emeralds, and I / Harvey think(s) Muggsy the pearls. (Hankamer 1971:19)
Second, Tomioka (p.c.) pointed out to me that backward Sluicing is possible, as in (iii). Again, multiple *wh*-remnants pattern like Sluicing (ex. (iv)) rather than like gapping (ex.(v)) in this respect:
(iii) I don't know WHO, but I'm sure she's dating somebody.
(iv) I don't know WHO with WHO, but I'm sure everybody will dance with somebody.
(v) * Alfonse the emeralds and Muggsy stole the pearls.
It is not clear, though, how to treat (50) and (51b) as ellipsis of a whole IP. Maybe the (usually LF)movement of the in-situ *wh*-phrase of a multiple question is done by Spell-Out in Sluicing. Note, in any case, that a similar problem arises with stranded prepositions, which in full interrogatives clauses appear in base generated position but in Sluicing may follow immediately the *wh*-phrase, as in (vi). Again, this is not a case of gapping since the ellipsis is embedded. (On deleted and stranded prepositions in Sluicing, see Ross (1969:265-6), Rosen (1976), Levin (1982:606ff) and CLM (1995:fn1))
(vi) She went out for dinner, but I don't know WHO with.

[18] The example (51a) is CLM's. They leave its explanation for further research.

b. I know everybody danced with somebody, but I don't know WHO with WHO.

Contrary to what CLM had concluded from their data, the examples (48)-(49) show that the variable provided by the ANT-phrase is not sufficient to yield a grammatical sluice, and the examples (50)-(51) show that it is not necessary either. The generalization resulting from the previous and new data is given under (52).

(52) New empirical generalization on ANT-phrases:

Good ANT-phrases	Bad ANT-phrases
indefinites: (41)	indefinites: (48)
wh-phrases: (42)	*wh*-phrases: (49)
names: (50)	names: (43)
QuNPs: (51)	QuNPs: (44)

From this generalization, we conclude that the kind of DP that constitutes the ANT-phrase does not determine by itself the (un)acceptability of the ANT-phrase in a sluice.

But we can still go further. So far, the examples we have seen --i.e., CLM's examples and the new examples in (48)-(51)-- involve focus stress on the *wh*-word. What would happen if we enforce a special intonation of Sluicing, removing the focus pitch and deaccenting the whole *wh*-phrase (and maybe some more material)? It turns out that, in this case, the ungrammatical examples (48), (49) and (43) become grammatical, as (48'), (49') and (43') show:[19]

[19] In these deaccented examples, I change the stress pattern of the second conjunct in order to make it possible for the reader to deaccent the *wh*-Determiner. It seems that phonologically reducing some syntactic material --because it is redundant-- involves stressing some other constituent that brings new information -- in this case, the main Subject *THEY*.
Notice, however, that placing focus stress on the subject *they* is not directly responsible for the improvement of the sluicing, since the example with stress on *they* but also on the *wh*-word is still bad:
(i) * We know how many papers this reviewer has read; (but) THEY don't know HOW MANY.

(48') I know that four students came to the party; THEY *don't know how many*.

(49') a. We know how many papers this reviewer has read, but THEY *don't know how many*.

b. We know which papers this reviewer has read, but THEY *don't know which ones*.

(43') I know that Meg's married to Harry; THEY *don't know to who*.[20]

By contrast, the grammatical examples (41), (42), (50) and (51b) deteriorate up to ungrammaticality if the sluiced *wh*-phrase is deaccented:

(41') * I know that Joan ate dinner with someone, but THEY *don't know with who*.

(42') * We know how many papers this reviewer has read, but THEY *don't know which ones*.

[20]Some speakers do not get a contrast between the focused version and the deaccented version of example (43) in English, thus ruling out both. In Catalan and Spanish, instead, there is a clear cut contrast: (i) is a perfect sluice without Focus on the *wh*-word (the two main subjects sound as contrastive Topics), whereas the focused version (ii) is odd, only salvagable if the previous context is independently motivating the Focus in the *wh*-word:

(i) Nosaltres sabem que la Nuria esta interessada en el Pere, pero ells no sabem en qui. (Catalan)
Nosotros sabemos que Nuria esta interesada en Pedro, pero ellos no saben en quien. (Spanish)
We know that (the) Nuria is interested in (the) Peter, but they not know in who.

(ii) # Nosaltres sabem que la Nuria esta interessada en el Pere, pero ells no sabem en QUI. (Catalan)
Nosotros sabemos que Nuria esta interesada en Pedro, pero ellos no saben en QUIEN. (Spanish)

At this point, I do not have any explanation for this disagreement. The analysis that I will propose rules in (43') as well as (i). Further research needs to be done on the nature of *which*-phrases in those languages.

Also, examples like (44a), with a QuNP as ANT-phrase, do not turn grammatical when the *wh*-word is deaccented, as (iii) shows, not even in Catalan/Spanish. Note, though, that its full-fledged, non-deaccented version in (iv) is not perfect either. The status of this type of examples may depend on the relation between questions and total and partial answers, a factor that will be shown to play a crucial role in other examples of Quantificational ANT-NPs, like (44b)-(51a) (=v). See subsection 3.5 on this issue.

(iii) * Tobi knows that each of the performers came in; SIMONE *doesn't know who*.

(iv) ?? Tobi knows that each of the performers came in, but SIMONE doesn't know who came in.

(v) She has read most books, but we don't know *(EXACTLY) which ones.

(50') * I know that Joan, Pat, Sam and Paul danced the first tango, but THEY *don't know who with who*.

(51') b. * I know everybody danced with somebody, but THEY *don't know who with who*.

If we take a close look at the good and bad examples, the following generalization arises. When the sluiced *wh*-word bears **focus** stress, any kind of DP will be an acceptable ANT-phrase if and only if it **contrasts** with the information asked by the *wh*-phrase; that is, iff the question denoted by the ANT-clause is not the same as the question denoted by the sluiced clause (e.g., if the ANT-clause inquires about the quantity or existence of students and the sluiced interrogative asks for their identity). If there is **no focus** on the *wh*-phrase, instead, a DP will be a good ANT-phrase if and only if the denotaton of the ANT-clause and the denotation of the sluiced interrogative are the **same**.

1.3.2.2 IP-Deaccenting *vs*. IP-Ellipsis (or Sluicing)

IP-Deaccenting patterns like Sluicing, even though no IP-Recycling or binding of a free variable is involved. This is shown by the oddness of both (53) and its deaccented version (54), which differ only in terms of the syntactic presence or absence of the IP, keeping the focus stress equal:

(53) *? I know that Meg's attracted to Harry, but they don't know to WHO.

(54) ?? I know that Meg's attracted to Harry, but they don't know to WHO *Meg's attracted*.

If the oddness of (53) and (54) is to be accounted for in a unified fashion, it cannot be due to any syntactic operation to recover elided material, since there is no elision in the deaccenting case.

In conclusion, the new data on good and bad ANT-phrases and on IP-deaccenting presented in this subsection have shown that the acceptability of an ANT-phrase does not depend on the kind of DP by itself. Instead, the acceptability of an ANT-phrase is the result of the interaction of two factors: the presence/absence of focus on the *wh*-word and the contrast/similarity between an ANT-denotation and the denotation of the sluiced interrogative clause (or higher constituent). This contrast/similarity hinges on the semantic contribution of both the ANT-phrase and the *wh*-word, not just on the shape of the ANT-phrase by itself.

1.3.3 Proposal

In this section, I will derive the data above from the focus stress on the sluiced *wh*-word and not from LF-operations specific to Sluicing. I will show that VP-Reduction and Sluicing can receive a unified analysis --namely, the one described in section 2-- and that the facts about ANT-phrases follow from the felicity conditions of Focus. The crucial condition will be Avoid F, which --as we saw-- is directly responsible for the characteristic in (55) (=40b) that focused material displays:

(55) The focused remnant must constrast in meaning with its antecedent.

Let me first recapitulate the Recoverability Conditions for VP-Ellipsis, which I slightly modify to cover IP-Ellipsis (i.e., Sluicing), too. The LF-Condition in (56) is only operative for ellipsis; the Background condition (in either Rooth's version or

Schwarzschild's version) and Avoid F describe the felicity conditions of Focus/Background and, hence, apply to both ellipsis and deaccenting of constituents.

(56) **LF-condition**:

A constituent may be elided only if it is LF-equivalent to another constituent in the discourse, up to different indices.

(57) **Background condition**:

a. Rooth's Focus condition:

There must be LF-constituents α and β dominating the ANT-constituent and the phonologically reduced constituent respectively such that the ordinary semantic value of α belongs to (or implies a member of) the focus semantic value of β.

b. Schwarzschild's Givenness condition:

If a syntactic node β is not Focus marked, there has to be a salient antecedent α suth that (modulo $\exists$-type shifting) α entails or implies the result of replacing the Focus marked parts of β with existentially bound variables of the same type.

(58) **Avoid Focus Constraint:**

Avoid Focus, unless needed to fulfill the background condition (57).

In order to apply this framework to Sluicing, I need to define a class of alternative denotations of the same semantic type for the focused portion of the *wh*-phrase, so that either version of the background condition can apply. We have seen that several kinds of NPs may contrasts with a focused *how many* phrase or with a focused *which* phrase, in the appropriate circumstances: contrasting ANT-phrases may be indefinites, names, quantificational NPs and, also, *wh*-phrases themselves. I will take the examples with antecedent *wh*-phrases as the core cases to define the desired set of alternatives. I will

then propose that ANT-clauses containing other kinds of ANT-phrases satisfy the background conditions not by direct membership to the set of Focus alternatives, but by implicational bridging (or logical entailment).

In all the examples that we have seen, the Focus of the *wh*-phrase was placed on the *wh*-Determiner. Hence, our task is to define the set of alternatives of a focused *wh*-Determiner. The denotations of *which* and *how many* are obvious alternatives to each other, and they behave as such in Sluicing examples, e.g., in (58a). We still need, though, a third alternative in view of the examples (58b)-(58c): the interrogative Complementizer *whether*, together with the Determiner *any*, seems to build a question denotation that functions as an alternative to the corresponding *how many*-question and *which*-question. That is, each of the questions denoted by the embedded interrogative clauses in (59) are Focus alternatives of each other (or entail the Focus-∃-closure version of each other).

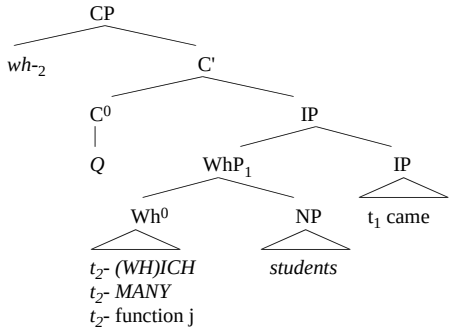
(58) a. They usually ask **how many** papers the candidate reviewed for the journal, but they never ask **WHICH** ones.
b. They usually ask **whether** the candidate reviewed **any** papers for the journal, but they never ask **HOW MANY**.
c. They usually ask **whether** the candidate reviewed **any** papers for the journal, but they never ask **WHICH** ones.

(59) a. They ask which papers the candidate reviewed for the journal.
b. They ask how many papers the candidate reviewed for the journal..
c. They ask whether the candidate reviewed any papers for the journal..

A sample LF for these three kinds of alternative interrogatives clauses is given under (60). Note that the *wh*-phrase is split in two parts: the *wh*-morpheme that moves to Spec-CP and the rest of the *wh*-phrase, that is, the left-over *wh*-Determiner t_2*-(wh)ich/many*

plus the NP *students*. The *wh*-morpheme is identical for all three alternative questions; the Focus feature is placed on the left-over Determiner, excluding the trace of *wh*-movement.[21]

(60) (I know) which / how many / whether some students came.



The intended semantic values of the relevant lexical entries in (60) are given in (61) through (64). First, under (61), I present the denotation of the *wh*-morpheme, common in all three alternative trees.

[21] Alternatively, we could consider that *wh*-phrases introduce a free variable and that the *Q*-operator in C^0 (un)selectively binds this variable (the free variable would take the place of the trace t_2), as in Baker (1970). Also, in the chapter on *which* phrases, I conclude that the index (free variable or trace) that a *which* phrase introduces ranges over intensional choice functions rather than over individuals. To make the denotation of *how many* phrases parallel, I would have to say that *how many* ranges not over individuals (numbers), but over intensional choice functions that yield "numerical" concepts as values. Note that this sophistication may turn out to be empirically motivated in view of examples like (i) and (ii), which have a reading where the particular number varies from bouletic world to bouletic world (intensional reading in (i)) and for world-player pairs (intensional functional reading in (ii)). For perspicuity, I will present my analysis of Sluicing as though *wh*-phrases ranged over individuals.
(i) Q: How many papers do you want me to read per week?
A: As many as your T.A. considers appropriate.
(ii) Q: How many friends of his_1 does the coach want every $player_1$ to bring along to the game?
A: As many as he_1 brought to the winter final.

(61) [[*wh*-]] = f ∈ $D_{<<e,<s,<st,t>>>, <s,<st,t>>>}$ such that, for every P ∈ $D_{<e,<s,<st,t>>>}$, every w ∈ D_s, p ∈ $D_{<st>}$

f(P)(w)(p) = 1 iff ∃x[P(x)(w)(p)]

(62) and (63) introduce the semantic value of the left-over *wh*-Determiners *many* and *(wh)ich*. Note that, once their denotations are combined with the value of t_2, their semantic type is the standard one for Determiners (<<e,st>,<<e,st>,<st>>>, abbreviated as δ).

(62) [[*many*]] = f ∈ $D_{<e,\delta>}$ such that for every n ∈ D_e, every P, Q ∈ $D_{<e,st>}$ and every w ∈ D_s,

f(n)(P)(Q)(w) = 1 iff $\exists_n$x [P(x)(w) & Q(x)(w)]

(63) [[*(wh)ich*]] = f ∈ $D_{<e,\delta>}$ such that, for every x ∈ D_e, every P, Q ∈ $D_{<e,st>}$ and every w ∈ D_s,

f(x)(P)(Q)(w) = 1 iff P(x)(w) & Q(x)(w)

Finally, under (64), a function j is defined with the same semantic type as *many* and *(wh)ich* to yield the third alternative, namely the propositional concept "whether some students came". This function j does not correspond to any syntactic constituent; it is just a semantic object of the same type as the semantic objects referred to by *many* and *(wh)ich*.[22]

[22] The reader should take this particular implementation of the *whether* alternative as tentative and rough. I have to leave for further research many issues concerning the semantics of *whether* that may prove relevant to our discussion. Among others, let me mention that, even though the function j does not correspond to one single lexical item, it may turn out to be the denotation of a discontinous syntactic constituent, namely the denotation of crosscategorial *whether* associated with *any*. That *whether* may associate with *any* to form a unit is suggested by two types of data.

The first set of data involves displacement of pitch accent onto the associated element. The crosscategorial disjunction burried in *whether* can conjoin not only clauses but also smaller constituents, as

(64) Function j: j ∈ $D_{<e,\delta>}$ such that for every n ∈ D_e, every P, Q ∈ $D_{<e,st>}$ and every w ∈ D_s,

j(n)(P)(Q)(w) = 1 iff ∃x [P(x)(w) & Q(x)(w)]

The result of the semantic computation yields Hamblin-type denotations for questions, that is, a function from worlds to sets of propositions (to each world w, this function assigns the set of possible answers to that question in w). The reader can follow the details of the computation in (65)-(67):[23]

in (i.a) and (ii.a). Larson (1985) proposes that, in either case, *whether* originates next to the disjuntion and forms a constituent with it (the constituent *(wh)ether IP or IP* in (i.a), and *(wh)ether John or Mary* in (ii.a)). Note that, if we want to make the questions in (i.a) and (ii.a) contrastive, the Focus pitch accent falls on the disjunct constituent (if present), not on *whether*, as (i-ii.b,c,d) show. Crucially, as A. Kratzer (p.c.) pointed out to me, the same displacement can be executed for *whether...any*, as (iii) shows.

(i) a. I'll tell you whether she came (or not).
b. I'll tell you WHETHER she came (... but not WHY).
c. # I'll tell you WHETHER she came or not (... but not WHY).
d. I'll tell you whether she came or NOT (... but not WHY).

(ii) a. I'll tell you whether she visited John or Mary.
b. # I'll tell you WHETHER she visited John or Mary (... but not WHY).
(It can only mean"whether she visited J or M or she didn't".)
c. I'll tell you whether she visited JOHN or MARY (... but not WHY).

(iii) a. They ask WHETHER the candidate reviewed papers for the journal.
b. They ask whether the candidate reviewed ANY papers for the journal.

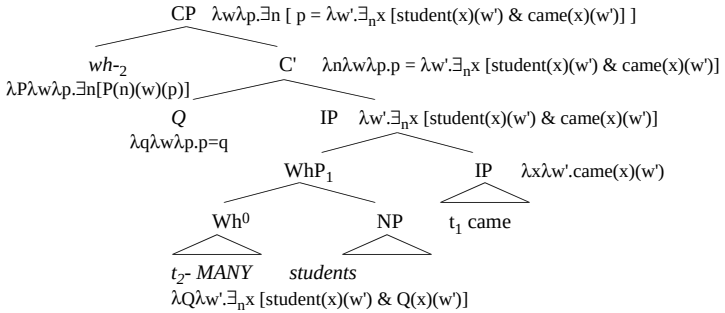
The second piece of data concerns examples like (iv), also brought to my attention by A. Kratzer. For many speakers, the examples in (iv) are good sluices under the readings "how many books", "how many paintings", "which guy", which are different from "how many good books", "how many famous paintings" and "which American guy". Here again, *whether* and the focused adjective seem to form a syntactic/semantic unit that contrasts with the interrogative Determiner *how many* or *which*.

(iv) a. I want to know whether you've read GOOD books this summer (or NOT). I don't want to kow HOW MANY.
b. This guidebook doesn't tell you whether a museum has FAMOUS paintings (or NOT). It only tells you HOW MANY.
c. The immigration officers will ask you whether you are dating an AMERICAN guy (or NOT). They definitely won't ask you WHO.

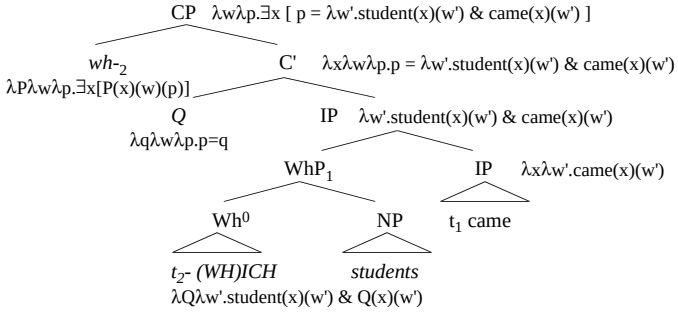
[23] In Hamblin (1973), as in Karttunen (1977), the proposition "no student came" does not belong to the denotation of *which student came* (=66). To account for the meaning of *know which students came* when no student actually came, I adopt Karttunen's (1977:fn11) denotation of *know* (or Heim's (1994) elaboration on it), modified as in (i) to match Hamblin's denotations. The same strategy can be used to derive this case from the denotation that I propose for *whether any student came* (=67), which differs from Karttunen's (and may be different from what Hamblin had envisaged, too --see Hamblin p. 50).

(i) [[*know*]](Q)(x)(w)=1 iff:
a. ∀p [Q(w)(p) & p(w) → x believes p in w] , and
b. if ¬∃p[Q(w)(p) & p(w)], then x believes in w (λw'.¬∃p[Q(w')(p) & p(w')]).

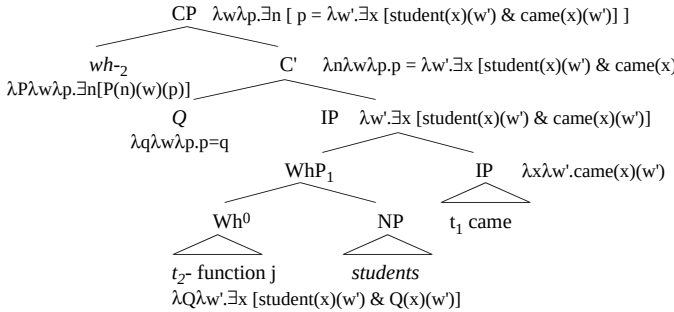
(65) (I know) how many students came.



(66) (I know) which students came.



(67) (I know) whether any students came.



In sum, a formalization has been proposed that yields, for any interrogative clause of the shape *WHICH P are Q* and *HOW MANY P are Q*, the following alternative question denotations: "which P are Q", "how many P are Q" and "whether some P are Q".[24] [25]

[24] This same set of alternatives may be used to derive the existence presupposition that arises in full-fledged interrogative clauses with a focused *wh*-word, as discussed in Hajicová (1983): (ia) does not presuppose (ic), but (ib) does:
(i) a. Who arrived late?
b. WHO arrived late?
c. Somebody arrived late.
The rough idea is the following: the focus stress on the *wh*-word presupposes the existence of an alternative to *who arrived late*. If no such alternative is provided in the discourse, it is accommodated, as any other presupposition. Now, asking *who arrived late* while presupposing that *how many people arrived late* and *did anybody arrive late* have already been asked, is a coherent discourse only if the speaker assumes that somebody indeed arrived late, since otherwise *who arrived late* would have been already answered.

[25] The Sluicing examples that we have examined involved focus stress on the *wh*-Determiner. Evidence from particles associated with Focus shows that a wider Focus is possible too, namely, a Focus on the whole *wh*-phrase. In (i), for example, the stressed *when* can be understood as contrasting with "where", "why", "with whom", etc. That is, besides the Determiner alternatives (yielding "how many times" and "whether... at any time"), we need a set of alternatives for the whole constituent. The same happens in (ii), where the patient-argument *what* constrasts with the manner-adjunct *how*.
(i) I only know WHEN she left (i.e., I don't know where to, or why, or with who...).
(ii) I liked not only WHAT she ordered, but also HOW she ordered it.
Note that this phrasal (maybe thematic-role) Focus also occurs with non-*wh*-phrases, as (iii) and (iv) show. I leave for further research the implementation of this type of Focus.
(iii) I only knew that she left [at 3pm]$_{\text{F-marked}}$. I didn't know that she left [with PAT]$_{\text{F-marked}}$.

1.3.4 Deriving the Contrast Cases

In this subsection, we will derive the (un)grammaticality of all the above examples -- with indefinite DPs, *wh*-phrases, names and QuNPs[26] as ANT-phrases-- by using the Recoverability Conditions in (56)-(58) and the set of alternatives of a *wh*-Determiner that I just proposed.

Let us examine, first, the examples with *wh*-phrases as ANT-phrases. I will illustrate how the Generalized Recoverability Conditions work with a grammatical example and with an ungrammatical one. The example (68) (=(42)) is grammatical because the LF-condition, the Background conditions and the Avoid Focus Constraint are all met. The LF-representation of the ANT-IP and of the elided IP are identical up to indices, as (68a) shows. Also, the denotation of the ANT-clause belongs to the focus semantic value of the sluiced interrogative --as shown in (68b)-- and entails the Focus-∃-closure of the ellipsis clause --as in (68b'). And, finally, the Avoid Focus Constraint is not violated because the focus on the sluiced *wh*-Determiner is not superfluous but necessary to fulfill either version of the Background condition, as sketched in (68c).

(68) We know how many papers this reviewer has read, but we don't know WHICH ones.

a. √ LF-Condition: *[this reviewer has read* t_1*]* is LF-identical to *[this reviewer has read* t_2*]*, up to different indices.

b. √ Rooth's Focus condition, since:

[[*how many papers this reviewer has read*]] ∈ [[*WHICH papers this reviewer has read*]]^f, which equals {"which papers this reviewer has read", "how many papers this reviewer has read", "whether this reviewer has read some papers"}

b'. √ Schwarzschild's Givenness condition, since:[27]

$\lambda w.\exists x_e \exists P_{<<s,st>,<e,st>>}$ [P **(**[[*how many papers this reviewer has read*]]**)** (x) (w)] entails

$\lambda w.\exists x \exists P \exists D_{<e,\delta>}$ [P **(**[[D *papers this reviewer has read*]]**)** (x) (w)]

c. √ Avoid Focus Constraint, since:

[[*how many papers this reviewer has read*]] ∉ [[*which papers this reviewer has read*]]^f, which equals {"which papers this reviewer has read"}; and

$\lambda w.\exists x_e \exists P_{<<s,st>,<e,st>>}$ [P **(**[[*how many papers this reviewer has read*]]**)** (x) (w)] does not entail

$\lambda w.\exists x \exists P$ [P **(**[[*which papers this reviewer has read*]]**)** (x) (w)]

Example (69) (=(49a)), instead, is ungrammatical. The LF and Background conditions are met exactly as in (68), but the focus feature on the *wh*-Determiner is superfluous and, hence, should not be there.

(69) * We know how many papers this reviewer has read, but they don't know HOW MANY.

(iv) Not only did she order $[\text{WINE}]_{\text{F-marked}}$. She also ordered it [with a Catalan $\text{ACCENT}]_{\text{F-marked}}$.

[26] The example (51a), involving the adverb *exactly*, will be explained in the next subsection (3.5).

[27] I use a hybrid object-language/metalanguage notation in this and the next (b')-formulations. This more perspicuous notation should be taken as a short-cut to convey the corresponding accurate formulations, which I exemplify for (68b') under (i):

(i) $\lambda w.\exists x_e \exists P_{<<s,st>,<e,st>>}$ [P **(**$\lambda w' \lambda p.\exists x$ [p = $\lambda w''$. [[$many_{<e,\delta>}$]] (x) ([[*papers*]]) ([[*1 this reviewer has read* t_1]]) (w'')**)** (x) (w)] entails
$\lambda w.\exists x \exists P \exists D_{<e,\delta>}$ [P **(**$\lambda w' \lambda p.\exists x$ [p = $\lambda w''$.D (x) ([[*papers*]]) ([[*1 this reviewer has read* t_1]]) (w'')**)** (x) (w)]

c. * Avoid Focus Constraint, since:

[[*how many papers this reviewer has read*]] ∈

[[*how many papers this reviewer has read*]]^{f}; and

λw.∃x∃P [P **(**[[*how many papers this reviewer has read*]]**)** (x) (w)]

entails

λw.∃x∃P [P **(**[[*how many papers this reviewer has read*]]**)** (x) (w)]

Let us, now, turn to names. For the grammatical example (70) (=50)), all three conditions are met. After QRing the names to IP-adjunct position, we have an IP lower than the adjunction site that is LF-identical to the sluiced IP. This is captured in (60a).[28] Next, the Background conditions are fulfilled as well, this time through implicational bridging, as (60b-b') show. Finally, the focus feature is not superfluous, which can be seen in (60c).

(60) I know that Joan, Pat, Sam and Paul danced the first tango, but I don't know WHO with WHO.

a. √ LF-Condition: *[t_1 danced the first tango]* is LF-identical to *[t_3 danced the first tango with t_4]* , up to different indices.

b. √ Focus condition, since:

[[*know that Joan, Pat, Sam and Paul danced the first tango*]] implies "to know whether somebody danced the first tango with someone", which ∈ [[*know WHO danced the first tango with WHOM*]]^{f}

[28] In order for the two IPs to be really identical at LF, we would have to "'sprout" an indefinite NP in the ANT-IP and then QR it outside the IP. However, besides the variability in indices and vehicle change that Fiengo-May allow for (see footnote 6 of this chapter), there is further evidence that the LF-identity condition has to be weakened in various ways. In section 5 in this chapter, we will see that a Quantificational NP and an E-type pronoun count as identical for ellipsis purposes, too. The case that we are looking at now may be another instance of permitted syntactic mismatch. I leave open the question whether the identity of the two IPs should be syntactic (with the above provisions) or semantic (as Rooth (1997) entertains).

b'. √ Givenness condition, since:

λw.∃x∃P$_{<<st><e,st>>}$ [P **(**[[*that Joan, Pat, Sam and Paul danced the first tango*]]**)** (x) (w)] implies

λw.∃x∃P'$_{<<s,st><e,st>>}$ [P' **(**[[*whether any person danced the first tango with any person*]]**)** (x) (w)], which in turn entails

λw.∃x∃P'∃D,D'$_{<e,\delta>}$ [P' **(**[[D *person danced the first tango with* D' *person*]]**)** (x) (w)]

c. √ Avoid Focus Principle, since: [29]

[[*know that Joan, Pat, Sam and Paul danced the first tango*]] implies "to know whether somebody danced the first tango with someone", which ∉ [[*know who danced the first tango with whom*]]^{f}; and

λw.∃x∃P$_{<<st><e,st>>}$ [P **(**[[*that Joan, Pat, Sam and Paul danced the first tango*]]**)** (x) (w)] implies

λw.∃x∃P'$_{<<s,st><e,st>>}$ [P' **(**[[*whether any person danced the first tango with any person*]]**)** (x) (w)], which does not entail

λw.∃x∃P'[P' **(**[[*which person danced the first tango with which person*]]**)** (x) (w)]

[29] Actually, the focus feature is necessary in the second *WHO*, but superfluous in the first *WHO*, as (ib) shows:

(i) √ I know that Pat, Joan, Sam and Paul danced the first tango, but I don't know WHO with WHO.

b. Background condition:

[[*know that Joan, Pat, Sam and Paul danced the first tango*]] implies "to know who danced the first tango with someone", which ∈ [[*know who danced the first tango with WHOM*]]^{f}

Strictly speaking, thus, the Avoid Focus Constraint is violated by the unnecessary focus on the subject *who*. However, it seems that multiple questions do not accept a focus on only one of their *wh*-phrases in general, as (ii)-(iii) show; they need to focus both *wh*-phrases at the same time. The explanation of this particularity of multiple questions is beyond the aim of this chapter.

(ii) * I know who danced with someone, but I don't know who danced with WHO.

(iii) * I know with who someone danced, but I don't know WHO danced with who.

The ungrammatical example (61) (both in its sluiced version (=43) and its deaccented version (=54)) is ruled out on the basis of the Avoid Focus constraint, like in the ungrammatical example with indefinite ANT-phrase:

(61) *? I know that Meg's attracted to Harry, but they don't know to WHO (*Meg's attracted*).

c. * Avoid Focus Principle, since:

[[*know that Meg's attracted to Harry*]] implies (if *Harry* is focused)[30] the property "to know to whom Meg is attracted", which ∈ [[*know who Meg's attracted to*]]^{f}; and

$\lambda w.\exists x \exists P_{<<st><e,st>>}$ [P **(**[[*that Meg's attracted to Harry*]]**)** (x) (w)] implies

$\lambda w.\exists x \exists P'_{<<s,st><e,st>>}$ [P' **(**[[*who Meg's attracted to*]]**)** (x) (w)], which entails

$\lambda w.\exists x \exists P'$[P' **(**[[*who Meg's attracted to*]]**)** (x) (w)]

Finally, the examples involving good and bad indefinite and quantificational ANT-phrases, which we recapitulate under (62) and (63) respectively, are exactly parallel to names: basically, if the ANT-clause (or any higher constituent, e.g. the matrix VP) is or implies (knowing) the answer to the question asked in the sluice, the focus feature is superfluous and the sluicing is ungrammatical.

(62) a. Joan ate dinner with someone, but I don't know with WHO.

b. * I know that four students came to the party, but they don't know HOW MANY.

[30] According to the definition of *know* given in footnote 21, [[*know that Meg's attracted to Harry*]] implies the property "to know to whom Meg is attracted" only in case [[*Meg's attracted to Harry*]] is understood as the **exhaustive** true answer to the question [[*who is Meg attracted to*]] in the evaluation world w. This exhaustivity can be gained if the assertive clause is uttered with focus stress --free focus-- on the name *Harry*.

Processing studies on Sluicing by Frazier-Clifton (1995) show that there is a tendency to focus ANT-phrases on Sluicing: given two indefinite DPs in the ANT-clause, informants prefer to interpret the focused DP as ANT-phrase rather than the unfocused DP.

(63) a. I know everybody danced with somebody, but I don't know WHO with WHO.

b. * We saw that each of the performers came in, but they didn't see WHO.

All the ungrammatical examples so far have been ruled out because of the Avoid Focus Constraint; that is, they have been excluded because the sluiced *wh*-phrase was uttered with a focus stress whose semantic consequences were not needed. At this point, some predictions clearly arise. On the one hand, all the examples that have been ruled out because of unnecessary focus stress are predicted to become grammatical as soon as we remove the focal stress and enforce a deaccented pronunciation of the sluiced *wh*-phrase. This prediction is borne out, as we saw in examples (48'), (49') and (43')(4c'). On the other hand, the grammatical examples of Sluicing with Focus --including the ones from CLM-- needed the focus feature on the *wh*-word in order to fulfill the Background condition. Hence, if that focal intonation is removed, our analysis predicts them to become ungrammatical, as it actually happens (examples (41'), (42'), (50') and (51')).

We have seen that the acceptability of indefinite DPs, *wh*-phrases and names as ANT-phrases for a sluice is a matter of **contrast** between the denotation of some higher ANT-constituent and the denotation of some constituent higher than the sluiced IP. This result is derived from the interaction of two conditions: the Background condition requires for there to be an equivalence or implication relation between the denotation of the ANT-constituent and one of the alternatives generated by the sluice; and Avoid F forces this equivalence or implication relation to hold with an alternative **different** from the denotation of the sluice itself.

In sum, the same algorithm as for VP-ellipsis has been successfully applied to derive the above cases of Sluicing, after defining an appropriate set of alternatives for a *wh*-Determiner.[31]

1.3.5 The Role of *Exactly* with Interrogative Clauses

A different case is the one involving the adverb *exactly*. Recall that, unexpectedly under CLM's analysis, inserting *exactly* in front of the sluice could make a Quantificational NP a good ANT-phrase:

(64) a. * I know that Sue has read most books, but I don't know HOW MANY.
b. I know that Sue has read most books, but I don't know EXACTLY how many.

We would like to point out that the markedness of (64a) --and the improvement we get by inserting *exactly*-- is independent of focusing and/or sluicing the *wh*-Determiner, as (65) shows:

(65) a. * I know that Sue has read most books, but I don't know how many books she has read.

[31] K. von Fintel (p.c.) pointed out to me a potential problem for my analysis of Sluicing. The first conjunct in (i) implies --more concretely, it presupposes, according to some analyses-- that Jordi saw a (non-hazel eyed) student. However, this implication does not suffice to make the Focus on the sluiced *wh*-phrase felicitous:
(i) * It isn't true that Jordi saw a student with HAZEL eyes, but I don't know WHO / WHICH student.
I would like to point out that this is a general problem concerning the relation between background information (and, probably, saliency) and implicational bridging, not just for the analysis of Sluicing that I am defending. Note that the same problem arises in VP-Ellipsis too: the presupposition "that a student with non-hazel eyes came" does not license the Focus in the second conjunct (though explicitely asserting such a proposition would, as (iii) shows).
(ii) # It's not the case that a student with HAZEL eyes came. And Prof. KINGSTON did, too.
(iii) A student with non-hazel eyes came. And Prof. KINGSTON did, too.

b. I know that Sue has read most books, but I don't know EXACTLY how many books she has read.

It seems that the effect is due to the semantics of negation, *know* and questions, since (64a-65a) simply sound contradictory, rather than ungrammatical. Let us explore this idea.

According to many analyses of questions (Karttunen (1977), Groenendijk-Stokhof (1984), Heim (1994), Rullmann (1995), Beck-Rullmann (1996)), to know a question means to know the exhaustive true answer to that question.[32] To know a partial answer to a question, hence, does not entail to know the question. It does not imply it either, at least not under any notion of implicational bridging related to the semantics of Focus. This is attested by the oddness of (66):

(66) # I only know that most students will come. THEY know how many students will come, too.
b. * Rooth's Focus condition, since:
[[*I know that most students will come*]] does not belong to nor implies a member of [[*THEY know how many students will come*]]^f;
b'. * Schwarzschild's Givenness condition, since:
[[*I know that most students will come*]] does entail or imply
$\exists$x [x knows how many students will come].

[32] These analyses differ in whether to know a question means to know the weakly exhaustive answer or the strongly exhaustive answer to that question, or whether *know* is ambiguous between both. The analysis of *know* that I am assuming --detailed in footnote 21-- is an adaptation of Karttunen's original, but the choice of his approach over the others is irrelevant for the purposes of my analysis.

However, example (65a) suggests that not to know a question means something stronger than not to know its complete exhaustive answer; it means **not to know any partial answer** to it.[33] That is, to know only a partial answer to a given question does not entail or imply --it even contradicts-- not to know the question. The inappropriateness of (67) points in that direction, too:

(67) # I only know that most students will come. THEY don't know how many students will come, either.

b. * Rooth's Focus condition, since:

[[*I only know that most students will come*]] does not belong to nor implies a member of [[*THEY don't know how many students will come*]]^f;

b'. * Schwarzschild's Givenness condition, since:

[[*I only know that most students will come*]] does not entail or imply

$\lambda w.\exists x$ [x doesn't know in w how many students will come].

We have seen that "to know a partial answer to a question" does neither imply "to know the question" nor "not to know the question", at least as far as the semantics and pragmatics of Focus are concerned. Thus, the only way to relate knowledge of partial answers to knowledge of questions is by making the knowledge of the question partial too: "to only know a partial answer to a question" implies "not to know exactly the question". That is, by sticking *not^exactly* (or *partially*) in front of the interrogative clause, the knowlege of partial answers and the partial knowledge of questions are

[33] Irene Heim (p.c.) and an anonymous reviewer for Romero (1997a) pointed out to me that a parallel effect appears in the interaction of negation with plurals. The sentence under (i) is true in the situation described under (i.a), but false --or lacking a truth value, according to Loebner (1987:184-5)-- in the situation (i.b):
(i) I didn't see the children.
a. There are three (relevant) children. I did not see any of them.
b. There are three (relevant) children. I saw one of them, but not the others.
See Lahiri (1991) for a treatment of questions as plurals.

compatible, as (68) shows, and comparable in terms of alternatives, as can be seen in (69)-(70).

(68) √ I know that Sue has read most books, but I don't know EXACTLY how many (books she has read).

→ No contradiction.

(69) √ I just know that most students will come. Maybe THEY will know EXACTLY how many (students will come).

b. √ Rooth's Focus condition, since:

[[*I just know that most students will come*]] implies

"that I know partially how many students will come", which ∈

[[*THEY know EXACTLY how many students will come*]]^f;

b'. √ Schwarzschild's Givenness condition, since:

[[*I just know that most students will come*]] implies

$\lambda w.\exists x_e \exists Z_{<<e,st><e,st>>}$ [x knows in w Z how many students will come].

(70) √ I just know that most students will come. And THEY don't know exactly how many students will come, either.

b. √ Rooth's Focus condition, since:

[[*I just know that most students will come*]] implies

"that I know partially how many students will come", that is,

"that I don't know exactly how many students will come", which ∈

[[*THEY don't know exactly how many students will come*]]^f;

b'. √ Schwarzschild's Givenness condition, since:

[[*I just know that most students will come*]] implies

$\lambda w.\exists x_e$ [x does not know exactly in w how many students will come].

In conclusion, the ungrammaticaly of the Sluicing examples of Quantificational NPs with *exactly* is explained as an epiphenomenon arising from the interaction of questions, the semantics of *know* and negation. Beyond these cases, Quantificational NPs are, in principle, predicted to be acceptable ANT-phrases.

1.3.6 Conclusions

A closer look at the data on Sluicing (examples with indefinites, wh-phrases, names and Quantificational NPs as ANT-phrases and examples of IP-deaccenting) revealed that the presence of a free variable in the copied material is neither necessary nor sufficient to yield a grammatical sluice, contrary to Chung-Ladusaw-McCloskey's generalization.

A proposal has been made that: **(i)** applies to Sluicing (IP-ellipsis) the same Recoverability Conditions as the ones proposed for VP-Reduction, and **(ii)** captures the good and bad examples of an ANT-phrases as well as the deaccenting case. These are explained not in terms of the kind of DP that constitutes the ANT-phrases, but in terms of the contrast between the ANT-proposition and the proposition denoted by the sluiced interrogative, which crucially carries a focus on the *wh*-Determiner.

In the next section, the proposed account for Sluicing will be shown to derive the inheritance of content effects, too, without the use of any special LF-operation.

1.4 Inheritance of Content

In this section, I will examine the cases of inheritance of content from the ANT-phrase to the *wh*-phrase. In (71a), for instance, the sluiced *WHO* seems to "inherit" its restrictor from its ANT-phrase, since it is understood as ranging only over students, not about people in general. In a similar fashion, the argument or restrictor of *ELSE* can only be understood to be [[*(than) Harry*]], not anybody else.

(71) a. I know she talked to some students, but I don't know WHO.
b. She talked to Harry, but I don't know to who ELSE.

CLM posit a special LF-operation, Merger, to deal with these facts:

(72) **Merger**: merge the ANT-phrase and the *wh*-phrase so that the semantic restriction on the domain of quantification of the *Q*-operator is determined both by the content of the ANT-phrase and the content of the wh-phrase.

In the present section, I will explain these apparently "inherited" restrictions as purely contextual restrictions enforced by the felicity conditions of Focus, the semantics of *know* subcategorizing for a question and its relation to partial answers, much in the way we explored in the subsection 3.5. The crucial observation discussed above on which the present analysis will hinge is given under (73b):

(73) a. To know a question is to know the exhaustive true answer to that question (Karttunen 1977, Groenendijk-Stokhof 1984, Heim 1994, Rullmann 1995, Beck-Rullmann 1996).
b. Not to know a question entails not to know any partial answer to that question (at least as far as the semantics of Focus is concerned).

Let us first look at (71a), where the restrictor of *WHO* has to be the set of students. Let us see, first, why a randomly chosen set, e.g., the set of (contextually relevant) **elves**, would not work as its restrictor. The problem arises in applying the semantic requirements driven by the Focus on the *wh*-word (sluiced or not), since [[*know she*

talked to some students]] neither belongs nor implies an alternative to *know WHO* (elves) *she talked to*, as the reader can see in (74):

(74) * I know she talked to some students, but I don't know WHO {(elves) she talked to}.

b. * Focus condition:

[[*know she talked to some students*]] implies

"to know whether she talked to some students", but this does not belong to

[[*know WHO* (elves) *she talked to*]]^{f}

b'. * Givenness condition:

$\lambda w.\exists x$ [[[*know she talked to some students*]](x)(w)] neither entails nor implies $\lambda w.\exists x \exists D_{<e,\delta>}$ [[[*know* D (elves) *she talked to*]](x)(w)]

These conditions failed to be met even if the set of relevant elves is a subset of the set of relevant students. This is so because "to know that she talked to some students" does not imply "to know whether she talked to some students that are elves", which is an alternative that would satisfy the Background conditions.

Let us now try a superset of [[*students*]], e.g., the set of (contextually relevant) **people**. This time, the Background conditions for Focus are met, since [[*to know that she talked to some students*]] certainly implies "to know whether she talked to some people", which is an alternative to [[*know WHICH people she talked to*]]^{f}. This result is sketched in (75b-b'):

(75) * I know she talked to some students, but I don't know WHO {(people) she talked to}.

b. Focus condition:

[[*know she talked to some students*]] implies

"to know whether she talked to some people", which belongs to

[[*know WHO* (people) *she talked to*]]^{f}

b'. Givenness condition:

$\lambda w.\exists x$ [[[*know she talked to some students*]](x)(w)] entails/implies

$\lambda w.\exists x \exists D_{<e,\delta>}$ [[[*know* D (people) *she talked to*]](x)(w)]

The oddity of (75) must, thus, come from somewhere else. I propose that this oddity has its source in the semantics of *know* plus a question and in its relation to partial answers. Let us see why. Intuitively, it seems that (76A) is a felicitous partial answer to (76Q):

(76) Q: Which people did she talk to?

A: She talked to some students.

Hence, the first conjunct in (75) --*I know she talked to some students*-- implies that I know a partial answer to the question "which people she talked to". The problem is that the second conjunct in (75) is precisely denying that I know that question. That is, following the generalization in (73b), the second conjunct in (75) denies that I know any partial answer to the question "which people she talked to". Hence, taking the set of (some relevant) people as the contextual restrictor for *WHO* in (71a) would lead to contradiction.

Let us, finally, try the set of (relevant) **students** as the restrictor of the focused wh-phrase. On the one hand, the Background conditions are met, as the reader can see in (78):

(78) I know she talked to some students, but I don't know WHO {(students) she talked to}.

b. Focus condition:

[[*know she talked to some students*]] implies

"to know whether she talked to some students", which belongs to

[[*know WHO* (students) *she talked to*]]^{f}

b'. Givenness condition:

$\lambda w.\exists x$ [[[*know she talked to some students*]](x)(w)] entails/implies

$\lambda w.\exists x \exists D_{<e,\delta>}$ [[[*know* D (students) *she talked to*]](x)(w)]

On the other hand, (79A) does not sound like a felicitous answer to (79Q):[34]

(79) Q: Which students did she talk to?

A: # She talked to some students.

This means that the first conjunct *I know she talked to some students* does not imply that I know any partial answer to the question "which students she talked to". Hence, my knowledge of that question --with the set of students as restrictor-- can be denied without contradicting the first conjunct.

In sum, the set of (relevant) students is the only felicitous restriction that results in a consistent, non-contradictory statement.

Let us turn now to the second example of inheritance of content, which I repeat under (80). The issue is why *who ELSE* has to be interpreted as "who else than Harry".

(80) She talked to Harry, but I don't know to who ELSE.

[34] In Groenendijk-Stokhof's (1984) theory of questions and of the pragmatics of answers, (79A) is a partial answer to (79Q) insofar as it wipes out of the picture one of the equivalence classes in the partition generated by the question, namely the equivalence class of the set of worlds where she didn't talk to any students. Still, (79) sounds pretty incoherent to me as a dialog.

First of all, under (81), I sketch a possible semantic value for the expression *else than*:

(81) $[[\textit{else than } a_e]] = f \in D_{<e,st>}$ such that, for all $x \in D_e$, $w \in D_s$,

$f(x)(w) = 1$ iff $x \not\leq a$ in w

If we take the contextually provided argument of *else* to be **Peter** (or any other individual or sum of individuals not including Harry), we would run into a contradiction again: knowing that she talked to Harry is knowing an (at least) partial answer to the question "to which individuals --besides Peter-- she talked". Hence, denying I know that question would be --modulo (73b)-- denying that I know any partial answer to it, which yields a contradiction with the first conjunct.

Instead, if the argument of *else* is taken to be **Harry**, the question whose knowledge is denied is "to which individuals --besides Harry-- she talked". That is felicitous, since the first conjunct in (80) does not assert that the subject knows any partial answer to that question.

Finally, if the contextually provided argument is understood as an individual sum including Harry --e.g., the **sum denoted by *Sally and Harry***--, we could deny any knowledge of the question "to which individuals --besides Sally and Harry-- she talked" without running into a contradiction with the first conjunct, since the first conjunct does not assert that any partial answer to that question is known. This last case, though, is ruled out as result of interpreting the Focus of *ELSE*. An appropriate alternative to *else than a* is *(out) of a*, defined under (82):

(82) $[[\textit{(out) of } a_e]] = f \in D_{<e,st>}$ such that, for all $x \in D_e$, $w \in D_s$,

$f(x)(w) = 1$ iff $x \leq a$ in w

In the second conjunct in (80), negation is associated with the Focus on *ELSE*. Taking *(out) of* as the alternative to *else than*, this Focus invokes the alternative proposition "I know to which individuals out of the plural individual Sally+Harry she talked". This proposition, however, is not entailed nor implied by the previous discourse as it stands. The only information that the first conjunct guarantees is that the speaker knows that she talked to Harry, but this does not imply that the speaker knows exhaustively --as (73a) dictates-- to which individuals that are part of the plural individual Sally and Harry she talked. Thus, the Background conditions are violated --as (83) shows-- and the sequence is unfelicituous.

(83) * She talked to Harry, but I don't know to who ELSE {than Sally and Harry she talked}.

b. * Focus condition:

[[*(know that) she talked to Harry*]] does not imply

"to know which individuals out of the plural individidual Sally+Harry she talked to", which is the alternative we need for

[[*know to who ELSE than Sally and Harry she talked*]]^{f}

b'. * Givenness condition:

$\lambda w.\exists x$ [[[*(know that) she talked to Harry*]](x)(w)]

neither entails nor implies

$\lambda w.\exists x \exists D_{<e,et>}$ [[[*know to who* D *Sally and Harry she talked*]](x)(w)]

In sum, in this section I have developed an explanation for the inheritance of content facts in Sluicing by confronting the notion of partial answer with the notion of not-knowledge of a question and by using Rooth's and Schwarzschild's algorithm for Focus.

1.5 Asymmetric Behavior with Respect to Islands

As we saw in the introduction to this chapter, a sluiced *wh*-phrase usually has an overt correlate in the ANT-clause: its ANT-phrase. In (84), for instance, the indefinite NP *somebody* is the ANT-phrase of the sluiced *who*. Sometimes, though, there is no overt ANT-phrase for the *wh*-phrase. The examples in (85) illustrate this latter type of Sluicing. In (85a), the sluice has no syntactic correlate; semantically, it corresponds to an implicit indefinite argument ("something"). Similarly, the sluiced *wh*-phrase in (85b) has no overt ANT-phrase and it corresponds, semantically, to an implicit adjunct ("somewhere" / "for some reason" / "with somebody").

(84) Somebody just left. Guess who. (Ross 1969)

(85) a. She´s eating, but I don´t know what. (CLM 1995)

b. She´s writing, but you can´t imagine where/why/with whom. (Ross 1969)

In this section, I will take a closer look to this latter type of Sluicing. In particular, I will investigate the different behavior that Sluicing with an overt indefinite ANT-phrase and Sluicing with an implicit indefinite ANT-phrase display with respect to strong islands. The goals of this section are the following:

First, I will show that Sluicing with implicit antecedents is far more restricted than what has been observed in the literature: it is not only blocked by strong islands, but also by the intervention of other operators.

Second, I will present an alternative account that covers the strong island cases as well as the new cases. The key point of the analysis will be, again, the Focus/Background felicity conditions that govern information flow in the discourse and Reduction phenomena as well. The characteristic of Reduction described in (86) (=40a) --which

follows from these conditions-- will play a central role. Two other independently motivated factors conspire with this property to block all the ungrammatical cases: the narrowest scope of implicit indefinites and the availability of E-type pronouns.

(86) The focused remnant and its antecedent must have parallel scope in their respective clauses.

This section is organized as follows. First, in subsection 5.1, I will recall the phenomenon and present CLM's analysis of it. In subsection 5.2, I present new data, followed by the proposed analysis in section 5.3. Subsection 5.4 brings in some interesting cases that provide further evidence for the new analysis. Finally, subsection 5.5 summarizes the conclusions.

1.5.1 Chung-Ladusaw-McCloskey's Analysis

It is a well-known fact since Ross (1967) that overt *wh*-movement across strong islands results in ungrammaticality, as (87a)-(90a) show. However, Ross (1969) observes that, in Sluicing, where the offending island is elided, there is no island violation and the sentence is grammatical.[35] CLM point out that this is the case only for Sluicing with an **overt** ANT-phrase. Their generalization is, hence, that Sluicing with an overt indefinite ANT-phrase is **insensitive to islands**. To see this, compare the grammatical sluices in (87b)-(88b) with their full-fledged (a)-versions:

[35] See footnote 4.

(87) Overt antedent and Complex NP Island: (CLM 1995)

a. * The administration has issued a statement that it is willing to meet with one of the student groups, but I´m not sure which one it has issued a statement that it is willing to meet with.

b. The administration has issued a statement that it is willing to meet with **one of the student groups**, but I´m not sure which one.

(88) Overt antedent and Subject Island: (CLM 1995)

a. * That certain countries would vote against the resolution has been widely reported, but I'm not sure which ones that [t] would vote against the resolution has been widely reported.

b. That **certain countries** would vote against the resolution has been widely reported, but I'm not sure which ones.

When the indefinite antecedent of the sluiced *wh*-phrase is **implicit**, instead, Sluicing is **sensitive to islands**. CLM attribute this observation to Chris Albert. The examples (89)-(90) illustrate this point: the sluices in (89b) and (90b) are ungrammatical, as much as their full-fledged (a)-versions are. CLM's example (91) shows that this ungrammaticality is the result of the island and not of long-distance *wh*-movement, since a sluiced *wh*-phrase with an implicit indefinite ANT-phrase can be extracted out of its clause.

(89) Implicit indefinite antecedent and Complex NP Island: (CLM 1995)

a. * Tony sent Mo a picture that he painted, but it's not clear with what he sent him a picture that he painted.

b. * Tony sent Mo a picture that he painted, but it's not clear with what.

(90) Implicit indefinite antecedent and Adjunct Island: (CLM 1995)

a. * Agnes arrived after John ate, but it´s not clear what she arrived after he ate.

b. * Agnes arrived after John ate, but it´s not clear what.

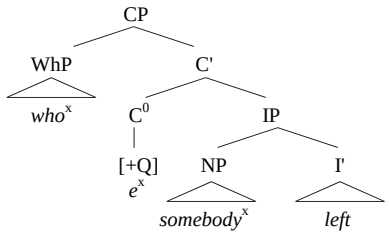
(91) I think Agnes said that Bill would speak, but I don´t remember what about. (id.)

Let us see how CLM capture these facts. Recall that their analysis of Sluicing is a copy or reconstruction analysis, not a deletion analysis. That is, in their approach to Sluicing, the sluiced IP is generated empty, and it is filled up at LF by copying the full IP from the ANT-clause into the empty slot. This is done by the LF-operation IP-Recycling, which I repeat under (92):

(92) IP-Recycling: Copy the ANT-IP into the empty IP at LF.

CLM propose that, when the indefinite ANT-phrase is **overt**, the indefinite NP is copied along with the rest of the antecedent IP, and its free variable -in Heim/Kamp style- is unselectively bound by the question operator in C^0. This is exemplified in (93). Since unselective binding is not sensitive to islands, the grammaticality of (87b)-(88b) is derived.

(93) Somebody left --guess who.

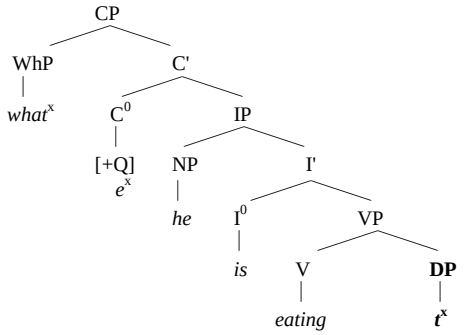


Implicit indefinite arguments and adjuncts, though, are not syntactically present in the structure. Hence, the LF-representation of the ANT-IP does not contain a phrase that may serve as ANT-phrase and provide a variable for the *Q*-operator to bind.[36] CLM propose that these cases are resolved in Sluicing by means of an LF-operation called "Sprouting":

(94) Sprouting: "sprout" or realize a trace in order to complete a *wh*-chain.

Sprouting is a A'-chain formation operation --thus, subject to islands and ECP, like any A'-chain created by overt movement-- in which the head of the chain is already present. It builds an A'-chain by "sprouting" or creating the necessary LF constituent containing an empty category (or a copy) coindexed with the sluiced *wh*-phrase. This is illustrated with the "sprouted" DP in bold face in (95). Since A'-chains are sensitive to islands, the ungramaticality of (89b)-(90b) is derived.

(95) He's eating, but I can't imagine what.



[36] See CLM's footnote 11.

In sum, CLM propose that what blocks antecedentless sluiced *wh*-phrases across islands is the same that blocks overt *wh*-movement across islands, namely, locality constraints on the links of an A'-chain $WhP_i...t_i$.

In the next section, we will see that Sluicing with implicit antecedents is far more restricted than we thought: it is not only blocked by strong islands, but also by the intervention of other operators that do not block the A'-chain $WhP_i...t_i$.

1.5.2 Other Intervenors that Block Sluicing with Implicit ANT-Phrase

Besides strong islands, other intervening operators --the ones yielding weak islands, as far as I found-- make Sluicing with implicit ANT-phrases ungrammatical, too. This is shown in (96)-(99):

(96) a. * Nobody went out for dinner, but I don´t remember to which restaurant {nobody went out for dinner}.
b. * Paul didn't want to read, but I don´t know which book {he didn't want to read}.
c. * Few kids ate, but I don't know what {few kids ate}.
d. * Joan rarely fed my fish, but I don´t know with which product {Joan rarely fed my fish}.

(97) a. ?* Susi asked whether you had eaten, but I don´t remember which meal {she asked whether you had eaten}.

(98)a. * Ramon is glad that Sally ate, but I don´t remember which dish {he is glad that Sally ate}.
b. * She regrets that we talked about it, but I don´t know to whom {she regrets that we talked about it}.

Note that this ungrammaticality cannot be due to a constraint on A'-chains, since the full-fledged questions corresponding to the sluiced interrogative clauses in (96)-(98) exhibit the same A'-chains and are grammatical.[37]

(96')a. I don´t remember to which restaurant nobody went out for dinner.
b. I don´t know which book he didn´t want to read.
c. I don't know what few kids ate.
d. I don´t know with which product Joan rarely fed my fish.

(97´) a. I don´t remember which meal she asked whether you had eaten.

(98')a. I don´t remember which dish he is glad that Sally ate.
b. I don´t know to whom she regrets that we talked about it.

The contrast between the sluices (96)-(98) and the full-fledged questions in (96')-(98') shows that Sluicing with an implicit indefinite ANT-phrase does not behave like overt *wh*-A'-chains. CLM's analysis does not explain this asymmetry, that is, it doesn't explain why the ungrammaticality of antecedentless sluices persists when no strong island intervenes.

[37] The so-called "weak islands" do not block A'-chains $WhP_i...t_i$ per se. They are "islands", though, insofar as they block some interpretations of the moved *wh*-phrase. For instance, in (i), the *how many* phrase only has the wide scope reading in (i.a) and not the narrow scope reading in (i.b), as Longobardi (1987) points out. Extraction of non-D-linked *wh*-phrases --e.g. example (96'c) if there is no contextual restriction on *what* or, better, the example (ii)--may yield somewhat deviant results, too.
(i) How many students do you wonder whether I should talk to?
a. Wide scope reading: "For what number n: there are n-many students x such that you wonder whether I should talk to x."
b. Narrow scope reading: "For what number n: you wonder whether there should be n-many students that I talk to."
(ii) ?? I don't know what the hell few kids ate.

In the next subsection, I will propose an analysis that covers the strong islands cases as well as the new cases I presented.

1.5.3 Proposal

I will propose an analysis that predicts Sluicing with an implicit indefinite ANT-phrase to be ungrammatical whenever any operator intervenes. This result will be derived not from any syntactic constraint, but from the interaction of two semantic effects: the scope parallelism between the sluiced *wh*-phrase and the ANT-phrase, and the scope of implicit indefinites.

The first factor is the by now familiar scope parallelism that the Background conditions impose on the sluiced *wh*-phrase and the ANT-phrase. Recall our example (20), repeated as (99): the scopal relation between the existential quantificational NP and the universal quantificational NP has to be the same in both conjuncts.

(99) Exactly three boys admire every professor, and exactly three GIRLS do, too.

a. √ "There are exactly three boys that admire every professor, and there are exactly three girls that admire every professor too."

b. √ "For every professor, there are exactly three boys that admire him/her, and, for every professor, there are exactly three girls that admire him/her too."

c. * "There are exactly three boys that admire every professor and, for every professor, there are exactly three girls that admire him/her."

d. * " For every professor, there are exactly three boys that admire him/her, and there are exactly three girls that admire every professor."

The same holds for Sluicing. In particular, the ANT-phrase and the sluiced *wh*-phrase must have parallel scope, too. Since the binder of the *wh*-phrase is the *wh*-part that

moved to Spec-CP (or, alternatively, the Q-operator in C^0), the ∃-closure of the *wh*-phrase has scope over any other operator in the clause.[38] This forces the corresponding quantificational element of the ANT-phrase to have scope over any other operator in its clause as well. The example under (100) illustrates this: since the interrogative clause presents the scopal relation *which book* >> *always*, the ANT-clause has the reading *a book* >> *always* --the one in (100a)--, but it lacks the reading *always* >> *a book* --the one in (100b).

(100) She always reads a book at dinnertime. We can't figure out WHICH one.

(CLM 1995)

a. √ "There is a particular book that she always reads at dinnertime, and we can´t figure out which book is such that she always reads it at dinnertime."

b. * "It is always the case that she reads one book or other at dinner time, and we can't figure out which book is such that she always reads it at dinnertime."

The other factor that plays a role in determining the blocking effect of strong islands and other intervenors is the scope of implicit indefinites. Fodor-Fodor (1980:759-60) and Condoravdi-Gawron (1996:3) note that implicit indefinites always have narrowest scope. This is shown by the examples in (101)-(103):[39]

[38] It is not clear whether a quantificational NP within a question can QR over the *wh*-phrase and adjoin to CP. Universally quantified Subjects have been argued to do so when they yield pair-list readings (May 1985). However, the array of quantifiers that generate pair-list readings is small (downward monotone, *most*, *both* and many others do not (Chierchia 1993:fn20; Szabolcsi 199?:10)), and the issue of how these readings are generated is not settled. See Chierchia (1993) for an alternative to the QR view.

[39] Fodor-Fodor's and Condoravdi-Gawron's work is on implicit indefinite arguments. They do not make any claim about implicit indefinite adjuncts, but the same observation seems to hold for them, too, as (i) suggests:

(i) Exactly three students bought strawberries.

a. √ "There are exactly three students that bought strawberries in some place or other."

b. * "There is a place where exactly three students bought strawberries."

(101) Exactly three kids ate.

a. √ "There are exactly three kids such that there is something they ate."

b. * "There is something that exactly three kids ate."

(102) Last year, he baked for few birthday parties.

a. √ "There are few birthday parties for which there is something he baked."

b. * "There is something that he baked for few birthday parties."

(103) He never goes out for dinner.

a. √ "There is no occasion on which he goes out for dinner to one place or other."

b. * "There is a place such that on no occasion he goes there."

Hence, on the one hand, we have that implicit indefinites have always narrower scope than any other operator in their clause; on the other, we have that the binder of a sluiced *wh*-phrase must have parallel scope to the existential quantification of the implicit indefinite ANT-phrase. From this, it follows that the binder of the sluiced *wh*-phrase should have narrowest scope in its own clause, too. But the binders of *wh*-phrases have scope at CP; that is, they have scope over any other operator within its clause, as we saw in the second conjunct of (100), and as (104) shows. Hence, antecedentless Sluicing succeeds only if the *wh*-phrase can have, at the same time, scope at CP and narrower scope than any other operator in the clause; that is, it succeeds only if there is no operator whatsoever under C^0 at LF, independently of whether that operator constitutes an island for *wh*-movement or not.

See also Shopen (1973), Thomas (1979), Dowty (1981), Mittwoch (1982) and Fillmore (1986) on implicit indedinite and definite arguments.

(104) What did few kids eat?

a. Scope *what* >> *few kids* (single answer): "For which person x: at least seven boys danced with x."

b. * Scope *few kids* >> *who* (pair-list answer): "For at least seven boys y, tell me who y danced with."

Let us illustrate this with an example. We just saw that, in (104), the only available reading is *what* >> *few kids*. In (105), instead, the only possible scopal relation is the inverse one, that is, *few kids* >> "something". Hence, when we put the two clauses together as in (106), the Background conditions cannot be met and the sentence is ungrammatical.

(105) Few kids ate.

a. * Scope "something" >> *few kids*: "There is something such that few kids ate it".

b. Scope *few kids* >> "something": "For few kids x, there is something that x ate".

(106) * I know that few kids ate, but I don't know WHAT {few kids ate}.

b. * Focus condition:

[[*know that few kids ate*]] does neither belong nor imply a member of [[*know WHAT (thing) few kids ate*]] ^{f}, which equals {“to know what thing is such that few kids ate it”, “to know how many things are such that few kids ate them”, “to know whether there is something such that few kids ate it”}

b'. * Givenness condition:

$\lambda w.\exists x_e$ [[[*know that few kids ate*]] (x)(w)] does neither entail nor imply $\lambda w.\exists x_e \exists D_{<e,\delta>}$ [[[*know* D ("thing") *few kids ate*]] (x)(w)]

In sum, Sluicing with an implicit indefinite ANT-phrase is ungrammatical whenever the sluiced *wh*-phrase takes scope over an embedded operator, no matter whether that operator constitutes a strong island or not. Ungrammaticality results from the impossibility of satisfying two contradictory requirements: the Background conditions impose a semantic scope parallelism between the ANT-phrase and the *wh*-phrase, but the implicit ANT-phrase can only have narrowest scope. Thus, the Background conditions cannot be satisfied.[40]

This problem does not extend to overt indefinite ANT-phrases. Since overt indefinites may have semantic scope over other operators --even across clause boundaries and islands--,[41] the Background conditions will be met if the sluiced *wh*-phrase has scope over those operators or islands as well.

In conclusion, the asymmetric behavior of these two types of Sluicing with respect to islands and other operators has been explained not as an intrinsic characteristic of Sluicing itself, but as a "by-product" of the semantics of implicit indefinites and of the Focus / Background articulation of discourse.

1.5.4 Apparent Intervenors

The predictions that the new analysis makes are rather strong: if there is any operator under the scope of the *wh*-phrase binder at LF, Sluicing with an implicit indefinite ANT-phrase is bound to violate the Background conditions. The cases of intervening quantificational NPs that we have seen so far --repeated under (107)-- confirmed this

[40] CLM can derive the scope parallelism facts about Sluicing from their IP-Recycling rule, too. However, they do not exploit the fact that implicit indefinites have narrowest scope and, hence, do not derive the asymmetric behavior with respect to islands (and other intervenors) in the way that I propose here.

[41] See Fodor-Sag 1982, Abusch 1994, Kratzer 1997, Reinhart 1997 and Winter 1997 on specific indefinites; CLM 1995:§8 on their relation to islands in Sluicing.

prediction: they both led to ungrammaticality. However, the examples in (108) present quantificational NPs in the first conjunct as well and they are perfectly grammatical:

(107) a. * Nobody went out for dinner, but I don't know to which restaurant.
b. * Few kids ate, but I don't know what.

(108) a. Just one kid was reading, but I don't know what / which book.
b. At least seven boys from your class danced the first waltz, but I don't know who with.

Let us take a closer look at each of these two grammatical examples. The intuitions about the meaning of the first example are listed under (109). This example does not have the reading (109a), which would result if the LF of the sluiced interrogative contained the quantificational NP *just one kid*. Instead, the example has the reading (109b), as if the pronoun *he* appeared instead of the quantificational NP at LF. That this is indeed the right LF representation is suggested by the deaccented version of (109), given under (110): the full-fledged rendering of the interrogative IP presents a pronoun instead of the quantificational NP. Note, finally, that this pronoun is an E-type pronoun (Evans 1980), since this reading is different from the impossible reading (109c), where *just one kid* scopes out of its clause and binds the pronoun *he*.

(109) Just one kid was reading, but I don't know what.
a. * "Just one kid was reading, but I don't know what just one kid was reading."
b. "Just one kid was reading, but I don't know what **he** was reading."
c. * "There just one kids such that: I know he was reading but I don't know what he was reading."

(110) Just one kid was reading, but I don't know WHAT ***he*** *was reading*.

Hence, in this first grammatical example, we do not have a quantificational NP in the sluiced IP, but a referential expression, namely an E-type pronoun.

Let us now turn to the second example, repeated under (111). I want to call the reader's attention to the fact that this example has a reading that resembles a pair-list reading, paraphrasable as in (111a):

(111) At least seven boys from your class danced the first waltz of the night, but I don't know who with.

a. Pair-list-like reading: "..., but I don't know who each of them danced with."

This reading cannot have arisen from an LF containing the quantificational NP *at least seven boys*, since questions with *at least n N'* do not allow for pair-list answers in general (Szabolcsi 199?). This can be seen in (112), where I spell out the full-fledged quantificational version of the sluiced interrogative. (112) lacks the pair-list reading (and, furthermore, it is pragmatically odd under its other potential reading (112b) --unless one single dancer danced a part of the first waltz of the night with each boy).

(112) Who did at least seven boys from your class dance the first waltz with?

a. * Pair-list answer: "For at least seven boys x of your choice, tell me: who did x dance the first waltz with (i.e., list me the couples)."

b. # Single answer: "Which person is such that at least seven boys danced the first waltz with her."

This pair-list-like reading is easily available if the E-type pronoun *they* takes the place of the quantificational NP at LF. This can be seen in the deaccented version (113), which, again, is rendered preferrably with that pronoun:

(113) At least seven boys from your class danced the first waltz of the night, but I don't know WHO ***they*** *danced it* WITH.

a. Pair-list-like reading: "..., but I don't know who each of them danced with."

This type of pair-list-like readings do not arise from the interaction of any quantifier with the *wh*-phrase. As Krifka (1992) proposes, these pair-list-like readings arise as a special case of cumulative readings generated by two interacting plural NPs, as in (114):[42]

(114) What did the boys rent last night?

a. Pair-list-like reading: "For each boy x, what is the thing that x rented last night?"

b. Single answer reading: "What is the thing such that the boys rented it last night?"

In sum, we do not have the quantificational NPs *just one kid* and *at least seven kids* denoting a generalized quantifier (type <<e,st>,<st>>) in the sluiced IP, but a referential expression denoting a plural individual of type e. Note that, independently of Sluicing, those QuNPs allow for an E-type pronoun to refer back to them, as exemplified in (115).

(115) a. Just one kid arrive late, and he (=the one kid that was late) asked for excuses.

[42] The two interacting plurals in (114) are *the boys* and the number-ambiguous *what*. These pair-list-like readings are predicted to disappear as soon as the *wh*-phrase is explicitely singular, e.g., *which book*. However, I found that, for some speakers, this reading is acceptable for (i). Those speakers also liked the pair-list-like reading of (ii):
(i) I need to know which book the kids are reading.
(ii) Most kids are reading, but I don't know which book.

b. At least seven kids helped me with the cleaning. They (=the kids that helped me) did a good job.

Hence, given that we do not have an intervening operator in the sluiced IP, but a referential expression, the Background conditions can be fulfilled. This is exemplified under (116) for the sluice (108a).

(116) I know most kids talked about it, but I don't know to WHOM.

b. Focus condition:

[[*know that most kids talked about it*]] implies the property "to know whether there is a group of people such that the kids that talked about it talked about it cumulatively to that group", which ∈ [[*know to WHOM they* (=the kids that talked about it) *talked about it*]]^{f}.

b'. Givenness condition:

$\lambda w.\exists x_e$ [[[*know that most kids talked about it*]](x)(w)] implies

$\lambda w.\exists x_e \exists D_{<e,\delta>}$ [[[*know to* D ("person") *they* (=the kids that talked about it) *talked about it*]](x)(w)]

Let us now go back to the ungrammatical examples, repeated in (117). From the analysis I just presented, the following prediction arises: if the type of quantificational NP does not license E-type pronouns, we cannot have such pronoun in the sluiced IP and, hence, the scope parallelism required by the Background conditions is not fulfilled. This is exactly the case for *no*. As Evans (1980:218) notes, a quantificational NP headed by *no* cannot be resumed with an E-type pronoun. Evans' example (118) illustrates this point. Hence, the example (117a) is out because its LF representation must contain a quantificational NP that disturbs the required scope parallelism.

(117) a. * Nobody went out for dinner, but I don´t remember to which restaurant {nobody went out for dinner}.

b. * Few kids ate, but I don't know what {few kids ate}.

(118) # No congressmen admire Kennedy, and they are very junior. (Evans 1980)

As for the example (117b), Evans observes that E-type pronouns can refer back to quantificational NPs headed by *few*, as illustrated in (119). However, it is often the case that this anaphora does not succeed --for reasons yet not well understood (Moxey-Sanford 1987, Kibble 1994, Corblin 1995). The examples in (120) are two such cases. In (120a), the pronoun they is preferrably understood as referring back to the total sum of students -- or even to the sum of students that did not eat-- rather than to the sum of students that ate. The example (120b), which primes the sum of students that ate as the antecedent for the pronoun, is somewhat deteriorated.

(119) Few congressmen admire Kennedy, and they are very junior. (Evans 1980)

(120) a. # Few students ate. They were embarassed.

b. ??? Few students ate, (but) they are still hungry.

Crucially, in the contexts where *few N'* licenses an E-type pronoun, Sluicing with an implicit indefinite ANT-phrase becomes acceptable again, as (121) shows:

(121) Scenario: An anonymous phone call warns the police that a small amount of poison --enough to kill a kid, though-- has been poured into three dishes served at a certain

party. The police goes to the party and finds out that the amount of kids that has already eaten is fairly small.

(122) a. Few kids ate, but nobody recalls what they ate.

b. Few kids ate, but I don't know what {they ate}.

Finally, let me point out that exactly the same effect and analysis extrapolates to adverbs of quantification. Kibble (1994) and Corblin (1995) note that, whereas Modal Subordination is easy with upward-monoton adverbs, downward-monoton adverbs make it impossible or much harder. This is exemplified by the contrast within (123) and within (124). Modal subordination is possible with downward-monoton adverbials only if a Prepositional Phrase makes explicit reference to the relevant occasions, as (123c) shows.

(123)a. A player usually picks up a card. He plays it immediately. (Corblin 1995)

b. * A player rarely picks up a card. He plays it immediately.

c. A player rarely picks up a card. But, in that case, he plays it immediately.

(124) a. It's likely that John will cook one dish or another. He may (even) serve it on his grandma's china.

b. * It's unlikely that John will cook anything. He may serve it on his grandma's china.

The Sluicing examples involving Modal Subordination pattern exactly the same way as the examples involving E-type pronouns: if the adverb of quantification elicits Modal Subordination, the Sluicing with an implicit ANT-phrase is possible; if we have a downward-monoton adverb that does not allow for Modal Subordination, the sluice becomes ungrammatical or deviant. This is shown in the examples (125)-(126).

(125)a. John usually cooks himself when he has guests, but I don't know what.

b. * John never cooks himself when he has guests, but I don't know what.

c. * John rarely cooks himself when he has guests, but I don't know what.

c'. ?? John rarely cooks himself when he has guests, and I certainly don't know what.

(126)a. It's likely that he'll cook, but it's unclear what.

b. * It's unlikely that he'll cook, but it's unclear what.

This result is expected under the proposed analysis of Sluicing if we assume that the phenomenon known as Modal Subordination is an instance of dircourse anaphora referring to a formerly described set of situations, much in the way an E-type pronoun does in the case of quantificational NPs.[43] Then, the sluiced IP in the grammatical (125a) would not contain the adverb of quantification *usually*. A referential anaphoric expression would stand in its place, and, hence, the scope parallelism between the ANT-phrase and the sluiced *wh*-phrase would be met. In fact, a paraphrase of the grammatical (126a) involves the use of a somewhat anaphoric expression, rather than the repetition of the modal adverb *likely*, as shown in (127).[44] The other grammatical Sluicing example -- (125a)-- also allows for a paraphrase with anaphora.

[43] This line has been developed in Farkas (1993), Kibble (1994a) and others as an alternative to Roberts' (1987, 1996) accommodation analysis.

[44] My analysis makes the same predictions for the island-free (126a), repeated as (i), and for its Subject Island versions in (ii), since in neither of these sluices the predicate *is likely* is present at LF. Speakers find (iia) only mildly deviant, improved if the order of the predicates is the same, as in (iia). As for CLM's examples and judgments in (iii)-(iv) (=their (102d,c)), the speakers I consulted considered both examples odd for independent reasons, namely, because *win* seems to prefer a definite implicit argument rather than an indefinite one.
(i) It's likely that he'll cook, but it's unclear what.
(ii) a. ? That he'll cook is likely, but it's unclear what.
b. That he'll cook is likely, but what isn't clear.
(iii) It's likely that Tom will win, but it's not clear which race.
(iv) * That Tom will win is likely, but it's not clear which race.

(127) Paraphrase for (126a):

a. "It's likely that he'll cook, but it's unclear what he'll cook if he does / in that case."

b. * "It's likely that he'll cook, but it's unclear what it's likely that he'll cook."

(128) Paraphrase for (125a):

"John usually cooks himself when he as guests, but I don't know what he cooks in those occasions."

To summarize this subsection, we have seen that, when the ANT-clause contains a quantificational NP, Sluicing with an implicit indefinite ANT-phrase is grammatical only insofar as an E-type pronoun takes the place of that quantificational NP. This is predicted under the analysis of Sluicing that I have defended all through this chapter: *wh*-phrases can only have parallel scope to their implicit indefinite ANT-phrases if no operator whatsoever takes scope under the interrogative COMP.

As a corollary, Sluicing data involving adverbs of quantification suggest a close similarity between E-type pronouns and Modal Subordination.

1.5.5 Conclusions on Sluicing with an Implicit Indefinite ANT-Phrase

We have seen that Sluicing with an implicit indefinite antecedent is ungrammatical whenever an operator intervenes, no matter whether that operator blocks A'-chains or not. The reason for this is the following. Since implicit indefinites have narrowest scope and since the sluiced *wh*-phrase must have parallel scope to its antecedent, the binder of a sluiced *wh*-phrase has to meet a potentitally contradictory requirement: it must have narrowest scope within the copied IP --for scope parallelism-- and it must have widest scope within the copied IP --in Spec-CP, for question interpretation. This double requirement can only be met if there is no other quantificational operator in the copied IP.

Examples with upward-entailing Quantifiers further support this generalization: this type of Sluicing only succeeds when the quantificational NP is resumed by an E-type pronoun --hence, we have a referential expression (or definite description) instead of a quantificational NP-- in the sluiced IP.

1.6 Conclusions

Three peculiarities of Sluicing have been explained as the result of the interaction of Focus with other independently motivated semantic, pragmatic and discourse principles. More concretely, we have seen that:

1. Contrary to CLM's analysis, the grammaticality of a given antecedent phrase does not hinge on the kind of DP itself, but on the contrast between the antecedent phrase and the sluiced *wh*-phrase, which crucially bears Focus stress on the *wh*-Determiner. The desired data are derived by defining the set of alternatives of a *wh*-Determiner and applying to it Rooth's (1985, 1992a,b, 1995) Focus Condition and Schwarzschild's (1997a,b) Givenness condition and Avoid Focus constraint.

2. *To know Q* --where *Q* is a question-- means to know the exhaustive true answer to that question *Q*, and *not to know Q* implies not to know any partial answer to that *Q*. From this generalization and from the Focus/Background conditions on discourse information, the inheritance of content effects follow automatically.

3. Sluicing with implicit indefinite antecedents is far more restricted than CLM point out: it is blocked not only when the sluiced IP contains a strong island, but also when it contains any operator whatsoever --independently of whether that operator blocks strong islands or not. This is again explained in terms of the conspiracy between different principles of the grammar: the semantics of Focus, the semantic scope of implicit indefinites and the (un)availability of E-type pronouns in certain pragmatic or discourse circumstances.

In the bigger picture, the work developed in this chapter is a step towards a unified account of VP-Ellipsis and Sluicing (and, potentially, other ellipsis phenomena). The rules that CLM propose for Sluicing --IP-Recycling, Merger and Sprouting[45]-- are not needed, since their job is done by the interplay of independently motivated factors.

[45] Some version of CLM's Sprouting operation may be needed if the ANT-IP and the sluiced IP need to be syntactically identical at LF. See, however, footnote 26 in this chapter, where I discuss other possibilities. In any case, the behaviour of sluiced *wh*-phrases with respect to islands and other intervenors is explained independently of this LF-operation.

CHAPTER 2

RECONSTRUCTION OF *HOW MANY* PHRASES

2.1 Introduction

Some overtly moved constituents behave syntactically and semantically as if their movement had been "undone" at LF. These constituents are said to show Reconstruction Effects. Phrases presenting reconstruction effects are, among others, fronted Verb Phrases, topicalized constituents, clefts, pseudoclefts[1], and, optionally, (parts of) *how many* phrases, *whose* phrases and *which* phrases. In this chapter, I focus on reconstruction effects of *how many* phrases, though many of the insights presented in it can be extended to other types of reconstructed phrases.

I will be concerned with two types of Reconstruction Effects: Scope Reconstruction and Connectivity (or Connectedness).

Let me first present Reconstruction Effects. The syntactic position that a phrase has at S-Structure does not always determine the logical scope that it will have in the final formal translation of the entire sentence.[2] For example, in (1), the surface scope of the existential Noun Phrase over the universal Noun Phrase does not preclude the reading captured by the formula in (1b), where the universal quantifier has logical scope over the existential quantifier.

(1) Exactly three students liked every lecture.[3]

a. $\exists X$ [student*(X) $\wedge$ |X|=3 $\wedge$ $\forall y$ [lecture(y) $\rightarrow$ like*(y)(X)]]

[1] It has been argued that clefts and pseudoclefts do not result from a movement operation (see Higgins 1979). Their reconstruction effects, hence, do not arise from "undoing" any movement, but presumably from "doing" something else that makes them similar to the movement cases.

[2] In a formula $\forall x\phi$, ϕ is the logical scope of this occurrence of the quantifier $\forall x$. The same holds for $\exists x$. (See Gamut I:76).

[3] In the formulae, '*' is Link's (1983) plural operator.

b. $\forall y$ [lecture(y) $\rightarrow \exists X$ [student*(X) $\wedge$ |X|=3 $\wedge$ like*(y)(X)]]

The term "Scope Reconstruction" refers to one particular type of mismatch between S-Structure position and logical scope. **Scope Reconstruction (ScopeR)** is the result of having the logical scope of overtly moved material determined not by its S-Structure site, but by a **previous site it visited** on its way to S-Structure position. Let us demonstrate this with an example. In (2), the existential Noun Phrase (NP) *n-many students* can be understood as having scope over *should* (wide reading (2a-a')) or with reconstructed scope under the modal (reconstructed reading (2b-b')):

(2) How many students should I talk to?

a. Wide reading: "For what number n: there are n-many particular students x such that I should talk to x".

a'. [[(1)]](w) =

{ p: $\exists n \in N$ [p = $\lambda w'.\exists X$ [student*(X)(w') $\wedge$ |X|=n $\wedge$ should ($\lambda w''$.talk*(X)(I)(w'')) (w')]] }

b. Reconstructed reading: "For what number n: it is necessary for there to be n-many students x such that I talk to x". (E.g., how many students/which amount of students should I talk to in order to have a representative survey?)

b'. [[(1)]](w) =

{ p: $\exists n \in N$ [p = $\lambda w'$.should ($\lambda w''.\exists X$[students*(X)(w'') & card(X)=n & talk*(X)(I)(w'')]) (w')] }

Another example of ScopeR is given under (3). Despite the fact that the binder and the bindee are not in a c-command configuration at S-Structure, the bound pronoun *his* is interpreted within the logical scope of the quantifier introduced by its binder *every boy*:

(3) Which relative of his_1 do you think every boy_1 likes the most?

The second reconstruction phenomenon is Connectivity. **Connectivity (Conn)** is the effect of evaluating Binding Theory (BT, henceforth) for an overtly moved constituent not with respect to its S-Structure site, but with respect to (one of) its prior site(s). For example, the fronted Verb Phrases in (4) are evaluated for BT Principles C and A as if they were in D-Structure position, locally c-commanded by the coindexed subject *she*. That is, they behave like their in situ versions in (5) and unlike non-reconstructable S-Structure material in (6). Similarly, in the cleft in (7), in the *which* phrase in (8) and in the *how many* phrase in (9), the anaphors *herself* and *himself* and the referential expressions *Mary* and *John* are evaluated for Principle A and C as if they were c-commanded by the coindexed pronoun *she/he* at some level of representation.

(4) a. * Write about $Mary_1$ I think she_1 certainly would.

b. Write about $herself_1$ I think she_1 certainly would.

(5) a. * I think she_1 would (certainly) write about $Mary_1$.

b. I think she_1 would (certainly) write about $herself_1$.

(6) a. I wrote about $Mary_1$ that I think she_1 should get a vacation.

b. * I wrote about $herself_1$ that I think she_1 should get a vacation.

(7) a. * It's about $Mary_1$ that I think she_1 likes writing the most.

b. It's about $herself_1$ that I think she_1 likes writing the most.

(8) a. * Which pictures of $John_1$ did he_1 like?

b. Which pictures of $himself_1$ did he_1 like?

(9) a. * How many pictures of John$_1$ did he$_1$ buy?

b. How many pictures of himself$_1$ did he$_1$ buy?

Two kinds of strategies have been pursued in the literature to account for these reconstruction effects. Chronologically, the first one is Syntactic Reconstruction. A second approach, called "Semantic Reconstruction", was developed afterwards.

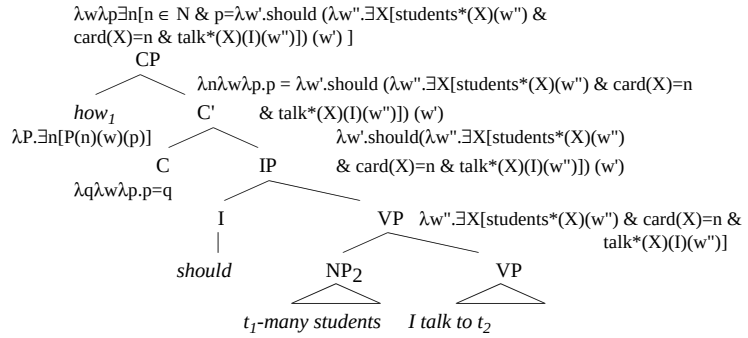
In the **Syntactic Reconstruction (SynR)** approach, the overtly moved constituent is placed back in its reconstruction site at LF, either by LF-lowering of the overtly moved phrase (Longobardi 1987, Cinque 1990) or by Copy Theory (Chomsky 1995). The LF-representation under (10) illustrates this type of reconstruction operation for the reconstructed reading of (1), repeated below. I annotate the corresponding semantic interpretation for the relevant constituents, too.[4]

(10) How many students should I talk to?

a. Reconstructed reading: "For what number n: it is necessary for there to be n-many students x such that I talk to x".

[4]Here and throughout the chapter, syntactic movement (Beck 1996) --or the indices of movement (Heim-Kratzer 1998)-- is interperted as a λ-abstraction operation over the variable introduced by the corresponding trace.

b. LF with SynR and its semantic interpretation:



Once the moved constituent is placed back at the reconstruction site, ScopeR effects follow from the usual assumption that logical scope is read off LF: the syntactic scope of a Quantificational NP (QuNP) at LF (i.e., its sister node at LF) determines the logical scope of that QuNP. The semantic computation in (10) illustrates how compositional rules derive this match.

Conn follows from the quite extended view that BT principles are defined in terms of c-command (Chomsky 1981) and that BT (also) applies at LF (Lebeaux 1990, 1994; Fox 1995b):[5]

(11) Binding Theory Principle A:

Anaphors must be c-commanded by a coindexed antecedent NP in their Binding Domain.[6]

[5] A node A c-commands a node B iff: (a) A does not dominate B and B does not dominate A; and (b) the first branching node dominating A also dominates B (Reinhart 1981).

[6] For the purposes of this chapter, the Binding Domain of an anaphor can be equated with its clause. Technically, Chomsky (1986) defines the Binding Domain of an anaphor as the smallest Complete Functional Complex (CFC) dominating the anaphor. A CFC is a maximal projection containing one (or

(12) Binding Theory Principle C:

Referential expressions (R-expressions, henceforth) cannot be c-commanded by a coindexed antecedent NP.

Since, in this approach, both reconstruction effects depend on the LF-position of the moved phrase, ScopeR and Conn are predicted to correlate.

Cinque (1990) makes an observation that may challenge this prediction: ScopeR and Conn do not seem to pattern together with repect to weak islands. As pointed out by Longobardi (1987), the scope of a *how many* phrase cannot be reconstructed inside a weak island. This is shown by the lack of reconstructed reading in (13). Note that this reading is possible when no island intervenes, as in (14).

(13) How many students do you wonder whether I should talk to?

a. For what number n: there are n-many students x such that you wonder whether I should talk to x.

b. * For what number n: you wonder whether it is necessary that there are n-many students x such that I talk to x.

(14) How many students do you think I should talk to?

a. For what number n: there are n-many students x such that you think I should talk to x.

b. For what number n: you think that it is necessary that there are n-many students x such that I talk to x.

more) theta-role assigners and all and only the phrases that receive a theta role from that/those theta-role assigner(s).

Reconstruction for BT purposes, instead, seems to be immune to islands, as Cinque's (1990:12-13) examples show:

(15) a. It is to herself$_1$ that I don't know whether she$_1$ wrote.

b. * It is to her$_1$ that I don't know whether Mary$_1$ wrote.

c. * It is to Mary$_1$ that I don't know whether she$_1$ wrote.

In view of this contrast (and also in order to keep semantic interpretation as close to surface configurations as possible), Cresti (1995:85) and Rullmann (1995:174) develop a semantic account of the scopal effects totally separate from the mechanism eliciting Conn.[7] This second account of reconstruction facts, known as **Semantic Reconstruction (SemR)**, involves two semantic types of traces: traces of individual type *e* (lower case *t*) and traces of generalized quantifier type <<*e*,<*st*>>,<*st*>> (upper case *T*). When a constituent moves leaving a trace *t*, its logical scope corresponds to its syntactic scope in the landing site (wide reading); when it leaves a trace *T*, instead, the compositional interpretation will assign it the logical scope corresponding to the site of *T* (reconstructed reading), as exemplified in (16). Note that there is no syntactic lowering or copying of the NP t_3-*many students* in this account; the scopal ambiguity depends entirely on semantic grounds, namely on the choice of the semantic type of the trace.[8]

[7] Cinque, instead, considers that both ScopeR and Conn are produced by the same reconstruction mechanism --Syntactic Reconstruction-- and explains the contrast between (13) and (15) as a difference in "referentiality": SynR is operative through weak islands, but only "referential" *how many* phrases can be extractred out of islands and, hence, the narrow, "non-referential" reading of *how many* in (13) is unavailable.

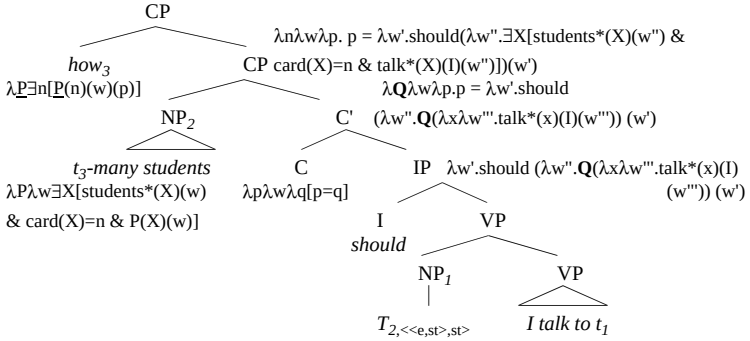
[8] See Cresti (1995:100,102) and Rullmann (1995:184) for details and slight differences in their implementation of the SemR line. For variable binding within the SemR framework, see section 4 in this chapter.

(16) How many students should I talk to?

a. Reconstructed reading: "For what number n: it is necessary for there to be n-many students x such that I talk to x".

b. LF with SemR and its semantic interpretation:

λwλpꓱn[n∈ℕ & p=λw'.should(λw".ꓱX[students*(X)(w") & card(X)=n & talk*(X)(I)(w")])(w')]



As for Conn, the SemR approach needs to invoke a non-local account of Binding Theory, e.g., Barss' (1986) account. Barss defines the notion of chain accessibility sequence to account for Principle A Conn (but it can be easily extended to cover Principle C and B, too). Intuitively, a chain accessibility sequence is a path starting from the anaphor up the tree that leaps from nodes that have moved to their traces and continues from there. The technical definition is provided under (17) and illustrated under (18). The BT-condition on anaphors --given in (19)-- dictates that a local antecedent for the anaphor has to be found as the sister to a node in that path, a requirement that is fulfilled for (18), since the coindexed DP *John* is the sister of I', which is a link in the chain (18b).

(17) Chain Accessibility Sequence (Barss 1986):

S = (a_1, ..., a_n) is a well-formed chain accessibility sequence for an NP A only if :

i. A is a_1,

ii. some a_i is a projection of the governor of A,

iii. for every pair (a_i, a_{i+1}), either (1) or (2):

1) a_{i+1} immediately dominates a_i

2) (a_i, a_{i+1}) is a link of a well-formed A' or A (movement) chain,

iv. and a_n is the root node of a Complete Functional Complex.

(18) a. [**WhP**Which [**NP**pictures [**PP**of **himself**$_1$]]]$_2$ did you think [**IP**John$_1$ [**I'**would [**VP** like **t$_2$**]]]

b. Chain accessibility sequence:

(*himself*, P', PP, N', NP, Wh', WhP, t_2, V', VP, I', IP)

(19) Chain Accessibility Condition on Anaphors:

An anaphor A is licensed only if there is a coindexed NP that is minimally chain accessible to A.

The aim of this chapter is double. First, in section 2, I will be concerned with the relation between ScopeR and Conn. It will be shown that the aforementioned island asymmetry is only apparent and, more importantly, that there exists a correlation between the reconstructed scope of a phrase and its Conn effects. Second, I will investigate which of the two competing accounts is best suited to explain reconstructions effects. I will discuss two potential problems for the Semantic Reconstruction approach. The first one is that the correlation between ScopeR and Conn is unexpected under the SemR analysis, which has to stipulate the dependency of Conn on scope; in the SynR approach, instead, this correlation is predicted. This is the subject of section 3. The second reason, discussed

in section 4, is a problem for the SemR interpretive device itself: some sloppy readings will be presented that cannot be derived by SemR without violating independently motivated assumptions about VP phonological reduction. Again, this problem does not arise in the SynR approach. Admittedly, neither of these arguments is conclusive evidence against Semantic Reconstruction, but they are challenges that any implementation of the Semantic Reconstruction line has to face and that do not arise in the Syntactic Reconstruction approach.

2.2 Scope Reconstruction and Connectivity Correlate

This section is concerned with the relation between the two reconstruction phenomena. It investigates whether ScopeR and Conn pattern together or not.

First, in subsection 2.1, I address the island asymmetry mentioned above. It will be shown that the contrasting examples do not form a minimal pair. Upon closer scrutiny, we will see that ScopeR and Conn pattern together in clefts --they are both possible across *whether* islands-- and that there is no evidence that they pattern differently in *how many* phrases. Hence, we lose the original motivation for keeping the two reconstruction effects as independent phenomena.

Subsection 2.2 is devoted to show that there are, indeed, reasons to keep the two reconstruction phenomena related in some fashion. We will see evidence that Principle C Conn effects are dependent on the reconstructed scope of a phrase. The subsections 2.2.1 (summarizing Heycock 1995), 2.2.2 and 2.2.3 (both from Romero 1997c, elaborating on Heycock) show that, when the entire *n-many* phrase has reconstructed scope, the phrase is evaluated for Principle C as if it was syntactically placed in the reconstruction site. Subsection 2.2.4 adds Sharvit's (1998) important observation that the transparency/ opacity of the N' restrictor of the *how many* phrase matters for Principle C Conn. From all these data, the following generalization will arise:

(20) The reconstructed scope of a constituent determines its Principle C Connectivity effects.

2.2.1 On the Apparent Island Asymmetry

Let us recall the alledged asymmetry between the two reconstruction phenomena: in (21), *how many students* cannot take scope under the *whether*-island, whereas the clefted constituents in (22) do reconstruct under it for BT-purposes.

(21) How many students do you wonder whether I should talk to?
√ wide reading of *how many*, * reconstructed reading

(22) a. It is to herself$_1$ that I don't know whether she$_1$ wrote.
b. * It is to Mary$_1$ that I don't know whether she$_1$ wrote.

I will show in this subsection that (21)-(22) do not form a minimal pair for comparing ScopeR and Conn. More concretely, we will see that the contrast in (21)-(22) does not show that the two reconstruction phenomena behave differently with respect to islands, but at most that the two types of phrases involved --i.e., *how many* phrases *vs*. clefts-- do.

First, (23) and (24) show that clefted DPs can also scopally reconstruct under an island:

(23) It’s three BOOKS that I don’t know whether you can check out at once (...but, three magazines, I’m sure you can.)

a. Reconstructed scope reading: “I don’t know whether it is possible for you to check out three books (any three) at once.”

(24) It's SEMANTICS papers that I wonder whether the new editor always sends to enough reviewers.

a. Reconstructed scope reading *always-semantics papers >> enough reviewers*: "I wonder whether, for all the situations s in which the new editor gets a semantics paper, there is a situation s' such that s≤s' and the new editor sends the unique semantics paper in s to enough reviewers in s'." [9]

Second, there is no way to test whether weak islands block ConnE in *how many* phrases. On the one hand, we cannot test whether they block the “negative” BT-Principles B and C because, to begin with, *how many* phrases may but do not need to reconstruct under embbeded Subjects, as far as Binding Theory is concerned. This is shown by the example (25b), borrowed from Huang (1993) and Takano (1995): the licensing of the anaphor is possible in (25a), whereas the violation of Principle C does not necessarily occur in the same configuration, since (25b) is quite good. Thus, we cannot check

[9] I have two comments about the examples (23)-(24). First, in order to get the reconstructed scope readings of (23)-(24), we need to place focus on *books* and *semantics*. I do not know how the semantics of focus by itself could give rise to these narrow scope readings if we prohibit any kind of reconstruction mechanism across islands. This brings up the issue of what is blocking ScopeR of *how many* phrases across islands but not ScopeR/Conn of clefts. Cresti's syntactic filter, inspired by Frampton (1991) and repeated here under (i), can account for the lack of ScopeR of *how many* across islands, but fails to derive the clefted NPs in (23)-(24). Cinque's (1990) proposal would not explain the difference, either: the clefted constituents in (23)-(24) are not more "referential" than the NP *n-many students* in (21). I leave the question open for further research.

(i)* $[_{CP}$ T $[_{CP}$

The second comment has to do with the status of (23). Kroch (1989) shows that pragmatic plausibility can make the narrow reading of *how many* perfectly available across a *whether* island:

(ii) How many points are the judges arguing whether to deduct?

The standard response to cases like (ii) (Cresti, p.c.) is that, in these examples, the *n-many* phrase is "frozen" and does not interact with any quantifier; that is, *n-many points* necessarily has narrow scope under any other potential operator within the embedded interrogative. Though this criticism may be extended to my example (23), it does not extend to (24), where the bare plural *semantics papers* is bound by *always* and has scope over *enough reviewers*. I thank M. Kappus (p.c.) for bringing example (24) to my attention.

whether inserting an island inbetween would prevent a Principle C violation that did not occur to begin with.

(25) a. How many pictures of himself$_1$ do you think that he$_1$ will like?

b. ? How many pictures of John$_1$ do you think that he$_1$ will like?

On the other hand, licensing of anaphors seems to be parasitic on the scope the *how many* phrase takes. For (26), for instance, both the wide and the narrow scope readings (26a-b) are possible, but only the narrow scope becomes available if we insert an anaphor coindexed with the embedded subject, as in (27):

(26) How many patients did the committee decide that Dr. Preuss and Dr. Spok should visit?

a. √ Wide reading of *how many*: “For what number n: there are n-many (particular) patients that the committee decided Dr. Preuss and Dr. Spok should visit.”

b. √ Narrow, reconstructed reading of *how many*: “For what number n: the committee decided that it should be the case that Dr. Preuss and Dr. Spok visit n-many patients.”

(27) How many of each other$_1$’s patients did the committee decide that [Dr. Preuss and Dr. Spok]$_1$ should visit?

* wide reading, √ narrow, reconstructed reading

This dependency is actually expected under the two-fold condition on anaphors that Lebeaux(1994:1,15) prososes: besides the classical Principle A requirement in (28a), to be fulfilled at some point or other in the derivation, Lebeaux observes that anaphors --like

variables bound by quantifiers-- need to take scope under their binders at LF, as (28b) dictates:

(28) a. Anaphors need to be coindexed with a c-commanding DP within their Governing Category at some point in the derivation.

b. Anaphors need to be c-commanded by their binders at LF.[10]

This second condition --taken as a pure scope requirement, without committing ourselves to derive it from LF-c-command or from the use of big traces *T*--, explains why licensing of anaphors is parasitic on the scope that the phrase containing it takes, since anaphor licensing is not just a matter of Principle A but also a matter of scope. Hence, we expect that islands that prevent a *how many* phrase from taking reconstructed scope will also block anaphor ConnE --a prediction that is born out, as (29) shows[11]--, but this does not tell us anything about the effect of weak islands over bare Connectivity in *how many* phrases.

(29) a. * How many rumors about each other$_1$ does the committee wonder whether they$_1$ would tolerate if they knew?

b. * How many rumors about herself$_1$ does the committee wonder whether Mary$_1$ really minds?[12]

[10] Lebeaux' second requirement is actually more demanding than that. He gives (i) (p.15):
(i) The LF must be coherent,
which means that there should be "a single level (LF) to read off the quantificational binding and the anaphoric binding" (p.4).

[11] One of my informants salvaged the islands in (29) and claimed to get the narrow scope reading. This preserves, if not strengthens, the correlation we are aiming for and calls into question the perseverance of the blocking effect of *whether*-islands. See also footnote 9.

[12] Shin-Sook Kim, p. c., pointed out to me that the speakers she consulted did lincense the reflexive in a configuration like (29b). I do not know whether her informants were also salvaging the scope island or whether there are other factors to control for.

Hence, the generalization is different from the one noted in Cinque (1990): both scope- and BT-reconstruction across weak islands are possible for clefted DPs and there is no evidence that they diverge in *how many*-phrases. That is, we do not have any reason to keep the two reconstruction phenomena separate and have a different reconstruction mechanism for each.[13]

The next subsection will be devoted to show that ScopeR and Conn are, indeed, related phenomena. The discussion will be based on data in which scope reconstruction and Principle C interact in *how many* phrases.

2.2.2 ScopeR Triggers Principle C Connectivity

2.2.2.1 Creation Verbs

Heycock (1995) presents some data involving creation verbs that suggest that the Conn effects of a *how many* phrase are dependent of the scope this *how many* phrase takes. Her examples are given in (30) and (31):

(30) a. ? How many stories about Diana$_1$ is she$_1$ really upset by?

b. How many lies aimed at exonerating Clifford$_1$ did he$_1$ claim he$_1$ had no knowledge of?

(31) a. * How many stories about Diana$_1$ is she$_1$ likely to invent?

b.* How many lies aimed at exonerating Clifford$_1$ is he$_1$ planning to come up with?

[13] Lechner (1997) provides another argument for keeping ScopeR and Conn as the result of two separate operations, namely German object scrambling data where ScopeR but not Conn occur. I presently do not have any argument against those data.

Due to the semantics of the creation verbs *invent* and *come up with*, the entire *n-many* phrases in (31) only have reconstructed scope reading, since the wide scope reading -- spelled out in (32) for the example (31a)-- is pragmatically odd.

(32) # For what number n: there are n-many particular stories x about Diana such that Diana is likely to invent x.

The only plausible logical scope for the *n-many* phrase is, thus, under *invent*/*come up with*. Now, since the sentence is ungrammatical, we should conclude that a Principle C violation has occurred. There is no violation at S-Structure,[14] and no D-Str violation seems to be at issue either (given that (30) is good). Hence, Principle C must have been violated at LF. But, if we are getting such a violation at LF, the *n-many* phrase must have undergone **syntactic** reconstruction into the c-command domain of *she*, not just semantic reconstruction.

These are the first data showing that reconstruction for scope reasons enforces Connectivity effects.

2.2.2.2 Embedding the Offending Antecedent

Another set of data comes from Huang (1993) and is recapitulated in Takano (1995). They note that, the closer the coindexed Subject is at S-Str, the stronger the Connectivity Effect is:

[14] Heycock (1995:fn15) remarks that the degraded status of (31) cannot be due to the presence in SpecNP of a PRO controlled by the subject of *invent / come up with*, since the examples in (i) are as degraded as the ones in (31):
(i) a. * How many stories about Diana$_1$ does she$_1$ want Charles to invent?
b. * How many lies aimed at exonerating Clifford$_1$ does he$_1$ want you to come up with?

(33)a. ?* How many pictures of John$_1$ does he$_1$ think that I like?
b. ? How many pictures of John$_1$ do you think that he$_1$ will like?

Takano only refers to the grammaticality judgment of these examples, without specifying whether the judgment holds for both scope readings of *how many*. In this subsection, I will show that the scope of the *n-many* phrase actually matters: the Principle C violation is obviated in (33b) only if the *n-many* phrase takes wide scope.[15]

Let us first look at the configuration in (33a), where the coindexed Subject is in the **matrix clause**. To make the judgments about its two readings sharper, I insert a *whether*-island in (34) (so that the only reading that the reader gets is the wide scope one) and I include a quantifier inducing "rate" reading in (35) (so that the reader primarily gets the narrow scope reading of the *n-many* phrase). The resulting examples are both ungrammatical:

(34) * How many pictures of John$_1$ does he$_1$ wonder whether I like?
a. * For what n: there are n-many pictures x of John such that John thinks that I like x.

(35)* How many pictures of Neil Young$_1$ does he$_1$ think that the newspapers should publish per month?
b. * For what n: Neil Young thinks that it should be the case that, every month, there are n-many pictures x of Neil Young such that the newspapers publish x.

[15] The judgments in this section correpond to destressing the coindexed subject. If the pronoun bears contrastive stress, though, some of my informants consider all of them more or less salvageable.

However, if we do the same for the **embedded** coindexed **Subject** configuration (33b), we see that the scope that the *n-many* phrase takes makes a difference for Principle C: the wide reading --enforced in (36) by the weak island-- is possible, but, crucially, the narrow reading of *n-many* --favoured by PP *per month* in (37)-- is still bad:

(36) ?√ How many pictures of $John_1$ do you wonder whether he_1 will like?

a. ?√ For what n: there are n-many pictures x of John such that you wonder whether he will like x.

(37) * How many pictures of Neil $Young_1$ do you think that he_1 should publish per month?

b. * For what n: you think that it should be the case that, every month, there are n-many pictures x of Neil Young such that Neil Young publishes x.

For a sharper judgment about (37), compare it with (38), where the name and the coindexed pronoun have switched places. In this case, the narrow reading (37b) does not induce a Principle C violation and, thus, becomes again available:

(38) How many pictures of $himself_1$ do you think that Neil $Young_1$ should publish per month?

√ narrow, reconstructed reading (37b).

What is important about (36)-(37) is that the embedding of the offending coindexed phrase (the Subject *he* in all the above examples) does not trigger the amelioration of the Principle C *per se*. An embedded coindexed Subject will salvage a Principle C Connectivity Effect only insofar as the *n-many* phrase containing the name has wide

reading. That is, if the entire *n-many* phrase has narrow scope within the embedded clause, the fact that the offending DP *he* is embedded is of no use.[16]

This point is further illustrated in (40) with a *wh*-construction that, as noted in the literature, necessarily has narrow scope: the *how much* construction. That *how much* has only the narrow scope reading is shown in (39), since, once the *whether*-island wipes out the narrow reading, the sentence becomes ungrammatical (or, at least, pragmatically odd). Once this has been established, we can check Principle C effects. (40a) is out, since the only possible scope for the *n-much* phrase --narrow scope within the embedded clause-- is causing a Principle C violation. Again, compare it with its inverted version (40b), which is perfectly grammatical:

(39) a. How much wine do you think he drank?

b. * How much wine do you wonder whether he drank?

(40) a. * How much of $John_1$'s Merlot 1993 do you think he_1 drank?

b. How much of his_1 Merlot 1993 do you think $John_1$ drank?

The pattern of judgments that we have presented can be explained if we assume that the existential quantification burried in *how many* and *how much* always has semantic scope **under** the referential **subject** of the clause, that is, if there is mandatory short scope

[16] Takano (1995) also observed that further embedding of the coindexed Subject does not always help ameliorating a Principle C violation. His examples are about predicate fronting, like in (i):
(i) * How proud of $John_1$ do you think he_1 said Mary is?
However, the persistence of the Principle C violation in (i) can be explained on pure **syntactic** terms, as Takano does (by the presence of a Subject trace within the fronted predicate that needs to be licensed through an LF-SynR procedure, thus causing Principle C violation at LF).
The data we are discussing, instead, show that Principle C violations persist on behalf of the **logical** / **semantic** scope of the phrase containing the name. The question we are heading towards is, thus, why semantic scope should produce LF Principle C violations if the reconstructed scope is gained by a purely semantic device independent of the one yielding Conn.

reconstruction.[17] I conclude, thus, from the data in (34) through (40), that the reconstructed scope of *how many* and *how much* phrases has an impact on Connectivity Effects. Namely, the referential subject of the clause where the entire *n-many/much* phrase takes scope acts as if it was c-commanding the whole *n-many/much* phrase for BT purposes.

2.2.2.3 Embedding the Name[18]

As Lebeaux (1994) observed, embedding the name in an adjunct (Relative Clause or adjunct PP) within the *wh*-phrase diminishes the Principle C violation. The basic contrast is given under (41):[19]

(41) a. * How many pictures of $John_1$ did he_1 buy?
b. How many pictures that $John_1$ took did he_1 buy?

I do not aim to account for this fact in this dissertion. However, I would like to point out that, as in the case of embedding the coindexed Subject, the amelioration that the embedding of the name supposes is dependent upon the scope the *n-many* phrase takes. The example (27), for instance, is certainly grammatical, but it only allows for the wide reading of *n-many* in (42a), whereas the narrow, reconstructed reading in (42b) is out:

[17] This shallow reconstruction site may be an Adjunct-AgrO/I position, recasting Chomsky's (1987) idea that A'-movement goes through adjunct-VP position. We leave the question open at this point.

[18] This subsection is based on my work in Romero (1997c). Independently, Fox (1997) has found similar data and come to the same concluding generalization.

[19] This embedding is also responsible for the grammaticality of Heycock's examples in (30), which have a much better status than the above examples (34)-(35) despite the fact that all exhibit coindexed clausemate subjects.

(42) How many pictures that $John_1$ took in Sarajevo does he_1 want the editor to publish in the Sunday Special?
a. √ "For what n: there are n-many particular pictures x that John took in Sarajevo such that John wants the editor to publish x."
b. * "For what n: John wants the editor to publish in the Sunday Special (any) n-many pictures that John took in Sarajevo."

Again, if we switch the positions of *John* and *he*, the reconstructed reading (42b) becomes available, since it does not involve any Principle C violation:

(43) How many pictures that he_1 took in Sarajevo does $John_1$ want the editor to publish in the Sunday Special?
√ wide reading (42a), √ reconstructed reading (42b)

Let me recapitulate, at this point, the last three subsections. We have seen that Connectivity effects are dependent upon the scope the *n-many* phrase takes. More concretely, it has been shown that, if the entire *n-many* phrase has X as its reconstructed scope, then Principle C applies to it as if the entire *n-many* phrase was the sister of X syntactically.

2.2.2.4 Transparent N-Bars within *How Many* Phrases

Up to this point, the reconstruction examples considered involved *how many* phrases that reconstruct as a whole, that is, *how many* phrases where both the quantifier *n-many* and its N-bar restrictor were reconstructed under an intensional verb: the quantifier took scope under the intensional verb and the N' was opaque (evaluated with respect to the possible worlds that the intensional verb quantifies over). In a recent paper, Sharvit

(1998) makes a very important observation: what matters for Principle C Conn is not the scope of the *n-many* quantifier, but the transparency or opacity of its N-bar. She gives the following example as grammatical under the reading (44a) and ungrammatical under the reading (44b):

(44) How many students who hate Anton$_1$ does he$_1$ hope will buy him$_1$ a beer?

a. Narrow *n-many*, transparent N':
"For what number n: in all bouletic alternatives of Anton's w', there are n-many x that are students who hate Anton in the actual world and that will buy him a beer in w'."

b. * Narrow *n-many*, opaque N':
"For what number n: in all bouletic alternatives of Anton's w', there are n-many x that are students who hate Anton in w' and that will buy him a beer in w'."

Note that, in both readings, the quantifier *n-many* has narrow scope under *hope*. The diffence between the two readings lies in the interpretation of the N' restrictor *students who hate Anton*: if the N' is opaque, there is a Principle C violation, as in the examples in the previous subsections; but, crucially, if the N' is transparent, the Principle C violation is obviated and the sentence is grammatical.

Sharvit develops an account of this fact which relies solely on the transparency or opacity of the N' containing the R-expression. Let us take an N' restrictor that is opaque with respect to a given intensional operator Op. In her account, this opaque N' will induce a Principle C violation only if a coindexed NP c-commands the CP/IP that the intensional operator Op takes as its (internal) argument. Let us see this in the above example. Under the reading (44b), *students who hate Anton* is opaque with respect to the intensional verb *hope*. Since the coindexed pronoun *he* c-commands the CP-argument of *hope* (i.e., the embedded *that*-clause) the sentence is ungrammatical under this reading. Under the

reading (44a), instead, *students who hate Anton* is transparent. At most, it could be argued that it is opaque with respect to the question operator in COMP. In any case, there is no coindexed NP c-commanding the CP/IP-argument of an intensional operator that makes the N' opaque. The result is, hence, a grammatical sentence.

I agree with Sahrvit that what determines the Principle C effects of a *how many* phrase is not the reconstructed scope of the quantifier *n-many*, but some property of the N' restrictor containing the name. However, I consider that this property is not just opacity (i.e., world variable binding), but also --following Fox (1997)-- pronoun variable binding. That is, I consider that Principle C is fed by pronominal variable binding as much as by opacity. To see that opacity is not the only feature that matters for Principle C effects in *how many* phrases, let us look at (46). We can see that *how many* phrases show the same pattern that Lebeaux (1990, 1994) and Fox (1997) found for *which* phrases, given under (45).

(45) a. [Which of the books that he$_1$ asked the teacher$_2$ for] did every student$_1$ get from her$_2$?

b. * [Which of the books that he$_1$ asked the teacher$_2$ for] did she$_2$ give every student$_1$?

c. [Which of the books that he$_1$ asked her$_2$ for] did the teacher$_2$ give every student$_1$?

(Fox 1997:(35))

(46) a. [How many (of the) books that he$_1$ needed from Caroline$_2$ last semester] did every boy$_1$ ask her$_2$ for?

b. * [How many (of the) books that he$_1$ asked Caroline$_2$ for last semester] did she$_2$ lend every boy$_1$?

c. [How many (of the) books that he$_1$ asked her$_2$ for last semester] did Caroline$_2$ lend every boy$_1$?

Furthermore, I found that, for some speakers, (46b) contrasts sharply with (47), where the N' restrictor contains a name but not a bound variable. The reading *every boy >> n-many*, then, does not induce a Principle C violation and, hence, the sentence is grammatial under this reading:

(47) [How many (of the) books that the department bought for Caroline$_2$ last semester] did she$_2$ lend every boy$_1$?
a. √ Narrow reading of *n-many*: "For what n: of the books that the department bought for Caroline last semester, it holds that, for every boy x, there are n-many (possibly different) books y of those such that Caroline lent y to x ."

An analysis that only takes the transparency/opacity of N' into consideration --like Sharvit's-- does not account for the contrast in (46) and the contrast between (46b) and (47). Under her analysis, all four examples are predicted to be grammatical. In particular, there is no intensional operator in (46b) that makes the N' *(of the) books that he$_1$ asked Caroline$_2$ for last semester* opaque and whose CP-argument is c-commanded by an NP coindexed with *Caroline*.

Instead, Sharvit's data in (44) and the contrast in (46)-(47) follow if we assume that Principle C is fed not just by opaque N-bars but by reconstructed scope N-bars in general. N' restrictors containing bound variables --bound pronouns or an opaque world variable-- must be within the logical scope of their binders: in (44b), the opaque N' has reconstructed scope under *hope*; in (46b), the N' containing the bound pronoun *he* has reconstructed scope under *every boy*. In both cases, the reconstructed scope site is c-

commanded by an NP coindexed with the name within N'. This yields a Principle C violation that makes both examples ungrammatical.[20]

The conclusion of this subsection is, hence, the following:

(48) The reconstructed scope of the N' restrictor of a *how many* phrase determines its Principle C Connectivity effects.[21]

2.2.3 Conclusions of Section 2

I conclude section 2 at this point. It has been shown that there is a correlation between the Scope Reconstruction and Connectivity. First, we saw that *whether* islands do not discriminate between the two reconstruction phenomena. Second, we saw that the

[20] I constructed more examples in order to make sure that pronoun variable binding by itself induces Principle C effects. The following are examples where an epithet functions, at the same time, as a bound variable (see Stowell-Lasnik) and as a transparent description. Furthermore, epithets obey some hybrid version of Principles B and C, as (ii) shows. I tested the data in a pilot survey and got some preliminary results. The sentences in (iii) were hard to process due to the long distance inverse binding *the little bastard...every friend*. However, to the extent that this binding is possible, there is a clear contrast between (iiia) and (iiib) that suggest that transparent N-bars containing a bound variable also feed Principle C. I defer, though, a final conclusion until a more extensive survey is done. For more data pointing at the same conclusion, see also footnote 17 in *which* phrase chapter.
(i) Scenario: Mary's friends went on a camp ground vacation. They misbehaved in the forest (they cut plants off, captured grasshoppers, tortured frogs...) and, because of that, the speakers think they are little bastards. Mary is not concerned with environmental issues and thinks that her friends are all very nice. Furthermore, she wants them to show us pictures (not any in particular) from the terrorizing vacation.
(ii) a. * Mary's friend$_1$ saw a snake near the bastard$_1$.
b. * Mary wants every friend$_1$ of hers to show you three pictures of the little bastard$_1$.
c. Mary wants every friend$_1$ of hers to show you three pictures that the little bastard$_1$ took in the forest.
(iii) b. * How many pictures of the little bastard$_1$ does Mary wants every friend$_1$ of hers to show you?
c. ?? How many pictures that the little bastard$_1$ took in the forest does Mary wants every friend$_1$ of hers to show you?

[21] It may be possible that only part of an N' restrictor has reconstructed scope. In (i), for example, the N' *pictures of himself* needs to reconstruct under *every boy*, but the Relative Clause does not seem to reconstruct along, since there is no Principle C violation in the sentence. The generalization in (48), hence, would have to amended to capture these finer cases. I leave the issue for further research. The same consideration holds for *which* phrases (see fn 11 in *which* phrase chapter).
(i) [How many pictures of himself$_1$ that Mary$_2$ has already seen] does she$_2$ want, nevertheless, every boy$_1$ to describe to her$_2$?

ScopeR of an N' restrictor triggers Principle C Conn effects. Generalizing this conclusion,[22] we arrive at (49):

(49) The reconstructed scope of a constituent determines its Principle C Connectivity effects.

2.3 Deriving the ScopeR-Conn Correlation under SynR and under SemR

This section spells out the mechanisms needed in order to capture the above generalization under the two competing reconstruction accounts: Syntactic Reconstruction (SynR) and Semantic Reconstruction (SemR). It will be argued that the correlation follows straighforwardly from the SynR approach, whereas, in the SemR line, in has to be stipulated.

2.3.1 Syntactic Reconstruction

As I mentioned in the introduction of this chapter, the Syntactic Reconstruction approach proposes that a constituent that has reconstructed scope is placed back in its reconstruction site at LF.[23] No matter whether this position is gained by LF-lowering (Longobardi 1987, Cinque 1990) or by Copy Theory (Chomsky 1995), the crucial feature of the analysis is that the overtly moved phrase is syntactically present at the reconstruction site at LF.

[22] The correlation ScopeR-Conn also holds for *whose* phrases (Romero 1997c:§4), for raising Subjects (Fox 1997:§2.1; Romero 1997c:§5), and for *which* phrases (Fox 1997:§2.2,2.3; chapter 4 of this dissertation).

[23] I use the term "reconstruction site" to refer to the site of the highest trace in the S-Str tree that the moved phrase left and that is still in the c-command domain of the binder at issue.

Connectivity effects occur when a phrase is syntactically reconstructed at LF (for some independent reason) and, as the result of the lowering or copying operation, a configuration arises that feeds Binding Theory at LF.

Let us illustrate how this approach derives the desired correlation with some examples. Let us look at (50) (=(42)) first, where we reconstruct the whole *n-many* phrase, that is, the quantifier *n-many* together with the opaque N' restrictor:

(50) How many pictures that John$_1$ took in Sarajevo does he$_1$ want the editor to publish in the Sunday Special?

a. √ Wide reading: "For what n: there are n-many particular pictures x that John took in Sarajevo such that John wants the editor to publish x."

b. * Reconstructed reading: "For what n: John wants the editor to publish in the Sunday Special (any) n-many pictures that John took in Sarajevo."

The corresponding LF representations under the SynR account are given in (51)-(52):

(51) LF representation for the wide reading (50a):

[$_{CP}$ how$_3$ Q [$_{IP}$ [$_{NP}$ t$_3$-many [$_{N'}$ pictures that **John$_1$** took in Sarajevo]]$_2$ [$_{IP}$ **he$_1$** wants [$_{CP}$ the editor to publish t$_2$ in the Sunday Special]]]]

(52) LF representation for the reconstructed reading (50b):

[$_{CP}$ how$_3$ Q [$_{IP}$ **he$_1$** wants [$_{CP}$ [$_{NP}$ t$_3$-many [$_{N'}$ pictures that **John$_1$** took in Sarajevo]]$_2$ [$_{IP}$ the editor to publish t$_2$ in the Sunday Special]]]]

In (51), the entire *n-many* phrase reconstructs only under the *Q* operator in COMP.[24] This produces no Principle C violation at LF, since *he* does not c-command *John* in the resulting LF. In the reconstructed reading representation in (52), instead, the entire *n-many* phrase is reconstructed lower, under the intensional verb *want* and, thus, under the subject *he*. This produces a Principle C violation at LF and the reading is out. Recall that, if we reverse the order between the name and the pronoun, no Principle C violation arises at LF and the reading becomes available, as (53)-(54) show:

(53) How many pictures that he_1 took in Sarajevo does $John_1$ want the editor to publish in the Sunday Special?

√ wide reading (50a), √ reconstructed reading (50b)

(54) LF representation for the reconstructed reading of (53):

$[_{CP}$ how$_3$ Q $[_{IP}$ **John$_1$** wants $[_{CP}$ $[_{NP}$ t$_3$-many $[_{N'}$ pictures that **he$_1$** took in Sarajevo$]]_2$ $[_{IP}$ the editor to publish t$_2$ in the Sunday Special]]]]

The second example that we will look at is Sharvit's example, repeated under (55). This time, we are only interested in the readings where the *n-many* quantifier has reconstructed scope. In one of them, (55a), the N' restrictor is opaque and is reconstructed under the verb *hope* together with the *n-many* quantifier. The LF for this reading is spelled out in (56). As in the former case in (52), a Principle C violation rules out this reading.

(55) How many students who hate $Anton_1$ does he_1 hope will buy him_1 a beer?

a. * Narrow *n-many*, opaque N':

[24] For reasons for this shallow reconstruction --using SynR or SemR-- see von Stechow (1996a). The point, though, is orthogonal to the present discussion.

"For what number n: in all bouletic alternatives of Anton's w', there are n-many x that are students who hate Anton in w' and that will buy him a beer in w'."

b. Narrow *n-many*, transparent N':

"For what number n: in all bouletic alternatives of Anton's w', there are n-many x that are students who hate Anton in the actual world and that will buy him a beer in w'."

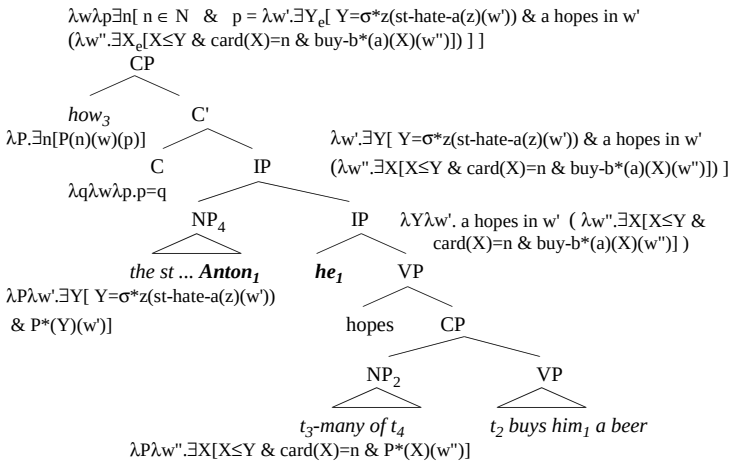
(56) LF representation for the reconstructed, opaque reading (54a):

$[_{CP}$ how$_3$ Q $[_{IP}$ **he$_1$** hopes $[_{CP}$ $[_{NP}$ t$_3$-many $[_{N'}$ students who hate **Anton$_1$**$]]_2$ $[_{IP}$ t$_2$ will buy him$_1$ a beer]]]]

In the second reading (55b), though, the N' restrictor is transparent with respect to *hope* and, hence, does not need to reconstruct along with the *n-many* quantifier. To account for the possibility that *n-many* reconstructs without its N' restrictor, I propose the following procedure. First, I have to assume that, at the relevant level of representation, *n-many students who hate Anton* amounts to *n-many of the students who hate Anton*. Let us say this level is LF. Second, the transparent NP *the students who hate Anton* QRs outside the *n-many* phrase (adjoining, e.g., to the matrix IP, though other possibilities are open). Third, the left-over *n-many* phrase reconstructs syntactically into its reconstruction site in the usual way. The resulting LF is sketched in (57), together with its semantic interpretation. No Principle C violation arises at LF --since *Anton* is not c-commanded by *he*-- and, thus, the reading is available.[25]

[25] Alternatively, we could consider that the relevant level at which *n-many students who hate Anton* and *n-many of the students who hate Anton* are equivalent (in this example) is semantic interpretation. In this case, it would be the transparent N-bar *students..Anton* that moves out of the NP. Note that N' movement occurs overtly in some languages, as the example (i) of Split Topicalization in German shows. In our example, this N' movement leaves a trace of extensional type <et>, as in (ii), or of individual (plural) type e, as in (iii). In either case, I need to postulate a flexible type interpretation rule for the structure, as done in (iv).

(57) LF and interpretation for the reconstructed, transparent reading (55b):



Finally, we will look at the examples (46), repeated in (58)-(59), where --as Fox (1997) suggests-- reconstruction of the N' restrictor is needed for pronominal variable binding. The *n-many* quantifier may have two readings. Under one reading --(a)-reading-- it has scope under *every boy* and quantifies over individuals. The second reading -- marginal in these examples-- is a functional reading: *n-many* quantifies over choice

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(i) Split Topicalization in German:
a. Erstsemester moechte er drei einladen.
First-semester-students would-like he three invite
"Of first semester students, he wants to invite three"
b. √ Narrow, transparent reading: "In all his bouletic alternatives w', there are three x that are first semester students in w and that he invites in w'."

(ii) $[_{NP}$ n-many $t_{<et>}]$

(iii) $[_{NP}$ n-many t_e]

(iv) Flexible Functional Application for Determiners:
If $[[Qu]] \in D_{<<e,st>,<<e,st><st>>>}$ and $[[P]] \in D_{<e,st>}$, $D_{<e,t>}$ or D_e,
$[[Qu\ P]]$ = $[[Qu]]([[P_{<e,st>}]])$, or
$[[Qu]](\lambda x\lambda w".[[P_{<e,t>}]](x))$, or
$[[Qu]](\lambda x\lambda w".\ x \leq [[P_e]])$.

functions and *n-many* may have scope over *every boy*. Here, I will only illustrate the first reading, but the same argumentation applies to the second (see *which* phrase chapter for functional readings).

(58) [How many (of the) books that he_1 needed from $Caroline_2$ last semester] did every boy_1 ask her_2 for?
a. Individual reading: "For what n: every boy asked Caroline for n-many books that he needed from her."
b. Functional reading: "For what n: there are n-many (natural) choice functions f such that, for every boy x, x asked Caroline for f(book that x needed from Caroline last semester)." (Answer: Three. Namely: the book that he needed to review for *NLS*, the book that his advisor had recommended him most vehemently, and the oldest book that Caroline hadn't returned to him yet.)

(59) * [How many (of the) books that he_1 asked $Caroline_2$ for last semester] did she_2 lend every boy_1?
a. Individual reading: "For what n: Caroline lend every boy n-many books that he asked Caroline for last semester."
b. Functional reading: "For what n: there are n-many (natural) choice functions f such that, for every boy x, she lent f(book that x asked Caroline for) to x."

The LF representation for (58a) is given under (60). The bound pronoun forces reconstruction of the N' restrictor under its binder *every boy*. No further reconstruction is needed and no Principle C violation occurs:

(60) [How many (of the) books that he_1 needed from $Caroline_2$ last semester] did every boy_1 ask her_2 for?

a. [$_{CP}$ how$_3$ Q [$_{IP}$ every boy$_1$ [$_{IP}$ [$_{NP}$ t$_3$-many [$_{N'}$books that he$_1$ needed from **Caroline$_2$**]]$_4$ [$_{IP}$ t$_1$ asked **her$_2$** for t$_4$]]]]

In the LF representation for (59a), instead, syntactic reconstrunction for pronominal binding purposes brings the whole N' restrictor under *every boy* and into the c-command domain of the coindexed subject *she*, inducing a Principle C violation:

(61) * [How many (of the) books that he$_1$ asked Caroline$_2$ for last semester] did she$_2$ lend every boy$_1$?

a. [$_{CP}$ how$_3$ Q [$_{IP}$ **she$_2$** [$_{VP}$ every boy$_1$ [$_{VP}$ [$_{NP}$ t$_3$-many [$_{N'}$books that he$_1$ needed from **Caroline$_2$**]]$_4$ [$_{VP}$ t$_2$ lend t$_1$ t$_4$]]]]]

Recall that, if the Relative Clause contains no pronoun that needs to be bound, syntactic reconstruction of the N'/NP restrictor is not enforced, as the grammaticality of (62) (=47) suggests: (62) has a reading where the quantifier *n-many* reconstructs and, yet, no Principle C violation arises. The proposed LF is spelled out under (62b):

(62) [How many (of the) books that the department bought for Caroline$_2$ last semester] did she$_2$ lend every boy$_1$?

a. √ Narrow reading of *n-many*: "For what n: of the books that the department bought for Caroline last semester, it holds that, for every boy x, there are n-many (possibly different) books y of those such that Caroline lent y to x ."

b. [$_{CP}$ how$_3$ Q [$_{IP}$ [$_{NP}$ the books that the department bought for **Caroline$_2$** last semester]$_5$ [$_{IP}$ **she$_2$** [$_{VP}$ every boy$_1$ [$_{VP}$ [$_{NP}$ t$_3$-many of t$_5$]$_4$ [$_{VP}$ t$_2$ lend t$_1$ t$_4$]]]]]]

In sum, under the SynR approach, ScopeR and Conn correlate because both are determined by the syntactic position of the phrase at LF. The correlation follows from the standard assumptions that logical scope is read off LF and that Binding Theory principles (also) apply at LF.

2.3.2 Semantic Reconstruction

Under the SemR account, the ScopeR-ConnE correlation is unexpected. To see this, let us examine the first set of examples. The two readings of (63) (=(50)) are now given the LF-representation under (64a) and (65a):

(63) How many pictures that John$_1$ took in Sarajevo does he$_1$ want the editor to publish in the Sunday Special?

a. √ Wide reading: "For what n: there are n-many particular pictures x that John took in Sarajevo such that John wants the editor to publish x."

b. * Reconstructed reading: "For what n: John wants the editor to publish in the Sunday Special (any) n-many pictures that John took in Sarajevo."

(64) LF representation for the wide reading (63a):

a. [$_{CP}$ how$_3$ [$_{CP}$ [**$_{NP}$** t$_3$-many [$_{N'}$ pictures that **John$_1$** took in Sarajevo]]$_2$ Q [**$_{IP}$** he$_1$ wants [$_{CP}$ **t$_2$** [$_{CP}$ the editor to publish t$_2$ in the Sunday Special]]]]

b. (*John*, ... , NP, t_2, ..., IP)

(65) LF representation for the reconstructed reading (63b):

a. [$_{CP}$ how$_3$ [$_{CP}$ [**$_{NP}$** t$_3$-many [$_{N'}$ pictures that **John$_1$** took in Sarajevo]]$_2$ Q [**$_{IP}$** he$_1$ wants [$_{CP}$ **T$_2$** [$_{CP}$ the editor to publish t$_2$ in the Sunday Special]]]]

b. (*John*,... , NP, T_2, ..., IP)

If we define Principle C violations in terms of c-command, neither (64a) nor (65a) present a violation and, thus, both should be grammatical. Alternatively, we could use Barss' non-local account of Binding Theory, as suggested in Sternefeld (1997) and Sharvit (1998) and discussed in Romero (1997b).[26] Barss' notion of chain accessibility and his definition of Principle A are repeated under in (66)-(67). Under (68), I define Principle C in terms of chain accessibility, too. Still, this non-local Binding Theory system yields wrong predictions: both LF-representations are predicted to be ruled out, since both contain a chain that makes the coindexed pronoun accessible to the name, namely the chains in (64b)-(65b).

(66) Chain Accessibility Sequence (Barss 1986):

S = (a_1, ..., a_n) is a well-formed chain accessibility sequence for an NP A only if :

i. A is a_1,

ii. some a_i is a projection of the governor of A,

iii. for every pair (a_i, a_{i+1}), either (1) or (2):

1) a_{i+1} immediately dominates a_i

2) (a_i, a_{i+1}) is a link of a well-formed A' or A (movement) chain,

iv. and a_n is the root node of a Complete Functional Complex.

(67) Chain Accessibility Condition on Anaphors:

An anaphor A is licensed only if there is a coindexed NP that is minimally chain accessible to A.

[26] I will present here Barss' theory and the minimal changes needed to account for the ScopeR-Conn correlation. Sternefeld (1997) and Sharvit (1998) develop variants of it, though the spirit is the same.

(68) Chain Accessibility Condition on R-expressions:

An R-expression R is licensed only if there is no coindexed NP that is chain accessible to R.

Nothing inherent to the SemR approach, hence, makes the parallelism between ScopeR and ConnE expectable. If we want to derive such a correlation within this approach, we have to derive it with some extra means. We would have to say that reconstructed phrases are evaluated for BT as if they were in their lowest *T*-site at LF. This can be done by amending Barss' chain accesibility sequence definition so that only higher type traces T can enter in a Chain or Binding Path, as done in (66.iii.2).[27]

(66.iii.2') **($XP_{\alpha,i}$, $T_{\alpha,i+1}$)** is a link of a well-formed A' or A (movement) chain (where α is the semantic type of both the moved element and its trace).

The refinement proposed in (66.iii.2') derives the contrast in (63). So far, so good.

Let us now proceed to the next set of data, namely, Sharvit's example (69):

(69) How many students who hate $Anton_1$ does he_1 hope will buy him_1 a beer?

a. * Narrow *n-many*, opaque N':

"For what number n: in all bouletic alternatives of Anton's w', there are n-many x that are students who hate Anton in w' and that will buy him a beer in w'."

[27] In Romero (1997b), I also discuss the possibility of redefining LF Principle C (and, in general, all LF conditions based on c-command) in terms of the notion of semantic scope from Heim (1994). I dismiss it on the grounds that it would require two completely different versions of Principle C: one for S-Str, based on c-command, and one for LF, based on semantic scope.

b. Narrow *n-many*, transparent N':

"For what number n: in all bouletic alternatives of Anton's w', there are n-many x that are students who hate Anton in the actual world and that will buy him a beer in w'."

This example shows that narrow, transparent readings obviate Principle C violations. To account for this fact, we would have to add one more constraint to (66.iii.2'). First, we would have to assume, as Sharvit suggests, that traces bear world indices (indicated with a superscript). Then, we would have to ensure that only big traces T that match the world index of the clause where they are placed can enter into a Binding Path. A way to guarantee this is illustrated under (66.iii.2").[28] (70)-(71) show the LF representations and Binding Paths for the two readings of (69):

(66.iii.2") $(XP_{\alpha,i}, T^{\mathbf{k}}_{\alpha,i+1})$ is a link of a well-formed A' or A (movement) chain **and the closest IP dominating T^{k} bears the same world index k as T^{k}**.

(70) LF and Binding Path for the narrow, opaque reading (69a):

a. $[_{CP}$ how$_3$ $[_{CP}$ $[_{\mathbf{NP}}$ n-many students who hate **Anton$_1$**$]_2$ Q $[_{\mathbf{matr\text{-}IP}}$ he$_1$ hopes $[_{\mathbf{CP}}$ T^k_2 $[_{\mathbf{IP}^k}$ $\mathbf{T^k_2}$ $[_{IP}$ t^k_2 will buy him$_1$ a beer]]]]]]

b. (*Anton*, ..., NP, T^k_2, IP^k, CP, ..., matrix-IP)

(71) LF and Binding Path for the narrow, transparent reading (69a):

a. $[_{\mathbf{CP}}$ how$_3$ $[_{CP}$ $[_{\mathbf{NP}}$ n-many students who hate **Anton$_1$**$]_2$ Q $[_{\text{matr-IP}^k}$ he$_1$ hopes $[_{CP}$ T^k_2 $[_{IP^j}$ T^k_2 $[_{IP}$ t^k_2 will buy him$_1$ a beer]]]]]]

[28] Sternefeld's and Sharvit's implementation of Barss' Binding Path idea is different from (66.iii.2"), since Sternefeld does not aim to capture the transparent/opaque distinction and Sharvit only aims to capture that distinction.

b. (*Anton*, ..., NP, highest-CP) (or no Binding Path at all, if CP does not count as a Complete Functional Complex)

The narrow, opaque LF representation in (70) is ruled out because *he* is accessible through the Binding Path (*he* is sister to the matrix I', which is a link in the chain). In the narrow, transparent LF in (71), instead, the Binding Path is shorter because none of the big traces T meets the condition in (66.iii.2").[29] Since *he* is not sister to any node in that Binding Path, no Principle C violations arises.

We still need to derive one final case. Recall the examples (72)-(74) (=(46a,b), (47)). I give below their semantically reconstructed LF representations for the reading *every*>>*n-many* and their Binding Paths:

(72) [How many (of the) books that he$_1$ needed from Caroline$_2$ last semester] did every boy$_1$ ask her$_2$ for?

a. $[_{CP}$ how$_3$ $[_{CP}$ $[_{\mathbf{NP}}$ t_3-many books that he$_1$ needed from **Caroline$_2$** $]_4$ Q $[_{\mathbf{matr\text{-}IP}^k}$ every boy$_1$ $[_{\mathbf{IP}^k}$ $\mathbf{T^k_4}$ $[_{IP}$ t_1 asked her$_2$ for t^k_4]]]]]

b. (*Caroline*, ..., NP, T^k_4, IP^k, matrix-IP^k)

(73) * [How many (of the) books that he$_1$ asked Caroline$_2$ for last semester] did she$_2$ lend every boy$_1$?

a. $[_{CP}$ how$_3$ $[_{CP}$ $[_{\mathbf{NP}}$ t_3-many books that he$_1$ needed from **Caroline$_2$** $]_4$ Q $[_{\mathbf{matr\text{-}IP}^k}$ she$_2$ $[_{\mathbf{VP}}$ every boy$_1$ $[_{\mathbf{VP}}$ $\mathbf{T^k_4}$ $[_{VP}$ t_2 lend t_1 t^k_4]]]]]

b. (*Caroline*, ..., NP, T^k_4, VP, VP, matrix-IP^k)

[29] One would have to assume that there is no intermediate trace in the matrix IP (i.e., the *wh*-phrase moved from CP to CP directly) in order to derive the right prediction from (66.iii.2").

(74) [How many (of the) books that the department bought for Caroline$_2$ last semester] did she$_2$ lend every boy$_1$?

a. √ Narrow reading of *n-many*: "For what n: of the books that the department bought for Caroline last semester, it holds that, for every boy x, there are n-many (possibly different) books y of those such that Caroline lent y to x ."

b. [$_{CP}$ how$_3$ [$_{CP}$ [$_{\mathbf{NP}}$ t$_3$-many books that the department bought for **Caroline$_2$**]$_4$ Q [$_{\mathbf{matr\text{-}IP^k}}$ she$_2$ [$_{\mathbf{VP}}$ every boy$_1$ [$_{\mathbf{VP}}$ **T$^k_4$** [$_{VP}$ t$_2$ lend t$_1$ t$^k_4$]]]]]

c. (*Caroline*, ..., NP, T$^k_4$, VP, VP, matrix-IP^k)

The example (72) is correctly predicted to be grammatical, since the pronoun *her* is not accessible through the corresponding Binding Path. The prediction for (73) is correct, too: *she* is sister to the matrix-I' node in the Binding Path and, thus, this LF configuration is ruled out. The problem is that (74) presents exactly the same Binding Path and the same position for *she* as (73) does, and, yet, (73) is ungrammatical and (74) is grammatical. This means that some further amendments are needed for the Binding Path idea to yield the desired reconstruction facts, since world-coindexed big traces do not always lead to Principle C violations.[30]

I leave this issue at this point. From the overall discussion, I conclude that, with the necessary machinery, the SemR-Binding Path approach might be able to derive the correlation between ScopeR and Principle C Connectivity. However, the way it might be derived is by stipulating which kinds of traces can enter into a Binding Path and which

[30] In footnote 20, I referred to some preliminary results suggesting that transparent N' restrictors containing bound variable pronouns induce Principle C effects too. The amendment (66.iii.2") does not capture this fact either. That is, (66.iii.2") wrongly predicts those cases to be grammatical, since the embedded big trace T bears a transparent world index and, hence, cannot enter into a Binding Path. In sum, taking all the cases into account, we have the following generalization: some occurrences of world-coindexed big traces enter into binding paths (namely, the big traces adjoined to the CP of the world-coindexed clause), and some occurrences of big traces enter into binding paths independently of their world index (namely, the ones corresponding to moved NPs that contain a bound pronoun).

traces cannot. Nothing intrinsic to the nature of traces seems to explain why each kind of trace behaves the way it does with respect to Binding Paths.

I conclude section 3 here. In this section, I have argued that SynR explains the correlation between ScopeR and Conn: the two phenomena correlate because the logical scope of a constituent and its Principle C Conn effects are all determined by the syntactic position that this constituent occupies at LF. In the SemR approach, instead, it is not obvious to me how the correlation could be derived without stipulating it somehow.[31] In conclusion, unless further developments of the SemR line prove more successful in this respect, I take the correlation between ScopeR and Conn as an argument to prefer the SynR account over the SemR analysis.

In the next section, I present a potential problem for the SemR device itself.

2.4 Scope Reconstruction in VP-Reduction

2.4.1 Data on VP-Reduction and Assumptions

The present section 4 is concerned with examples like the ones in (75) through (77), in particular, with the (b)-versions where the VP is deaccented.[32] It investigates which LF-representation --the SynR LF-representation or the SemR LF-representation-- is capable of deriving the reconstructed scope (sloppy) reading of those sentences, spelled out under each example:

[31] In the text, I have spelled out what it would take for SemR to derive ConnE when coupled with Barss' Binding Path theory. I regret not having time to elaborate on another possible implementation, namely SemR aided by Reinhart's (1997) Rule I (which, roughly, states that binding should be preferred over coreference or covaluation). This second account may yield better results, though it is not clear whether it could do away with Binding Paths at all, since S-Str c-command (and, thus, for our reconstruction cases, Binding Path accessibility) is an element of the definition of Rule I.

[32] In a unified analysis of ellipsis and deaccenting --like Rooth's, which I will adopt--, the argumentation that I will present in this section applies to the VP-ellipsis examples too. Deaccented material is written in italics.

(75) a. How many jokes did John manage to come up with before PETER did?

b. How many jokes did John manage to come up with before PETER *managed to come up with that many jokes*?

c. √ Reconstructed scope reading:

"For what n: John managed to come up with n-many jokes before Peter managed to come up with n-many jokes."

(76) a. How many pictures of himself did John manage to sell per month before PETER did?

b. How many pictures of himself did John manage to sell per month before PETER *managed to sell that many pictures of himself per month*?

c. √ Reconstructed scope sloppy reading:

"For what n: John manage to sell (the amount of) n-many pictures of John per month before Peter managed to sell (that amount of) n-many pictures of Peter per month."

(77)a. How many copies of his last CD did P. Simon manage to sell before A. GARFUNKEL did?

b. How many copies of his last CD did P. Simon manage to sell before A. GARFUNKEL *managed to sell that many copies of his last CD*?

c. √ Reconstructed scope sloppy reading:

"For what n: P. Simon reached the record of selling n-many copies of P. Simon's last CD before A. Garfunkel reached the record of selling n-many copies of A. Garfunkel last CD."

In this section, I assume the theory of VP phonological reduction and Focus developed in Rooth (1985, 1992a,b, 1995). Rooth posits two recoverability conditions for VP phonological reduction, given under (78).

(78) Rooth's recoverability conditions for VP reduction.

a. LF-identity Condition

(for VP-Ellipsis only)

The antecedent VP and the elided VP must be identical at LF, except maybe for indices.

b. Focus Condition

(for both VP-Ellipsis and VP-deaccenting)

There must be LF-constituents α and β dominating the antecedent VP and the elided VP respectively such that the ordinary semantic value of α ($[[\alpha]]$) belongs to (or implies a proposition that belongs to) the focus semantic value of β ($[[\beta]]^f$).[33]

The Focus Condition is the crucial one for the argumentation that I will present in this section. Let us see it at work in an example. Take, e.g., (79), whose sloppy reading LF-representation is derived by moving the subjects and λ-binding the sloppy pronouns, as in (80).

(79) Mary_1 introduced her_1 parents to him_3 and LUCY_2 *introduce* $\textit{her}_2$ *parents to* $\textit{him}_3$, too.

[33] The Focus semantic value of a constituent is recursively defined in Rooth along the following lines:
(i) If α is a non-focused lexical item, then $[[\alpha]]^f = \{ [[\alpha]] \}$.
(ii) If α is a focused lexical item, then $[[\alpha]]^f = D_\sigma$, where σ is the type of $[[\alpha]]$.
(iii) If the node α has the daughters β and γ (order irrelevant), and there are types σ and τ such that $<\sigma,\tau>$ is the type of $[[\beta]]$ and σ is the type of $[[\gamma]]$, then $[[\alpha]]^f = \{x \in D_\tau : \exists y,z [\, y \in [[\beta]]^f \ \& \ z \in [[\gamma]]^f \ \& \ x=y(z) \,]\}$

(80) [$_{IP}$ Mary 1 [$_{IP}$ t_1 introduced her$_1$ parents to him$_3$]] and [$_{IP}$ LUCY 2 [$_{IP}$ t_2 did introduce her$_2$ parents to him$_3$]]

The LF in (80) fulfills the Focus condition, since the denotation (81a) of the first clause belongs to the focus semantic value (81b) of the second clause. That is, (81a) belongs to the set of alternative (dynamic) propositions resulting from replacing the denotation of the focused DP *Lucy* with some denotation of individual type (e.g., by Mary, Elisabeth, Chris, etc.), as stated in (81c,d).

(81) Focus condition:

a. Denotation of first clause:

{ < g_1, λw.Mary introduced Mary's parents to Joshua in w >,
< g_2, λw.Mary introduced Mary's parents to Peter in w >,
< g_3, λw.Mary introduced Mary's parents to Marcel in w >, ... }

b. Focus semantic value of second clause: the set of dynamic propositions of the following shape, where x ∈ D_e:

{ < g_1, λw.x introduced x's parents to Joshua in w >,
< g_2, λw.x introduced x's parents to Peter in w >,
< g_3, λw.x introduced x's parents to Marcel in w >, ... }

c. [[*Mary 1 introduced her$_1$ parents to him$_3$*]] ∈ [[*LUCY 2 introduced her$_2$ parents to him$_3$*]]^f, since:

d. λgλw[Mary introduced Mary's parents to g(1) in w] ∈ { λgλw[x introduced x's parents to g(1) in w] : x ∈ D_e }

I will argue that this Focus Condition cannot be fulfilled with the LF-representations and semantic interpretations assigned to (75)-(77) by the current SemR approach. To

this end, I will first devote some more time to the SemR mechanism itself and present how variable binding can be achieved without LF c-command. Two SemR accounts will be introduced: Chierchia's (1995) dynamic SemR account and a (static) SemR account that uses doubly indexed traces (extension on Engdahl 1986). All this will be the topic of the next subsection, 4.2. Then, in subsection 4.3, I will argue that neither of these two SemR approaches can derive the aforementioned Focus Condition. I will explore several alternatives and show that all of them run into problems. Subsection 4.4 shows that the Focus Condition is easily met if we use SynR, instead. I will conclude that, unless a solution is worked out for the SemR analysis, we need to use SynR in order to derive reconstructed scope readings in VP phonological reduction.

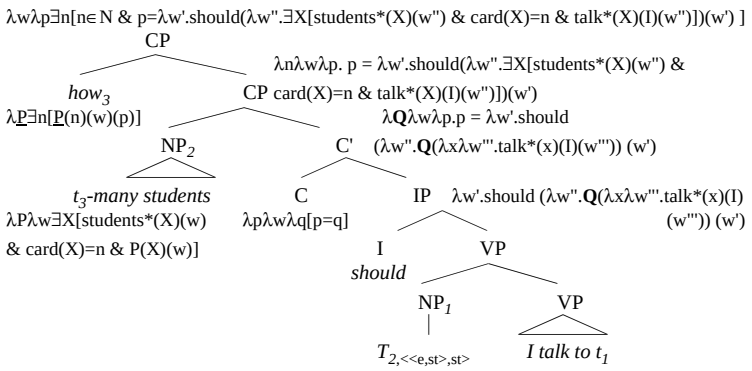
2.4.2 Variable Binding in the SemR Approach

In section 1 of this chapter, I presented the basic SemR strategy, which derives reconstructed scope readings by using higher type traces. Recall that, in the LF and semantic interpretation under (82) (=(16)), the overtly moved constituent is interpreted in its overt site. What derives the reconstructed scope reading is λ-conversion of the generalized quantifier [[*t_3-many students*]] into [[C']] (or into [[*2* C']]).

(82) How many students should I talk to?

a. Reconstructed reading: "For what number n: it is necessary for there to be n-many students x such that I talk to x".

b. LF with SemR and its semantic interpretation:



This SemR strategy has to be refined in order to derive variable binding without LF c-command. This further refinement is needed in order to overcome a ban on λ-conversion: no free variable should get accidentally bound in λ-converting. If we apply the SemR framework above to the example (83), the pronoun *his*, which is free in the moved NP, will have to stay free after λ-converting [[*n-many students of his*$_1$]] into [[C']], and, thus, there is no way for it to get bound by *every professor*.

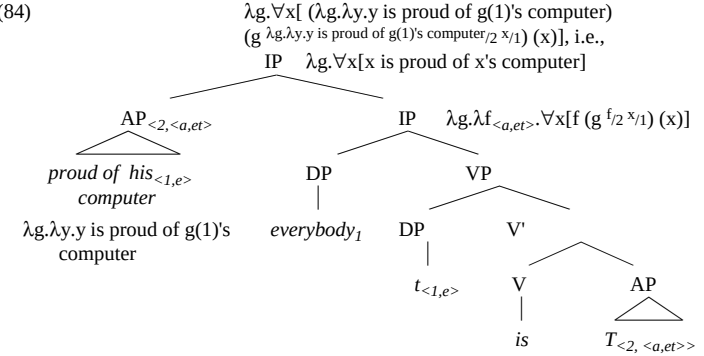
(83) How many students of his$_1$ should every professor$_1$ talk to?

Two main strategies have been pursued to derive variable binding in the SemR approach: dynamic SemR and (static) SemR with doubly indexed traces. I briefly introduce the former in subsection 4.2.1; I present the latter and develop an extension of it for *how many* phrases in subsection 4.2.2.

2.4.2.1 Dynamic SemR

Within a dynamic framework, variables can be bound by their binders without need of LF c-command. Chierchia (1995) points out that a dynamic framework where we λ-abstract over assignments provides the tools to perform variable binding in semantically reconstructed LFs. The interpretation of the AP topicalization under (84) is an example of this dynamic SemR.

(84)



2.4.2.2 (Static) SemR and Doubly Indexed Traces

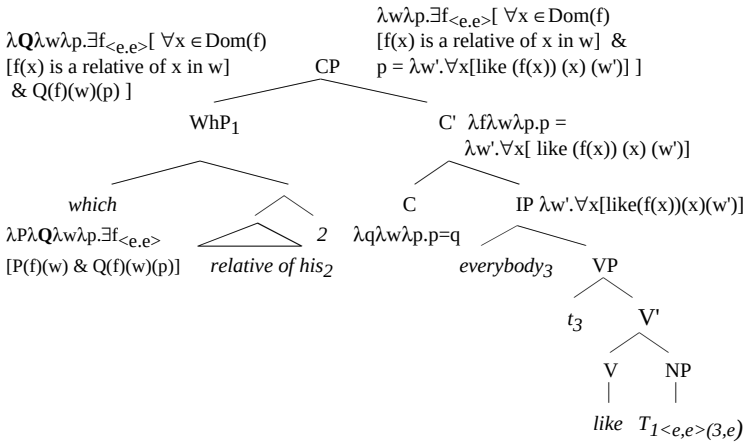
Engdahl (1986) develops an account of functional readings of *which* phrases where a pronoun contained in a *which* phrase "turns out" bound without being c-commanded by its binder at LF. In her account, the movement of a functional *which* phrase leaves a doubly indexed trace (or, if the reader prefers, two traces): the first index corresponds to the *which* phrase itself and is of type <e,e> --skolem function--, whereas the second index is the argument of the skolem function. It is this second index that the binder has to c-command and bind at LF, not the index on the anaphor itself.

The reader can follow the details of this binding in the following example. (85) illustrates the aforementioned functional reading of *which* phrases. The LF-representation proposed for the question (85Q) is spelled out in (86) and the functional N'-rule needed to interpret the components of the *which* phrase is given under (87).

(85) Q: Which relative of his$_1$ does everybody$_1$ like?

A: His mother.

(86) LF and semantic computation of (85A):



(87) Functional N'-rule:

[[*relative of his$_2$ 2*]]^g (f)(w)=1

iff ∀x ∈ Dom(f) [[*relative of his$_2$ 2*]]$^{g^{x/2}}$ (f(x))(w)=1

iff ∀x ∈ Dom(f) [f(x) is a relative of x in w]

The question arises whether Engdahl's doubly indexed traces can be used to derive bound variable readings in *how many* phrases. I would like to point out that functional readings for *how many* phrases exist, too. The questions in (88)-(89), for instance, can be answered not just by referring to a specific number, but also by giving a function that determines a number for each player:

(88) Q: How many kilos does the coach want every player on the team to weigh at the beginning of the season? (question inspired by Rullmann 1995)

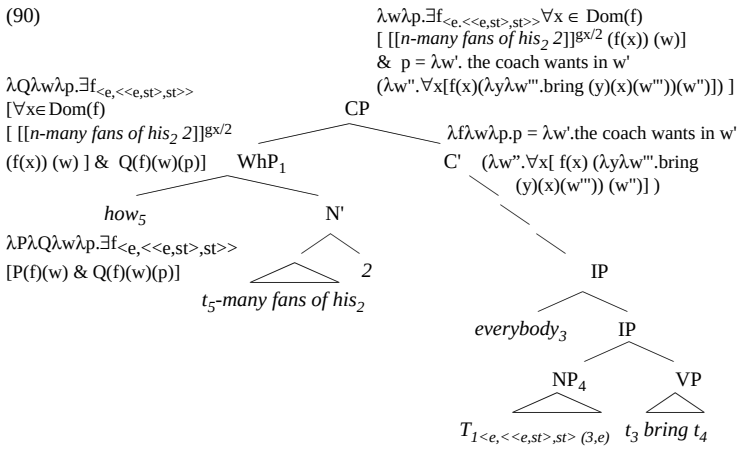
A: Three kilos over his normal weight.

(89) Q: How many fans of his$_1$ does the coach want every player$_1$ on the team to bring to the next game?

A: As many as he$_1$ brought to the winter final.

Hence, in principle, there is no reason why we should not extend Engdahl's strategy to cover *how many* phrases, too. In (90)-(91), I sketch a possible way to implement such extension, keeping as close to Engdahl's original proposal for *which* phrases as possible. Note that the *wh*-word burried in *how many* introduces a function from individuals to generalized quantifiers instead of the skolem function of type <e,e> that the determiner *which* introduces.

(90)



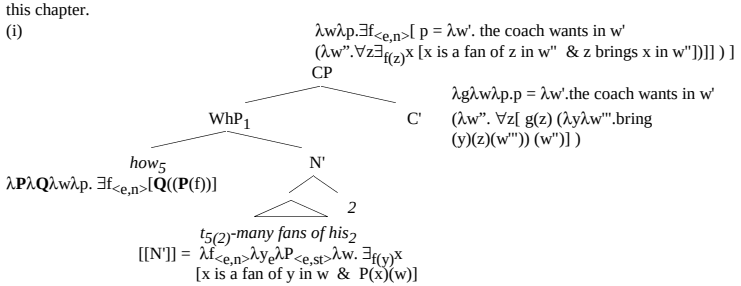
(91) Functional N'-rule:[34]

[[*n-many fans of his*$_2$ *2*]]^g (f)(w)=1

iff ∀x ∈ Dom(f) [[*n-many fans of his*$_2$ *2*]]$^{gx/2}$ (f(x))(w)=1

[34] The prososal sketched under (90)-(91) does not treat the movement of the *how* part in the way movement is standardly treated in Heim-Kratzer. Note that the variable *n* corresponding to t_5 in *t_5-many fans of his* is syncategorematically bound in the functional N' rule instead of being λ-abstracted over. If we want to keep the interpretation of movement indices uniform, a slightly more sophisticated extension of Engdahl (1986) needs to be adopted, e.g., the one under (i). In (i), g has type <e,<<e,st><st>>>, f is a function from individuals to numbers (type <e,n>), **P** and [[N']] are functions from <e,n> to <e,<<e,st><st>>> , and **Q** is a function from <e,<<e,st><st>>> to <st>. The choice between (90) and (i) is irrelevant for the purposes of this chapter.

(i)



iff ∀x ∈ Dom(f) [f(x) ∈ {λPλw'.∃$_n$z [z is a fan of x in w' & P(z)(w')] : n ∈ N}]

In this subsection 4.2, I have spelled out in more detail the SemR mechanisms deriving scope reconstruction readings, including variable bound readings. We saw that two implementations of Cresti's and Rullmann's SemR idea are possible: we can use dynamic big traces or, alternatively, (static) doubly indexed traces. In the next section, I go back to the VP-Reduction examples introduced above and show that, assuming Rooth's VP-Reduction and Focus theory, these examples present a problem for either implementation of SemR.

2.4.3 SemR and VP-Reduction

This subsection is concerned with the fulfillment of Rooth's Focus condition for the reconstructed scope readings of the VP-Deaccenting examples (92)-(94) (=(75b,c)-(77b,c)). The LF-representation corresponding to (93) in the SemR framework is given under (95).

(92) How many jokes did John manage to come up with before PETER *managed to come up with that many jokes*?

a. √ Reconstructed scope reading:

"For what n: John managed to come up with n-many jokes before Peter managed to come up with n-many jokes."

(93) How many pictures of himself did John manage to sell per month before PETER *managed to sell that many pictures of himself per month*?

a. √ Reconstructed scope sloppy reading:

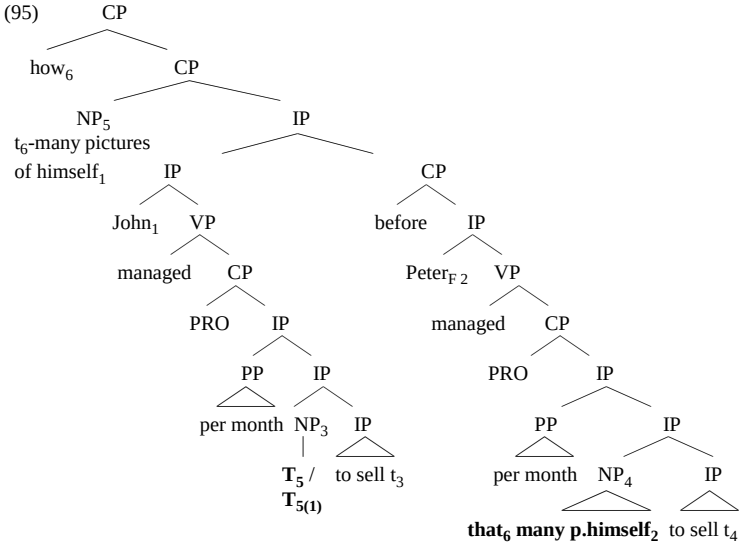
"For what n: John manage to sell (the amount of) n-many pictures of John per month before Peter managed to sell (that amount of) n-many pictures of Peter per month."

(94) How many copies of his last CD did P. Simon manage to sell before A. GARFUNKEL *managed to sell that many copies of his last CD*?

a. √ Reconstructed scope sloppy reading:

"For what n: P. Simon reached the record of selling n-many copies of P. Simon's last CD before A. Garfunkel reached the record of selling n-many copies of A. Garfunkel last CD."

(95)



The problem is that this LF-representation does not satisfy the Focus condition under either of the two versions of SemR that we saw. Under both accounts, we are forced to compare a constituent that contains a free variable *T* (free within that constituent) with a constituent that constains a full-fledged NP instead.

To see why this is problematic, let us concentrate in the static SemR analysis first. This account yields wrong predictions no matter whether the particular assignment g provided by the context yields parallel denotations for the free variable $T_{5(1)}$ and for the full-fledged NP *that*$_6$*-many pictures of himself*$_2$ or not. Let us briefly examine both possibilities.

On the one hand, if the contextual assignment g has, e.g., the values specified under (96), the Focus condition is obviously not met, as (97) summarizes.

(96) g(5) = $\lambda x \lambda P \lambda w.\exists_9 y$[y is a chair of x in w & P(y)(w)]
g(6) = 50

(97) a. [[*John*$_1$ *managed PRO to per month* $T_{5(1)}$ *sell* t_3]]^g ∉ [[*PETER*$_2$ *managed PRO to p. month that*$_6$*-many pictures of himself*$_2$ *sell* t_4]]$^{g\,f}$, since:

b. λw[John managed to sell 9 chairs of John per month in w] ∉ { λw[x managed to sell 50 pictures of x per month in w] : x ∈ D_e }

On the other hand, allowing for sheer coincidence (or for some process of presupposition accomodation that makes the denotations of $T_{5(1)}$ and *that*$_6$*-many pictures of himself*$_2$ match) would produce unwelcome results. Certainly, if the contextual assignment g provides the right values --e.g., the ones in (98)-- the Focus condition can be satisfied for the tree (95), as spelled out in (99).

(98) g(5) = $\lambda x \lambda P \lambda w. \exists_{100} y$[y is a picture of x in w & P(y)(w)]
g(6) = 100

(99) a. [[*John*$_1$ *managed PRO to per month* $T_{5(1)}$ *sell* t_3]]^g ∈
[[*PETER*$_2$ *managed PRO to p. month that*$_6$*-many pictures of himself*$_2$ *sell* t_4]]$^{g\,f}$, since:
b. λw[John managed to sell 100 pictures of John per month in w] ∈ { λw[x managed to sell 100 pictures of x per month in w] : x ∈ D_e }

But, then, we would expect pure coincidence to do a similar job in other cases too. Take the examples (100)-(101) under the readings spelled out in (100a)-(101a): deaccenting the second VP in (100) is felicitous, but deaccenting the VP in (100) is not.

(100) A graduate student welcomed every candidate, and a PROFESSOR *welcomed every candidate*, too.
a. ∀∃-reading: "For every candidate x, there is a graduate student or another that welcomed x, and, for every candidate y, there is a professor that welcomed y, too."

(101) A graduate student welcomed every candidate, and a PROFESSOR *welcomed Susan*, too.
a. ∀∃-reading: "For every candidate x, there is a graduate student or another that welcomed x, and there is a professor that welcomed Susan, too."

The problem is that, under the appropriate contextual assignment, the Focus condition could be satisfied for (101), too. Let us see how. First, the NP *every candidate* QRs over its Subject. This yields the LF representation in (102) for the first clause. Then, in order to

fulfill the Focus condition, we choose a constituent in the first clause containing the antecedent VP. Let us take the inner IP node. It turns out that, under an assignment g such that g(1)=Susan, the Focus condition is satisfied --as (104) shows-- and, hence, deaccenting is wrongly predicted to be possible.

(102) [$_{IP}$ Every candidate$_1$ [$_{IP}$ a graduate student welcomed t_1]

(103) g(1) = Susan

(104) a. [[*[$_{IP}$ an grad student welcomed* t_1 *]*]]^g ∈
[[*[$_{IP}$ a PROFESSOR welcomed Susan]*]]$^{g\,f}$, since:
b. λw[∃y[[[*grad. student*]](y)(w) & met(Susan)(y)(w)] ∈
{ λw[∃y[X(y)(w) & met(Susan)(y)(w)] : X ∈ $D_{<e,st>}$ }

In sum, if we allow for coincidental contextual assignments, we may be able to derive the first example, but we also overgenerate and predict many infelicitous cases of deaccenting to be acceptable.

The dynamic SemR approach does not prove more successful. Rooth's Focus condition is not met in the LF representation in (95) because the presence of the unbound *T* within the first IP makes the denotation of that IP radically different from the denotation of the second IP, where we have the constant *(that*$_6$*-)many pictures of (himself*$_2$*)* instead. The denotation of the first IP is exemplified under (105a) and the focus semantic value of the second IP is illustrated in (105b). As the reader can see, the dynamic proposition in (105a) does not belong to the set of dynamic propositions described in (105b), as stated in (105c,d). Hence, the Focus condition is not met in the semantically reconstructed LF-representation in (95).

(105) a. Denotation of the first IP:

{ < g_1, λw.John managed in w to sell **a house** per month >,

< g_2, λw.John managed in w to sell **my pictures of John** per month>,

< g_3, λw.John managed in w to sell **few pictures of Peter** per month>,

... }

b. Focus semantic value of the second IP: the set of dynamic propositions of the following shape, for which x ∈ D_e:

{ < g_1, λw.Peter managed in w to sell **2** pictures of Peter per month>,

< g_2, λw.Peter managed in w to sell **4** pictures of Peter per month >,

< g_3, λw.Peter managed in w to sell **1** picture of Peter per month>,

... }

c. [[*John*$_1$ *managed PRO to per month* T_5 *sell* t_3]] ∉

[[*PETER*$_2$ *managed PRO to p. month that*$_6$*-many pictures of himself*$_2$ *sell* t_4]]^f,

since:

d. λgλw[John managed to sell g(5) per month in w] ∉

{ λgλw[x managed to sell g(6)-many pictures of x per month in w] : x ∈ D_e }

As in the static SemR analysis, we could argue that some presupposition accommodation process saves the dynamic SemR LF in (95). Let us briefly explore this possibility. Let us introduce the presupposition that all the assignments g taken into consideration meet the description in (106). This result is achieved by making the denotation of each expression in the sentence defined only for such assignments g. Then, the first IP and the second IP would have similar denotations --as (107) illustrates-- and the Focus condition would be satisfied.

(106) g(5) = λgλPλw.$\exists_{g(6)}$y[y is a picture of g(1) in w & P(y)(w)]

(107) a. Denotation of the first IP:

[[*John*$_1$ *managed PRO to per month* [T_5]$_3$ *sell* t_3]] =

{ < g_{17}, λw.John managed in w to sell **10 pictures of** John per month >,

< g_{23}, λw.John managed in w to sell **14 pictures of** John per month>,

< g_{33}, λw.John managed in w to sell **11 pictures of** John per month>,

... }

b. Focus semantic value of the second IP:

[[*PETER*$_2$ *managed PRO to p. month* [*that*$_6$*-many pictures of himself*$_2$]$_4$ *sell* t_4]]^f

= the set of dynamic propositions of the following shape, for which x ∈ D_e:

{ < g_{17}, λw.Peter managed in w to sell **10 pictures of** Peter per month>,

< g_{23}, λw.Peter managed in w to sell **14 pictures of** Peter per month >,

< g_{33}, λw.Peter managed in w to sell **11 pictures of** Peter per month>,

... }

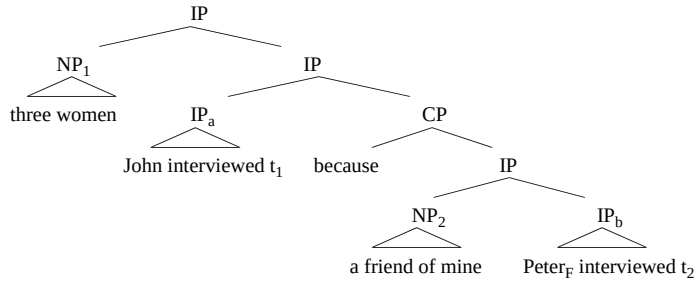
However, as in the static SemR analysis, this license brings unwelcome predictions for other examples. Take, e.g., the grammatical sentence (108) under its *three women >> because* reading, and compare it with its unfelicitous deaccented version (109), where the first VP does not serve as antecedent for the deaccented VP. The problem it presents is the following. The Focus condition is satisfied by the constituents IP_a and IP_b in (110) if we accommodate that all the assignments g for which our denotations are defined are such that g(1)=g(2). With this accommodation, the sentence in (109) is not only felicitous, but it is also true for an assignment of that kind and a world w iff there a three women x in w such that John interviewed x in w because x is my friend and Peter interviewed x. This is an unwelcome result.

(108) John interviewed three women because Peter interviewed a friend of mine.

a. √ *Three women* >> *because* reading: "There are three women x such that John interviewed x because Peter inteviewed a friend of mine."

(109) # John interviewed three women because PETER *interviewed a friend of mine*.

(110) LF representation for the *three women* >> *because* reading:



We have seen that Rooth's Focus condition cannot be met for the semantically reconstructed LF representation in (95). The problem that this LF has is that we have to compare the denotation of a constituent containing a free variable with the denotation of a constituent containing a full-fledged NP instead: the two denotations do not match to begin with, and, if we allow for a strategy that ensures the match, we make wrong predictions for other examples.[35]

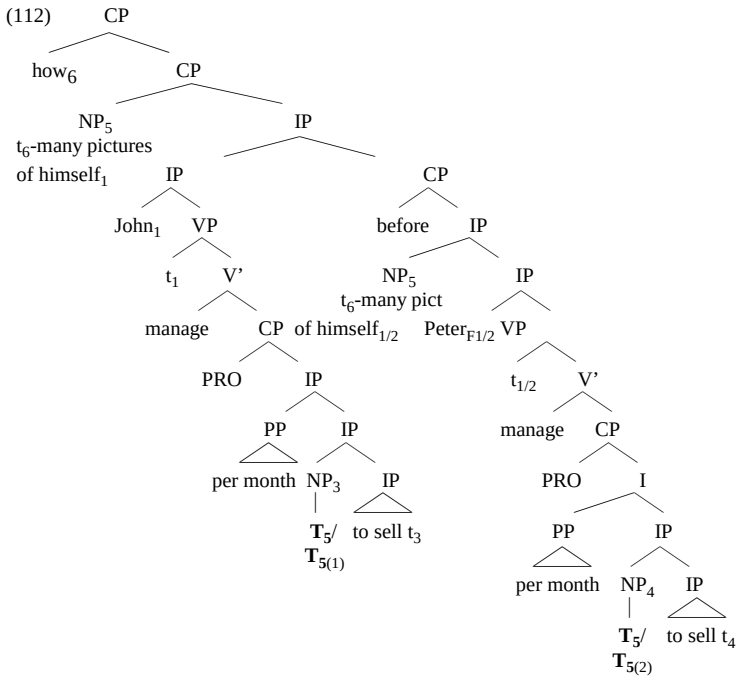
[35] An alternative to Rooth's Focus condition is Schwarzschild's (1996, 1997a,b) Givenness requirement for non-focused material. Under Schwarzschild's system, the denotation of every node in the second conjunct -- not just some node dominating the deaccentend VP-- has to be entailed by the previous context. In order to meet this givenness requirement, focused material is replaced with variables, and --crucially-- all free variables in a given constituent are bound by existential closure. Since the problem we had was that T_5 was free within the first IP, the question arises whether we could use Schwarzschild's ∃-closure to avoid the problem. As far as I can see, the answer is no. For the ∃-closure of the first IP (i.a) does not entail the ∃-closure of the second (i.b):
(i) How many pictures of himself did [$_{IP_a}$John manage to sell T_5 per month] before [$_{IPb}$PETER$_2$ *managed to sell that$_6$ many pictures of himself$_2$ per month*]?
a. ∃-closure of IP$_a$: λw.∃Q [John managed in w (λw'.Q (λyλw".sell(y)(j)(w")))]
b. ∃-closure of IP$_b$: λw.∃x,n [x managed in w (λw'.x sell n-many pictures of x)]

In the remainder of this subsection, I will entertain a last possilibity. I will explore the possibility of moving the deaccented phrase *[that$_6$-many pictures of himself$_2$]* and adjoining it to the causal IP. In this way, the Focus condition does not have to compare a trace *T* with a full-fledged NP, but two higher type traces *T*. It turns out that, then, both static SemR and dynamic SemR can fulfill Rooth's condition for the reconstructed scope sloppy reading of (111) (=76), but only if the moved *n-many* phrases are coindexed; that is, only if the movement index of the first *n-many* phrase is the same as the movement index of the second *n-many* phrase.[36] The resulting LF representation is displayed in (112):

(111) How many pictures of himself did John manage to sell per month before PETER *managed to sell that many pictures of himself per month*?
a. √ Reconstructed scope sloppy reading:
"For which n: John manage to sell (the amount of) n-many pictures of John per month before Peter managed to sell (the amount of) n-many pictures of Peter per month."

[36] In the dynamic SemR framework, the two sloppy Subjects *John* and *Peter* would have to be coindexed, too, as well as the two occurrences of the anaphor.

(112)



Is this coindexation licit? In principle, free indices on pronouns are meaningful --since the relevant assignment may assign the pronoun a denotation or another depending on the index it bears--, but, if the index of the pronoun (or trace) is bound, it does not really matter which particular index we use. Hence, the question arises whether the same index can be used to represent binding in two different, disjoint phrase markers, as (113). This limited ”reuse” of indices is called accidental coindexing.

(113) Every girl$_1$ visited her$_1$ parents on Monday and every boy$_1$ visited his$_1$ parents on Tuesday.

It turns out that, under Rooth's account, accidental coindexing needs to be prohibited in VP-Ellipsis for independent reasons, namely, in order to derive the existing parallelism between the binders of sloppy pronouns. That binders of sloppy pronouns must obey some parallelism is shown by the examples (114)-(115), which allow for the parallel sloppy readings in (b) but lack the asymmetric sloppy readings in (c).

(114) Norma told Beth$_1$'s boyfriend to give her$_1$ a dime, and Judy told Lois's boyfriend to. (Sag 1976)

a. Strict reading: {to give Beth a dime}.

b. Sloppy reading with respect to to Lois: {to give Lois a dime}.

c. * Sloppy reading with respect to Judy: {to give Judy a dime}.

(115) John$_1$ wants Susan to water his$_1$ plants, but/and my father said Peter wants Mary to. (inspired by Jacobson 1992)

a. Strict reading: {water John's plants}

b. Sloppy reading with respect to Peter: {water Peter's plants}.

c. * Sloppy reading with respect to my father: {water my father's plants}.

The correct sloppy readings fulfill Rooth's Focus condition no matter whether we use accidental coindexing or not, as (116) shows.

(116) *Peter*-sloppy reading for (115), with or without accidental coindexing:

a. John$_1$ wants Susan to water his$_1$ plants, and my father said PETER$_{1/2}$ wants MARY to {water his$_{1/2}$ plants}.

b. [[*John 1 wants Susan to water his$_1$ plants*]] ∈

[[*PETER 1/2 wants MARY to water his$_{1/2}$ plants*]]^f, since:

c. λgλw[John wants Susan to water John's plants in w] ∈

{ λgλw[x wants y to water x's in w] : x, y ∈ D_e }

The problem is that, if we allow for accidental coindexing, even the asymmetric sloppy readings would meet the Focus condition and, hence, they would be predicted to be possible. Let us illustrate this point with the example in (117), which lacks the two sloppy readings (117b,c).

(117) John$_1$ wants Susan to water his$_1$ plants. My father said nobody believed MARY would.

a. Strict reading: {water John's plants}

b. * Sloppy reading with respect to *nobody*: {water x (nodody)'s plants}.

c. * Sloppy reading with respect to my father: {water my father's plants}.

Let us concentrate in the missing *nobody*-sloppy reading (117b). Since (117) only has focus stress on *Mary*, Rooth's Focus condition does not need to be checked any higher than for the most embedded IPs, as we do in (118b) and (119b). In (118b), though, this condition is fulfilled because the two pronouns *his* share the same index (as the result of accidental coindexing between *John* and *nobody*). That is, accidental coindexing renders the sloppy reading felicitous, contrary to judgments. If we prohibit such accidental coindexation, instead, the Focus requirement is not met --as (119b,c) show-- and the sloppy reading is correctly ruled out.

(118) *Nobody*-sloppy reading of (117) with accidental coindexing:

a. John$_1$ will ask Susan to water his$_1$ plants. My father said nobody$_1$ believed MARY would {water his$_1$ plants}.

b. [[*Susan water his$_1$ plants*]] ∈ [[*MARY water his$_1$ plants*]]^f, since:

c. λgλw[Susan waters g(1)'s plants in w] ∈ { λgλw[y waters g(1)'s plants in w] : y ∈ D_e }

(119) *Nobody*-sloppy reading of (117) without accidental coindexing:

a. John$_1$ will ask Susan to water his$_1$ plants. My father said nobody$_2$ believed MARY would {water his$_2$ plants}.

b. [[*Susan water his$_1$ plants*]] ∉ [[*MARY water his$_2$ plants*]]^f, since:

c. λgλw[Susan waters g(1)'s plants in w] ∉ { λgλw[y waters g(2)'s plants in w] : y ∈ D_e }

In sum, accidental coindexing needs to be prohibited in Rooth's account of VP-Ellipsis for independent reasons. Hence, static/dynamic SemR cannot derive the desired reconstructed scope sloppy reading from the LF representation in (112), either, since SemR would rely on this type of accidental coindexation to derive it.[37]

We have seen that SemR gives rise to a problematic configuration for Focus checking: two independent phrases have to be compared, one of which is a variable (*T*) and the other a full-fledged NP (i.e., it is like comparing an individual type trace with a

[37] As far as I can see, accidental coindexing can be allowed in Schwarzschild's system without overgenerating sloppy readings. This is so because Givenness has to be checked not just for one node dominating the VP, but for each node. Again, using Givenness --instead of Rooth's Focus condition-- and allowing for accidental coindexing does not help in our LF (112). We would also have to check givenness for the causal IP that includes the locally moved *n-many* phrase. This would bring us back to the problems that the former LF (=95) presented, since, again, we would have to compare one constituent with a free variable and a constituent with a full-fledged NP instead.

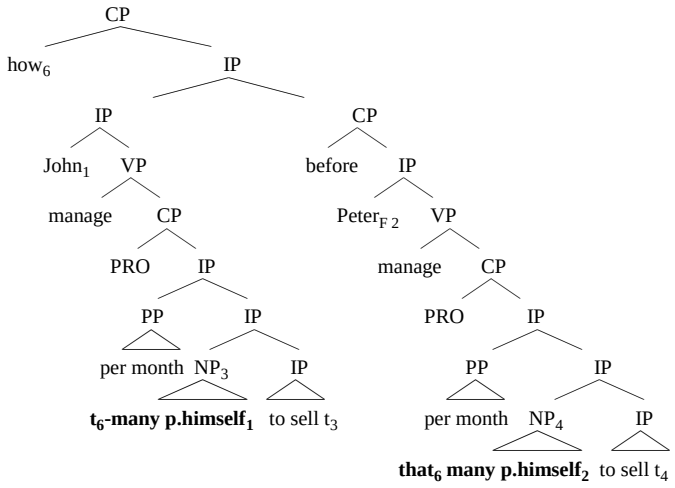
name). I presently do not see a way to derive the reconstructed scope readings of (75)-(77) in either version of the SemR line. Unless a solution is worked out in that framework, we need SynR to derive the aforementioned readings. Next section shows that these readings follow straightforwardly in the SynR approach.

2.4.4 SynR and VP- Reduction

To conclude, let me show how the reconstruted scope sloppy reading of (120) (=76) arises in the SynR account. The syntactically reconstructed LF-representation is given under (121). Note that, this time, the overtly moved phrase *t_6-many pictures of himself$_1$* is placed back in the embedded CP.

(120) How many pictures of himself did John manage to sell per month before PETER *manage to sell that many pictures of himself per month*?

(121)



Now, we have to compare two full-fledged NPs that are lexically alike and that contain parallel bound variables. The variables introduced by t_6 and *that$_6$* have the same binder --*how*-- and, hence, bear the same index. As for the two anaphors, the Subjects that bind them are in parallel syntactic positions. Hence, the Focus condition is successfully met in this LF representation, as sketched under (122):

(122) a. [[*John$_1$ managed PRO to per month t_6-many pictures of himself$_1$ sell t_3*]] ∈
[[*PETER$_2$ managed PRO to per month that$_6$-many pictures of himself$_2$ sell t_4*]]^f,
since:

b. λgλw[John managed to sell g(6)-many pictures of John per month in w] ∈
{ λgλw[x managed to sell g(6)-many pictures of x per month in w] : x ∈ D_e }

Thus, reconstructed scope readings of *how many* phrases in VP-deaccenting are straightforwardly derived if we assume SynR.

Section 4 ends here. From the discussion in its subsections (and in the lack of a solution to the problem), I conclude that Rooth's theory of Focus cannot be successfully applied to certain LF representations that the SemR analysis generates. Hence, we need the SynR device in order to derive reconstructed scope (sloppy) readings in VP-Reduction.

2.5 Conclusions

This chapter has investigated reconstruction effects in *how many* phrases. Two main issues have been addressed.

First, we explored the relation between the two reconstruction phenomena --Scope Reconstrunction and Connectivity-- in *how many* phrases. It was shown that the two phenomena correlate, namely, that the reconstructed scope of a constituent determines its Principle C Connectivity effects.

Second, we were concerned with the explanation of the reconstruction facts. I argued that the Semantic Reconstruction line has to face two challenges that are straightforwardly derived in the Syntactic Reconstruction approach instead.

The first challenge consists of deriving the aforementioned correlation between ScopeR and Conn. This correlation is predicted under the SynR approach but, in principle, unexpected under the SemR account, which has to stipulate it somehow.

The second challenge involves reconstructed scope (sloppy) readings in VP Phonological Reduction. Again, these readings are derived straightforwardly in the SynR line. In the SemR approach, instead, the Focus condition that Rooth (1998, 1992a,b, 1995) proposes does not seem to be fulfilled without making further assumptions that produce unwelcome consequences. Unless a semantic solution for the VP Reduction cases is developed, we need SynR in our grammar. Once this is so, a second reconstructon device duplicating the same results is redundant.

CHAPTER 3

RECONSTRUCTION, CHOICE FUNCTIONS AND *WHICH* PHRASES

3.1 Introduction

In the previous chapter, it has been assumed that *how many* phrases consist of a *wh* part (how_1) and an existential generalized quantifier part (t_1-*many N'*) pied piped along with *how* in overt syntax. We saw that the generalized quantifier part may interact with other operators in the sentence (attitude verbs, other generalized quantifiers, modals...) and be interpreted with scope over them or within them. The discussion of the chapter focused on the following question: when the overtly pied piped generalized quantifier is interpreted within the scope of some other operator, what is the site of that generalized quantifier at LF? The Syntactic Reconstruction approach (SynR) places the *n-many N'* phrase back in the c-command domain of the interacting operator and, by means of the usual interpretation rules, yields the reading *Op^ n-many N'*. The Semantic Reconstruction line (SemR), instead, leaves the *n-many* phrase in its overt site and derives its narrow scope reading by using traces *T* of (dynamic) generalized quantifier type. In the lack of a better SemR alternative at present, we chose the SynR approach over the SemR line for two reasons: (a) narrow scope readings of the *n-many N'* phrase yield Binding Theory Principle C effects, and (b) generalized quantifier traces pose a problem for the fulfillment of the Focus Condition in VP-Phonological Reduction.

In the case of *which* phrases, it is less clear what the non-*wh* part looks like --*N'(x)*, *the N' x*, $f_{<<et>e>}([[N']])$, etc.--, but we can at least judge that *N'* has semantic scope under an operator when the interpretation of N' depends on the value of a variable bound by that operator. Let us see it in an example:

(1) Which friend of his_1 did Mary say every boy_1 will invite?

In (1), the N' *friend of his$_1$* contains the pronoun *his$_1$* bound by the Quantificational NP *every boy*. Since the interpretation of *friend of his$_1$* is dependent on the assignments that the Determiner *every* introduces, the semantic scope of the N' *friend of his$_1$* is within the semantic scope of the QuNP *every boy*. We will then say that the N' *friend of his$_1$* has **Reconstructed Scope** under *every boy*.

This chapter tackles two different questions concerning the LF-representation and semantic interpretation of *which* phrases.

The first issue concerns the position of the *which* phrase's N' restrictor at LF. Two basic avenues have been explored in the literature: the wide scope line places N' restrictors of *which* phrases outside the scope of the question formation operator *Q* at LF, whereas the base position line places them under *Q* and potentially under other further embedded operators at LF. In this chapter, I develop an argument in favor of the latter by looking at Scope Reconstruction and addressing the question whether the Reconstructed Scope of N' is derived by SemR --compatible with the wide scope line and with the base position line-- or by SynR --compatible only with the base position line. I will argue for the SynR approach --and, hence, for the base position line-- in view of two types of data: (a) pronoun binding feeds Principle C effects in *which* phrases (Lebeaux 1990, 1994; Fox 1997), and (b) opacity (world binding) feeds Principle C effects in Catalan and Spanish *which* phrases containing Subjunctive relative clauses. The resulting generalization is stated under (2). The term "reconstructed site" refers to the site of the highest trace left by the *which* phrase that is still in the c-command domain of the binder at issue.

(2) **Reconstructed site characteristic** of Reconstructed Scope N-bars of *which* phrases:
N' restrictors whose interpretation is dependent on the value of a bound variable behave with respect to Principle C as if they were c-commanded by the binder of that variable at LF.

As in the previous chapter on *how many* phrases, it will be argued that this generalization follows straightforwardly from SynR and the classical c-command account of Principle C violations, whereas, in the SemR analyses in the literature, it has to be stipulated.

The second question involves the concrete implementation of the base position line. For a base position account, a puzzle arises when we consider that N' sisters of *which* phrases --even reconstructed ones-- usually have the wide scope-like characteristics in (3):

(3) **Wide scope characteristics** of the N' restrictors of *which* phrases:
a. Non-assertionality: The property denoted by N' is not asserted of any individual in the reconstruction site or base position of N'.
b. Transparency effect: N' is usually interpreted as transparent with respect to any operator intervening between its +*wh* COMP and the reconstructed site of N'.

Reinhart (1993) develops an account in terms of choice functions in order to resolve the type of paradox arising from the *prima facie* contradictory characteristics in (2) and (3). In this chapter, I will pursue the choice function strategy --though other alternatives are certainly conceivable (*vid*. Rullmann-Beck 1997)--, but I will argue against Reinhart's particular implementation. My argumentation will be based on two new sets of data. First, in view of examples of local presupposition accommodation, I will conclude that we need intensional choice functions (yielding individual concepts (type <s, e>) instead of individuals (type e)) more often than we thought. Second, in view of the existence of *which* phrases with transparent restrictors eliciting intensional answers, I will propose a new definition of intensional choice functions. Once this new version of intensional choice functions is motivated, purely intensional answers can be derived from it, too.

Equipped with the new definition, we can shed some light on the transparency effect described in (3b) --which Reinhart had to stipulate-- and derive the correlation between opaque Relative Clauses in Catalan/Spanish and Principle C violations.

This chapter is organized as follows. In Section 2, I will briefly introduce the approaches to *which* phrases existing in the literature. Section 3 presents the aforementioned correlation between scope reconstruction for binding purposes and Principle C effects, arguing for a SynR account of it. Section 4, the most extensive one, works out an implementation of the SynR line in terms of choice functions. Its subsections 4.2, 4.3 and 4.4 are devoted, respectively, to capture the local presupposition accommodation cases, to motivate the new version of intensional choice functions, and to explain the frequent transparency effect. Finally, in section 5, I return to the correlation in (2) and show how the new architecture of choice functions derives the correlation for pronoun variable binding as well as for opacity.

3.2 Approaches to *Which* Phrases in the Literature

Two main avenues have been explored in the literature to account for *which* phrases: the wide scope line and the in situ (or base position) line. I will describe the wide scope line first. Then, I will present the in situ (or base position) line, which in turns splits in two alternatives: the (un)selective binding-Hamblin approach and the choice function approach.

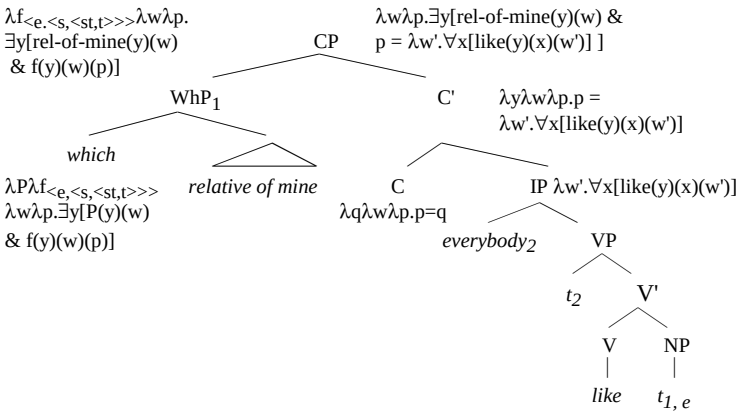
The **wide scope line** places all *which* phrases in Spec-CP at LF and interprets them there. Karttunen (1977) provides the standard semantics for this LF configuration, as examplified under (5) for the question (4Q). What is crucial about the LF/semantic

representation under (5) is that the *which* phrase has wider scope than the question operator *Q* in C^0.[1]

(4) Q: Which relative of mine does everybody like?

A: Your cousin Sylvia.

(5) LF and Karttunen semantic computation of (4Q):[2]



In order to better describe the features of this account, let me first introduce some terminology. Following von Stechow (1996), the subfomula following "p=" in the final formula in (5) is called "question nucleus". In the wide scope account, the entire *which*

[1] The denotation of the question operator *Q* is Heim's (1995) adaptation of Karttunen's (1977: 13) Montagovian Proto-Question rule (given in (i)) to the current semantic framework. I ignore, though, Karttunen's (and Heim's) requirement that the resulting set contain only true propositions, since this feature is irrelevant for the purposes of this chapter.

(i) If ϕ translates to ϕ', then "?ϕ" translates to $p[^{\vee}p \wedge p=^{\wedge}\phi']$.

[2] In this and in the following tree, the semantic contribution of syntactic movement (or of the index of the moved phrase, as in Heim-Kratzer (1998)) is a λ-abstraction operation over the variable introduced by the corresponding trace.

phrase is interpreted outside the question nucleus: the *which* phrase has wider scope than any operator within the question, including the question operator *Q* in C^0, which is the one that closes off the question nucleus. This fact ensures that its N' restrictor will always have the two wide scope properties described in (3): (i) its denotation is not asserted of any individual at the base position within the question nucleus, but it is rather presupposed for the individual that each proposition in the question nucleus is about; and (ii) the N' restrictor is necessarily interpreted as transparent with respect to any operators intervening between its D-Structure position and its interrogative CP, since the N' is not c-commanded --and hence its world variable cannot be bound-- by any of them.

The question that we just saw in (4) asked for the identity of an individual having a certain property. As such, a felicitous, complete answer --like the one in (4A)-- provides the name or description of that particular individual. However, there are questions that have a reading where the *which* phrase does not ask for an individual but for a set of pairs. A felicitous, complete answer to them has to enumerate those pairs or provide a description of how to construct them, as (6) illustrates. Readings of this type are called "functional" readings.

(6) Q: Which relative of his does everybody like (best)?

A1: Ralph likes Leah (=his mother), Pius likes Maria (=his mother) and Martinet likes Annelise (=his mother).

A2: Everybody likes his mother.

Engdahl (1986) develops an account of functional readings of *which* phrases within the wide scope line. She proposes that, at least under those functional readings, *which* ranges not over individuals but over skolem functions (type <e, e>). The denotation of the

N' sister of *which* consequently needs a special interpretation rule in order to combine with the function variable, as specified under (7). Furthermore, the trace left by the *which* phrase has type <e, e> instead of type e. Since the trace translates as a variable over skolem functions, it must take an argument of type e --namely, an index-- in order to yield a denotation of individual type e, so that the compositional semantic interpretation proceeds. This kind of trace holding two indices is called a doubly indexed trace or layered trace. The resulting semantic computation is demonstrated under (8).

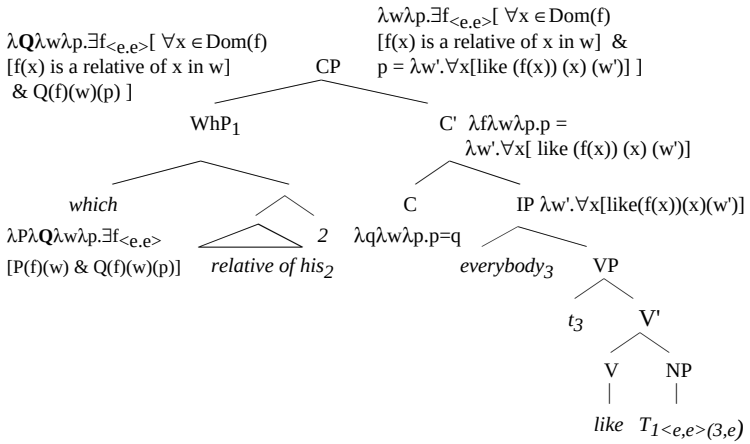
(7) Functional N'-rule:

$[[\textit{relative of his}_2\ 2]]^g(f)(w)=1$

iff $\forall x \in \text{Dom}(f)\ [[\textit{relative of his}_2\ 2]]^{g^{x/2}}(f(x))(w)=1$

iff $\forall x \in \text{Dom}(f)$ [f(x) is a relative of x in w]

(8) Engdahl's (1986) semantics for the functional reading of (6Q):



Note that, as in the individual reading, the N' restrictor of the functional *which* phrase is interpreted outside the question nucleus. Non-assertionality and transparency, thus, automatically follow. However, since the N' restrictor is never placed under C^0, we will see that the correlation announced in (2) between Reconstructed Scope and Principle C effects is not predicted: no Principle C violation is in principle expected between a referential expression contained in the N' restrictor outscoping C^0 and a coindexed referential expression embedded under C^0.

Let us now turn to the **in situ (or base position) line**. In this type of approach, *which* phrases are placed under the question operator *Q* at LF. They may be in their D-Str position (or adjoined to VP to avoid type mismatch, if we do not use flexible types) or scoping over some other intermediate operator, but, at any rate, they are placed under the interrogative C^0. When the *which* phrase is located under C^0 at LF, we will say that it is placed in base position at LF.

Two semantic approaches have been pursued to interpret *which* phrases in base position: the (un)selective binding-Hamblin approach and the choice function approach.

Let us first examine the **(un)selective binding-Hamblin approach**.

The (un)selective binding approach (Baker (1970), Pesetsky (1987); see also Berman (1991)) treats *which* phrases as Heimian/DRT indefinites, that is, as NPs with no quantificational import of their own that translate as open formulae. *Which* is semantically vacuous,[3] the N' constituent denotes a property of individuals, and the index on the WhP introduces a free variable to which the N'-property applies. The question

[3] In chapter 1 and under the analysis of Focus assumed there, I proposed that *which* is not totally semanticly empty. (*Wh)ich* must contribute a denotation of the same type as *(how) many*, since the denotation of one is a member of the focus semantic value of the other. The basic idea is still the same, though: *which* phrases translate as logical expressions containing a free variable.

operator *Q*, then, (un)selectively binds this free variable and construes the question-type meaning, as spelled out in the rule in (9). The details of this semantic apparatus are illustrated under (12) for the question in (11Q):[4] [5]

(9) Syncategorematic rule for *Q*:[6]

$[[Q_{n,\sigma}\ \phi]]^g\,(p) = 1$ iff $\exists x \in D_\sigma\,[\ p = \lambda w'.[[\phi]]^{g^{x/n}}(w')\ ]$

(10) Syncategorematic rule for *every*:

$[[every_{n,\sigma}\ \phi\ \psi]]^g\,(w) = 1$ iff $\forall x \in D_\sigma\,[\ [[\phi]]^{g^{x/n}}(w) \rightarrow [[\psi]]^{g^{x/n}}(w)\ ]$

(11) Q: Which relative of mine does everybody like?

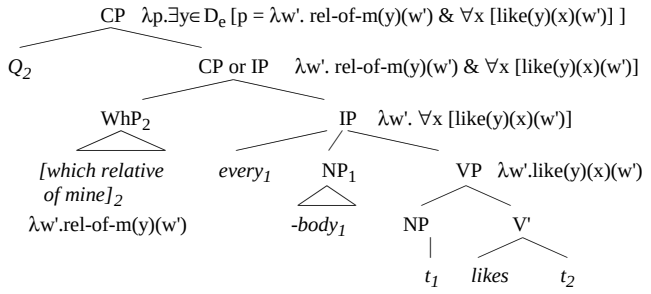
A: Your sister Rosa.

[4] A similar analysis is found in Rullmann (1995: 171-181) for *how many*, except that the selective binding of the free variable *n* in *n-many books* (=$\lambda P \exists x$[book(w)(x,n) & P(w)(x)], p. 172) is done at the CP level (by a Maximality Question Rule, p. 180) instead of by C^0.

[5] A variant of the (un)selective binding approach is suggested for *how many* in Cresti (1995: 99) and extended to *which* phrases in Romero (1997): *how many* splits into a *wh*-part *wh(how)* and a Determiner part *t-many*, and similarly *which* splits into a *wh*-part *wh* and a Determiner part *t-(wh)ich*. The difference with respect to the (un)selective binding approach is that the free variable within the interrogative Determiner is not selectively bound by *Q*, but by the split *wh*-part (which has moved to Spec-CP). I do not see any empirical difference between these two versions of the in situ or base position approach; maybe some theoretical considerations about LF movement and islands would favor the selective binding alternative over the split movement alternative. I leave the issue open here and, for the sake of simplicity, conflate the two alternatives under the label "(un)selective binding".

[6] In this and the following syncategorematic rules, *n* is an index and σ is the semantic type of that index.

(12) (Un)selective binding approach for (11Q):



Hamblin's (1973) proposal is similar to the (un)selective binding account in that *which* phrases are interpreted in base position and the output of the semantic computation is exactly the same as in (12). The semantic means used, though, are quite different: *wh*-phrases denote sets of individuals (actually, all expressions, even an NP like *Mary*, do: [[*Mary*]]= {Mary}), which combine compositionally[7] with the meaning of other expressions and yield a set of propositions as the final denotation of a question. I will not go through the details of the semantic computation here. What is important is that, although there is no *Q* operator or (un)selective binding involved, Hamblin's *which* phrases stay in situ at LF --that is, they are in based position, sometimes embedded under other operators-- and that Hamblin's question denotations are as in (12).[8]

[7] Hamblin's (1973: 49) Functional Application Rule is roughly the following (I switch freely between set notation and characteristic function notation):
(i) $a_{<\sigma\tau,t>}(b_{<\sigma,t>}) = \{ c: \exists d \in a, e \in b\ [c=d(e)] \}$

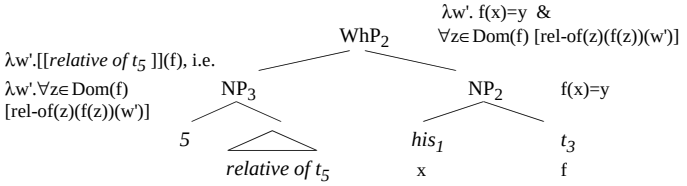
[8] Groenendijk-Stokhof's (1984) analysis of questions falls into the base position line, too. The question meaning is built not by the operator *Q*, but by a syncategorematic rule that applies to a node dominating all the *which* phrases in the question. Hence, we can say that *which* phrases are in base position at LF. However, their account differs from the other base position accounts in one important respect: *which* phrases are **immediately** below the question formation node; they cannot be further embedded under other quantifiers or operators. Though this aspect of their analysis might be worked out differently, I will adhere, for the purposes of this chapter, to the aforementioned base position analyses, since we will need their degree of flexibility.

The (un)selective-Hamblin analysis can also account for functional readings of *which* phrases. We just need to combine the analysis in (12) with the skolem function idea: in some *which* phrases, the free variable has type <e, e> instead of individual type e, and the N' property combines with the skolem function via the Functional N' Rule in (7). The resulting semantic computation of the *which* phrase is detailed in (14). (15) gives the LF/semantic tree of the whole interrogative clause, for which the ∃-closure interpretation rule in (13) is needed:

(13) Syncategorematic rule for ∃-closure:

$[[\exists_{n,\sigma}\ \phi\ ]]^g\ (w) = 1 \quad \text{iff} \quad \exists x \in D_\sigma\ [\ [[\phi]]^{g\,x/n}(w)\ ]$

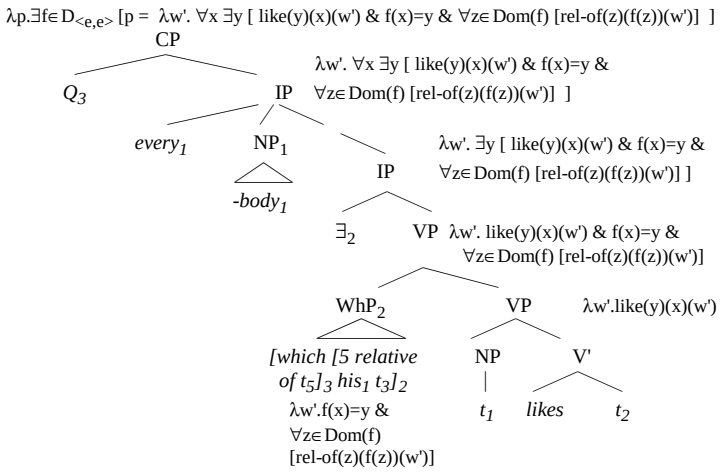
(14) Detail of the *which* phrase:[9]



[9] A special NP rule would have to be postulated to derive the semantics of NP_2.

(15) (Un)selective binding plus skolem function approach:

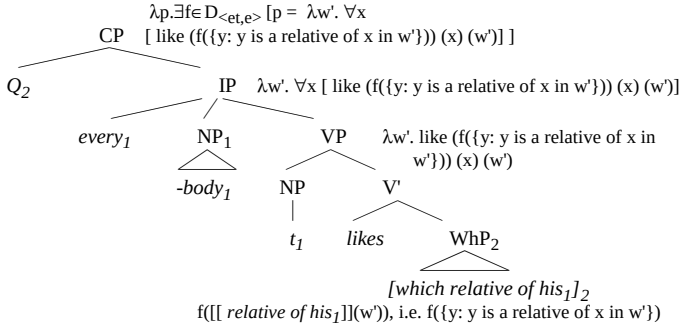
a. Which relative of his$_1$ does everybody$_1$ like? (=6Q)



Once we assume an (un)selective binding-Hamblin analysis of *which* phrases, we make some predictions. First, nothing prevents *which* phrases (and theirs N'-restrictors) from scoping under other operators (Quantificational NPs, attitude verbs, other intensional operators, etc.) within the question nucleus. We will see that, unless something else is said, the frequent non-assertionality and transparency effect mentioned in (3) is left unexplained. Second, when a *which* phrase containing a name takes scope under a certain operator and this operator is c-commanded by a pronoun coindexed with the name, a Principle C violation is predicted to arise. That is, the correlation mentioned under (2) is expected: the Reconstructed Scope of a *which* phrase determines its Principle C effects.

Let us finally present the second base position analysis: the **choice function approach**. Reinhart (1993), elaborating on Engdahl (1980), proposes that individual and functional *which* phrases introduce a free variable *f* of choice function type <<s,et>,e>, instead of a variable of individual type e. The variable *f* takes the N'-property as its argument and is (un)selectively bound by *Q*. The interpretation procedure is illustrated for the functional reading in (16):

(16) Choice function approach:



f([[*relative of his$_1$*]](w')), i.e. f({y: y is a relative of x in w'})

The choice function analysis was aimed to account for the non-assertionality and transparency effect of *which* phrases while still maintaining the essentials and good predictions that base position accounts make.[10] I will not present the details of this accomplishment here; I will postpone them, instead, until section 4, where I discuss the choice function approach extensively.

In sum, we have seen three treatments of *which* phrases, each of them making different predictions:

[10] Reinhart (1993) is concerned not with Principle C effects but with the insensitivity to islands that in situ *wh*-phrases show: the movement analysis would have to postulate island-insensitive LF movement, whereas the (un)selective binding, base position account obviates the problem.

(i) the wide scope approach predicts that the N' restrictor of a *which* phrase is not asserted of any individual inside the question nucleus and that the N' is always interpreted as transparent with respect to any intensional operator under C^0. No correlation between binding (Reconstructed Scope) and Principle C effects is predicted.

(ii) the (un)selective binding-Hamblin base position account, instead, predicts the Reconstructed Scope - Principle C correlation; it does not predict non-assertionality and transparency effects.

(iii) the choice function base position account predicts the Reconstructed Scope-Principle C correlation; we will see that it also provides the tools to explain the non-assertionality and the transparency effect of *which* phrases.

In the two next sections, I will present data addressing each of these predictions. Section 3 will show that the correlation between Reconstructed Scope and Principle C is in fact borne out, a fact that argues against the wide scope analysis and in favor of the base position possibilities (ii) and (iii). Section 4 investigates how to implement the base position line. The original data that supported the non-assertionality generalization will be presented, thus arguing against the (un)selective binding-Hamblin approach. However, section 4 will also include data that challenge the current implementation of the choice function approach to *which* phrases in the literature; among other things, we will see that *which* phrases do sometimes take opaque N' restrictors. I will propose a new architecture of choice functions in order to account for the new data. Equipped with the new proposal, I will return to the correlation between Reconstructed Scope and Principle C in section 5.

3.3 The Correlation between Reconstructed Scope and Principle C

I will devote this section to overtly moved *which* phrases whose N' restrictor contains a variable bound by an operator under C^0. These *which* phrases are said to have "Reconstructed Scope" under that operator. Recall that I use the term "Reconstructed

Scope" in a theory neutral way, without implying that such scope is gained by LF c-command (SynR) or by other semantic mechanisms (SemR).

This section contains data showing that Reconstructed Scope feeds Principle C. It briefly reviews the data on pronoun variable binding (Lebeaux 1990, Fox 1997) and unselective binding (Fox 1997) in the literature, to which a new piece of data is added: opacity in Spanish/Catalan Subjunctive Relative Clauses triggers Principle C effects, too.

It will be shown that the correlation between Reconstructed Scope and Principle C effects is predicted if we pursue a base position account of *which* phrases and assume that *which* phrases (or, at least, their N' restrictor) can be syntactically reconstructed under some intermediate operator for binding purposes. I will argue that the wide scope approach to *which* phrases --which amounts to Semantic Reconstruction for functional readings-- does not predict this correlation; it has to stipulate it.

3.3.1 Principle C Effects Due to Pronoun Variable Binding and Unselective Binding

Lebeaux (1990, 1994) observes that, in general, no Principle C violation occurs between a name embedded in a Relative Clause within the *which* phrase and a coindexed pronoun outside the Relative Clause:

(17) Which pictures that $John_1$ took did he_1 like? (Lebeaux 1994: (15a))

However, he continues, when the Relative Clause also contains a pronoun bound by an operator outside that Relative Clause (i.e., when the N' restrictor of the *which* phrase has Reconstructed Scope under some operator), the otherwise grammatical coindexation in (1) yields a Principle C violation. He gives the contrasting examples in (18). Fox (1997) elaborates on them and provides the paradigm in (19). The generalization that arises is expressed in (20).

(18) a. [Which paper that he$_1$ gave to Bresnan$_2$] did every student$_1$ think that she$_2$ would like t?

b. * [Which paper that he$_1$ gave to Bresnan$_2$] did she$_2$ think that every student$_1$ would like t?

(Lebeaux 1990: (41))

(19) a. [Which of the papers that he$_1$ gave the teacher$_2$] did every student$_1$ ask her$_2$ to read carefully?

b. * [Which of the papers that he$_1$ gave the teacher$_2$] did she$_2$ ask every student$_1$ to revise?

c. [Which of the books that he$_1$ gave her$_2$] did the teacher$_2$ ask every student$_1$ to revise?

(Fox 1997: (35))

(20) Correlation between pronoun variable binding and Principle C effects:

A *which* phrase (or part of its N' restrictor) that has Reconstructed Scope under a Quantificational NP (QuNP) for pronoun variable binding purposes behaves with respect to Principle C as if it were syntactically placed in the c-command domain of that QuNP at LF.

These facts follow straighforwardly from a Syntactic Reconstruction analysis, as Fox (1997) argues. Let us see that by comparing the sentences in (19). In each of them, the Relative Clause within the *which* phrase contains a pronoun --*he$_1$*-- bound by the Quantificational NP (QuNP) *every student*. If scope reconstruction is done syntactically (by LF-lowering (Longobardi 1987, Cinque 1990) or by Copy Theory (Chomsky 1993)),

then each Relative Clause is placed within the c-command domain of the QuNP at LF.[11] This c-command configuration can be achieved for (19a) and (19c) without inducing a Principle C violation, as (19'a)-(19'c) show: the pronoun *she/her* does not c-command the referential expression *the teacher*. Hence, SynR correctly predicts no Principle C violation there.

(19') a. [(Which of the papers)] every student$_1$ [(which of the papers) that he$_1$ gave **the teacher$_2$**] ask **her$_2$** to read?

c. [(Which of the papers)] **the teacher$_2$** ask every student$_1$ [(which of the papers) that he$_1$ gave **her$_2$**] to revise?

In the case of (19'b), instead, LF c-command of *every student* over the bound pronoun *he* necessarily results in a Principle C violation, since the coindexed pronoun *she* c-commands the binder under which the Relative Clause is reconstructed. The ungrammaticality of (19b) is, hence, derived.[12]

(19') b. * [(Which of the papers)] did **she$_2$** ask every student$_1$ [(which of the books) that he$_1$ gave **the teacher$_2$**] to revise ?

[11] I leave open the possibility that only part of the N' restrictor of a *which* phrase syntactically reconstructs. Note that, in (i), the scope reconstruction of the N' *picture of himself* does not seems to induce a Principle C violation within the Relative Clause. Sauerland (1998) presents examples of Antecedent Contained Deletion that point in a similar direction.

(i) [Which picture of himself$_1$ that Mary$_2$ has already seen] does she$_2$ want, nevertheless, every student$_1$ to describe to her$_2$?

[12] The ungrammaticality of (19b), furthermore, suggests that the object *every student* is not able to QR over the subject *she* in (19b). Otherwise, a escape hatch would be created between *every student* and *she*, and reconstruction into it would not yield a Principle C violation. Fox (1995) provides evidence from Ellipsis showing that this kind of vacuous QR is prohibited.

Fox (1997) makes the same case for unselective binding. In the examples in (21), the *which* phrase (or, at least, its Relative Clause restrictor) needs to reconstruct under the scope of the unselective binder *usually*. That brings the unselectively bound indefinite *a linguist* --which acts as a R-expression for Principle C purposes-- under the c-command domain of the coindexed pronoun *he* in (21b). A Principle C violation occurs.

(21) a. [Which languages spoken in the country he_1 comes from] does a $linguist_1$ usually know t?

b. * [Which languages spoken in the country a $linguist_1$ comes from] does he_1 usually know t?

c. [Which languages spoken in the country a $linguist_1$ comes from] do his_1 students usually know t? (Fox 1997: (43))

These are the cases in the literature showing that scope reconstruction in *which* phrases feeds Principle C. We have seen that this correlation is predicted if we assume the base position approach to *which* phrases and Syntactic Reconstruction; that is, it is predicted under the view that *which* phrases (or part of their N' restrictor) are placed and interpreted under C^0 and possibly under more embedded operators at LF.

In the next subsection, I present another piece of data supporting the same generalization: opacity (world varible binding) feeds Principle C.

3.3.2 Principle C Effects Due to Opacity: Spanish and Catalan Subjunctive Relatives

Next to the *de re* and *de dicto* readings of Noun Phrases (NP) exemplified in (22) (Quine 1956, Lewis 1979, Cresswell-Stechow 1982, Chierchia 1989, among many others), the interpretation of an NP can also vary with respect to the world variable assigned to its N' restrictor. This derives the so called "opaque" and "transparent"

readings of NPs (Fodor 197?, Bauerle 1983, Kratzer 1997; cf. Enç 1986, Musan 1995 for a parallel effect with temporally dependent N-bars). Thus, while an NP is interpreted *de dicto* with respect to a given intensional operator (in the case of a Quantificational NP, we can tell that the NP as whole is *de dicto* because its quantifier has narrow scope under the intensioanl operator), its N' restrictor may still be opaque or transparent with respect to that operator: it is opaque if its world variable is bound by that operator, and it is transparent (with respect to that operator) if its world variable is bound higher up. The example in (23) illustrates the three possible combinations. (24)-(25) provide examples where the narrow scope transparent reading is the most plausible one.

(22) Ralph believes that the murderer of his wife is very nice.

a. *De re (de se)*: There is a relation of acquaintance R between Ralph and the actual murderer of Ralph's wife in w, and, for all possible individuals x' and possible worlds w' such that Ralph could be x' in w' for all Ralph believes in w, the unique individual y such that R(w')(y)(x')=1 is very nice.

b. *De dicto*: For all possible individuals x' and possible worlds w' such that Ralph could be x' in w' for all Ralph believes in w, the unique individual y such that y is (the) murderer of x"s wife in w' is very nice.

(23) Ralph believes that ten millionaires from Manhattan will come to the auction.

a. *De re (de se)*: "Ralph believes of ten particular millionaires from Manhattan that they will come to the auction". I.e.:
"For each of ten particular millionaires from Manhattan z, there is a relation of acquaintance R such that R(w)(z)(Ralph)=1 and such that, for all possible individuals x' and possible worlds w' such that Ralph could be x' in w' for all Ralph believes in w, the unique individual y such that R(w')(y)(x')=1 will come to the auction in w'."

b. Narrow scope, opaque N': "Ralph believes that there will be ten millionaires from Manhattan (but not any in particular) at the auction". I. e.:
"For all possible individuals x' and possible worlds w' such that Ralph could be x' in w' for all Ralph believes in w, there are ten individuals y that are millionaires from Manhattan in w' and that will come to the auction in w'."

c. Narrow scope, transparent N': "Ralph believes that there will be ten individuals that are actual millionaires from Manhattan coming to the auction". I.e.:
"For all possible individuals x' and possible worlds w' such that Ralph could be x' in w' for all Ralph believes in w, there are ten individuals y that are millionaires from Manhattan in w and that will come to the auction in w'."

(24) I would be happier if ten millionaires were poor. (≈Farkas 1997)

a. If >> ∃; transparent N': "I would be happier if (any) ten people that are actual millionaires were poor".

(25)If every semanticist was a syntactician instead, a lot more would get done in the field.

a. If >> ∀; transparent N': "If every person that is a semanticist in actuality was a syntactician instead, a lot more would get done". (Percus 1998)

The transparent/opaque distinction has been argued to have a morphological realization in the selection of mood in Spanish and Catalan Relative Clauses (Farkas 1997, Quer 1998). In many intensional contexts,[13] Subjunctive mood is used in a Relative Clause to indicate that the description that the Relative Clause introduces is taken as opaque, whereas transparency requires the use of Indicative mood. This is illustrated under (26)-(28) for Spanish:

[13] The use of Subjunctive is not licensed in all intensional contexts. Verbs like Sp. *creer* / Cat. *creure* ("believe") do not license Subjunctive in opaque Relative Clauses embedded under them.

(26) Seria feliz si al menos diez personas que son (**Ind**) ricas fuesen pobres.
I'd-be happy if at least ten people that are-Ind rich were poor
"I would be happy if at least ten people that are (actually) rich were poor."
(From Farkas' example in English)

(27) # Seria feliz si al menos diez personas que fuesen (**Sub**) ricas fuesen pobres.
I'd-be happy if at least ten people that are-Sub rich were poor
"I would be happy if at least ten people that were rich were poor."

(28) Seria feliz si al menos diez personas que fuesen (**Sub**) ricas donasen parte de su fortuna a los pobres.
I'd-be happy if at least ten people that are-Sub rich gave part of their fortune to the poor
"I would be happy if at least ten people that were rich gave part of their fortune to the poor."

The example (26)-(27) is pragmatically plausible under the narrow-transparent intrepretation of the Quantificational NP (QuNP) *[al menos diez personas que...]* ("at least ten people that..."), but totally non-sensical under a narrow-opaque reading of it. Correspondingly, we can use Indicative mood in the Relative Clause, as in (26), but the use of Subjunctive in (27) renders the antecedent a logical contradiction. To make sure that the use of Subjunctive in the Relative Clause is otherwise licensed by the conditional context, we just need to look at (28): the sentence expresses a perfectly coherent thought about people that are rich in some world w' accessible to w_0.[14]

[14] The examples (26)-(28) show that the modal alternation Indicative/Subjunctive marks the transparent/opaque constrast and not the *de re / de dicto* distinction, since in all three examples the relevant

Now that the correspondence Subjunctive - opacity has been established, I turn to the relation between *which* phrases and Subjunctive Relative Clauses.

The first thing to note is that Subjunctive Relatives can restrict a *which* phrase, as (29) shows. This fact suggest that the alleged transparency of *which* phrases cannot be a matter of necessity, but a matter of frequency at best. I will return to this issue in section 4. For the time being, let us assume that the wide scope line can handle opaque readings too. Let us say that, besides ranging over functions of type <e,e>, *which* phrases may range over functions of type <s,e> and leave traces of type <s,e>.[15]

(29) [Quien se enfadaria si que familiar suyo que estuviera (**Sub**) a punto de casarse]
Who would-be-upset if which relative of-his that was-Sub about to-get-married
no le llamara para decirselo?
not him/her called to tell-him/her
[Who would be upset if which relative of his that was about to get married] didn't call him to tell him?
Answer: Peter would be upset if his cousin Paco was about to get married and didn't call him to tell him.

NP as a whole is taken *de dicto* with respect to the conditional context (i.e., the quantifier of the NP has scope within the restrictive clause of the conditional quantification). There are still characteristics of Indicative and Subjunctive Relatives that need to be explained, though. For example, Relative Clauses stacked on the same NP cannot display different moods, as (i) illustrates. See Quer (1998:120-133) for discussion of this and other limitations.

(i) *Troba'm una guia de Menorca que es completa que pugui dur a la motxilla.
Find-IMPER-me a guide of Menorca that is-IND complete that I-can-SUBJ carry in my back-pack
"Find me a guide about Menorca that is-IND complete and that I can-SUBJ carry in my back pack.
(Quer 1998: 122)

[15] World indexation in traces has been proposed on independent grounds in Sharvit (1998) for *how many* phrases. Still, in accepting that *which* phrases sometimes have opaque restrictors, we lose one of the main motivations for the wide scope line.

What I will focus on here is the relation between world variable binding and Principle C effects. Let us examine it in detail. In (30), we have *which* phrases containing an Indicative/transparent Relative Clause. No Principle C violation between the name *Eva* and the coindexed silent *pro* arises, independently of their relative order:

(30) No Pple C with Indicative:

a. √ [Con que hombre que pro_1 conocio (**Ind**) en los suburbios] quiere Eva_1 tener
With which man that she_1 met-Ind in the suburbs wants Eva_1 to-have
una cita?
a date
[With which man that she_1 met for the first time in the suburbs] does Eva_1 want to have a date?

b. √ [Con que hombre que Eva_1 conocio (**Ind**) en los suburbios] quiere pro_1 tener
With which man that Eva_1 met-Ind in the suburbs wants she_1 to-have
una cita?
a date
[With which man that Eva_1 met for the first time in the suburbs] does she_1 want to have a date?

If, instead of Indicative, we use Subjunctive mood in the Relative Clause --thus making it opaque with respect to the intensional verb *querer* ("want")--, we find that the relative order between *pro* and *Eva* matters. We can see that in (31). If *pro* is embedded in the Relative Clause and the name *Eva* is the subject of the attitude verb "want", as in (31a), the sentence is grammatical. But, if the order of the silent pronoun and the name is reversed, we get a Principle C violation and the sentence is, at best, very marginal, as (31b) shows.

(31) Pple C Effects with Subjunctive:

a. √ [Con que hombre que pro$_1$ haya (**Sub**) conocido en los suburbios] quiere Eva$_1$
With which man that she$_1$ has-Sub met in the suburbs wants Eva$_1$
tener una cita?
to-have a date
[With which man that she$_1$ met for the first time in the suburbs] does Eva$_1$ want to have a date?

b. * [Con que hombre que Eva$_1$ haya (**Sub**) conocido en los suburbios] quiere pro$_1$
With which man that Eva$_1$ has-Sub met in the suburbs wants she$_1$
tener una cita?
to-have a date
[With which man that Eva$_1$ met for the first time in the suburbs] does she$_1$ want to have a date?

From the data in (30)-(31), we infer the following generalization:

(32) Correlation between opacity and Principle C effects:

A *which* phrase (or its N' restrictor) that has Reconstructed Scope under an intensional operator for world variable binding purposes behaves with respect to Principle C as if it was syntactically placed in the c-command domain of that operator at LF.

It is not hard to see that this generalization follows straightforwardly if we assume (any of) the base position analysis(-es) together with Syntactic Reconstruction. We saw that the base position line places and interprets *which* phrases at some site under the question formation operator *Q*. When the N' restrictor of the *which* phrase is transparent (with respect to any further embedded operator), we do not have any reason to

syntactically reconstruct it into a lower site at LF. Hence, assuming that the computational component takes the most parsimonious or econominal derivation (Fox 1995), the transparent *which* phrase stays in its surface position at LF, i.e., immediatly underneath C^0. This is shown in (33) for the transparent examples in (30). No Principle C violation arises.

(33) *Which* phrases containing Indicative Relative Clauses:

a. [$_{CP}$ Q [$_{IP}$ [$_{WhP}$ which man that **she$_1$** met for the first time in the suburbs]$_2$ [$_{IP}$ **Eva$_1$** wants [$_{IP}$ t$_2$' to have a date with t$_2$]]]]

b. [$_{CP}$ Q [$_{IP}$ [$_{WhP}$ which man that **Eva$_1$** met for the first time in the suburbs]$_2$ [$_{IP}$ **she$_1$** wants [$_{IP}$ t$_2$' to have a date with t$_2$]]]]

When the N' restrictor of the *which* phrase is opaque with respect to "want", instead, the interpretation of the Relative Clause is dependent on the value of a world variable bound by the intensional verb. If we assume that variable binding requires LF-c-command of the binder over the bindee --as is standard practice--, then the opaque predicate needs to be within the c-command domain of the intensional verb at LF, so that its world variable can be bound. In the examples in (31), this involves reconstructing the overtly moved *which* phrase (or its N' restrictor) to some intermediate trace position under "want". This is illustrated in (34):

(34) *Which* phrases containing Subjunctive Relative Clauses:

a. [$_{CP}$ Q [$_{IP}$ **Eva$_1$** wants [$_{IP}$ [$_{WhP}$ which man that **she$_1$** met for the first time in the suburbs]$_2$ [$_{IP}$ to have a date with t$_2$]]]]

b. * [$_{CP}$ Q [$_{IP}$ **she$_1$** wants [$_{IP}$ [$_{WhP}$ which man that **Eva$_1$** met for the first time in the suburbs]$_2$ [$_{IP}$ to have a date with t$_2$]]]]

Once the *which* phrase has been syntactically reconstructed, Principle C effects follow: no violation occurs in (34a), since the name *Eva* is not c-commanded by the coindexed *pro*; a violation arises in (34b), since, this time *Eva* is c-commanded by *pro* at LF.

In this subsection, I have shown that *which* phrases can sometimes take opaque restrictors, and that opacity (world variable binding) and Principle C effects correlate in *which* phrases. The generalization that arises from the data in the previous and present section is, hence, the following:[16]

(35) Correlation between Reconstructed Scope and Principle C effects:

A *which* phrase (or its N' restrictor) that has Reconstructed Scope under a given operator behaves with respect to Principle C as if it was syntactically placed in the c-command domain of that operator at LF.

We have seen that, for all the cases, this correlation follows straighforwardly from the base position line coupled with Syntactic Reconstruction. In the next subsection, I discuss a possible implementation of it within the wide scope - Semantic Reconstruction line, and argue that the crucial ingredient is undesirable.

[16] It is time to recall Sharvit's (1998:8) important observation that narrow scope, transparent readings of *how many* phrases do not feed Principle C. Once we have seen that transparency/opacity in *which* phrases also makes a difference for Principle C, the question arises whether reconstructed scope transparent readings of *which* phrases obviate Principle C or not. In a pilot survey that I conducted, I asked informants to evaluate the sentences in (i) --which are like Lebeaux' examples, i.e., plausibly interpreted as opaque-- and the sentences in (ii) --where only the transparent reading of the Relative Clause is plausible. Judgments were extremely hard and, consequently, the results are not very reliable: the speakers that allowed the long distance binding in *he...every boy* in (i) and (ii) --binding was harder in (ii)--, found a contrast in (i) and, for the most part, a milder contrast between (iia) and (iib).

(i) a. Which paper that he_1 owes her_2 does $Elisabeth_2$ hope that every boy_1 will give her_2 soon?
b. * Which paper that he_1 owes $Elisabeth_2$ does she_2 hope that every boy_1 will give her_2 soon?

(ii) a. Which paper that he_1 in fact already gave her_2 does $Elisabeth_2$ hope that every boy_1 will give her_2 soon?
b. ??? Which paper that he_1 in fact already gave $Elisabeth_2$ does she_2 hope that every boy_1 will give her_2 soon?

3.3.3 Deriving the Correlation within the Semantic Reconstruction Line

In the chapter on *how many* phrases, we saw that, besides the c-command definition of Binding Theory principles, an alternative view has been proposed in the literature (Barss 1986; Sternefeld 1997, Sharvit 1998 for reconstruction): Binding Theory principles can be defined in terms of Barss' Chains or Binding Paths.[17]

As we saw in the preceding chapter, a chain accessibility sequence or binding path for a given node α is a path starting from α up the tree that leaps from nodes that have moved to their traces and continues from there. The complete definition is repeated under (36). Recall that we modified Barss' original definition in the point (36.iii.2), so that only generalized quantifier traces T of *how many* phrases were able to enter into a binding path.

(36) Chain Accessibility Sequence (modified from Barss 1986):

$S = (a_1, ..., a_n)$ is a well-formed chain accessibility sequence for an NP α only if :

i. α is a_1,

ii. some a_i is a projection of the governor of α,

iii. for every pair (a_i, a_{i+1}), either (1) or (2):

1) a_{i+1} immediately dominates a_i

2) (a_i, a_{i+1}) is a link of a well-formed A' or A (movement) chain and $\mathbf{a_{i+1}}$ **has type <et,t>**,

iv. and a_n is the root node of a Complete Functional Complex.

[17] What I will present in this section is Barss' theory minimally amended to account for the correlation in (35), as I did in Romero (1997). Sternefeld (1997) and Sharvit (1998) propose variants of it, though the spirit is the same.

(37) Wide scope reading of *how many*:

a. [**WhP**How many [**NP**pictures [**PP**of **John$_1$**]]]$_2$ did [**IP-2** you [**VP-2** **T$_2$** think [$_{CP}$ t_2 [$_{IP}$ he$_1$ [$_{I'}$ will [$_{VP}$ like t_2]]]

b. Chain accessibility sequence for *John*:

(*John*, P', PP, N', NP, Wh', WhP, T_2, V'-2, VP-2, I'-2, IP-2)

(38) * Narrow scope reading of *how many*:

a. [**WhP**How many [**NP**pictures [**PP**of **John$_1$**]]]$_2$ did you think [**IP-1** he$_1$ [**I'-1**will [**VP-1** **T$_2$** [$_{VP}$ like t_2]]]

b. Chain accessibility sequence:

(*John*, P', PP, N', NP, Wh', WhP, T_2, V'-1, VP-1, I'-1, IP-1)

The recasting of Principle C in terms of chain accessibility is repeated under (39). According to this definition, no Principle C violation occurs in (37), since the only coindexed expression --the pronoun *he* in the embedded clause-- is not sister to any node in the binding path. The syntactic representation in (38), instead, violates the Chain Accessibility Principle C and is, consequently, ruled out, since this time *he* is sister to a node in the Binding Path.

(39) Chain Accessibility Principle C:

An R-expression α is licensed only if there is no coindexed NP that is the sister of a node in the chain accessibility sequence (or binding path) of α.

Let us return to *which* phrases now. In view of the data reviewed and presented in this chapter, we need to allow for functional traces to be part of a binding path, too. Hence, (36.iii.2) should be amended as in (36'.iii.2):

(36'.iii.2) ($a_{i,}$ a_{i+1}) is a link of a well-formed A' or A (movement) chain and **a_{i+1} has type <et,t>, <e,e> or <s,e>**,

It is easy to see that, once (36'.iii.2) is granted, the correlation between Reconstructed Scope and Principle C effects follows. Let us illustrate it with Fox' examples (19a) and (19b), repeated here as (40) and (41): no NP coindexed with *the teacher* is accessible through the (abridged) chain (40b); in (41b), instead, the coindexed pronoun *she$_2$* is sister to the last node of the chain, which results in a Principle C violation. The same configurations can be extrapolated to the opacity examples.

(40)[Which of the books that he$_1$ asked the teacher$_2$ for] did every student$_1$ get from her$_2$?

a. [**WhP** Which of the books [**CP** that he$_1$ asked **the teacher$_2$** for]]$_4$ did [**IP** every student$_1$ [**VP** [$t_{4(1)}$]$_3$ [**VP** get t_3 from her$_2$]]]

b. (*the teacher*, ..., CP, ... WhP, $t_{4(1)}$, VP, IP)

(40) * [Which of the books that he$_1$ asked the teacher$_2$ for] did she$_2$ give every student$_1$?

a. [**WhP** Which of the books [**CP** that he$_1$ asked **the teacher$_2$** for]]$_4$ did [**IP** she$_2$ [**VP** give every student$_1$ $t_{4(1)}$]]

b. (*the teacher*, ..., CP, ... WhP, $t_{4(1)}$, VP, IP)

As I mentioned in the previous chapter, the problem of this account is that it has to stipulate which types of traces can enter in a binding path. It does not explain why higher type traces --i.e., the ones yielding scope reconstruction-- result in a Principle C violation and individual type traces do not. In other words, there is nothing intrinsic to higher order semantic types that makes us foresee that traces of those types will be able to participate

in a binding path and traces of individual type will not.[18] In the SynR approach, instead, the correlation is explained: Reconstructed Scope and Principle C effects correlate because both are determined by the syntactic position of the phrase at LF; there is no need to discriminate different semantic types of traces and assign them different behaviors with respect to binding path formation. On these grounds, and if no stronger competitor arises within the SemR approach, I choose to pursue the Syntactic Reconstruction approach instead of the Semantic Recontrunction - Binding Path line.

Once I choose Syntactic Reconstruction, I am committed to a base position analysis of *which* phrases, since I need to be able to interpret them (or their N' restrictors) under C^0 and under more embedded operators. The next section, section 4, addresses how the base position strategy should be implemented.

3.4 Base Position Approach to *Which* Phrases --but How?

After having examinded evidence from Reconstruction Effects and having decided in favor of the base position approach of *which* phrases, I will devote this section to investigating how to implement the base position line. The resulting proposal will consist of a new, revised version of the choice function approach.

To this end, several types of data will be considered.

In subsection 4.1, I will recall the well-known truth condition problem that the (un)selective binding - Hamblin approach faces, for which a solution using choice

[18] This criticism of the SemR-Binding Path approach does not apply to Sharvit (1998). In her implementation for *how many* phrases, the success of a trace in creating a binding path does not depend on its semantic type, but on its world index: the world index of the trace determines the "shape" of the path, namely, it determines that the path ends at an IP evaluated under that same world variable. Hence, no discrimination between types of traces needs to be done for binding path purposes. However, I am not sure whether her implementation would have the adequate empirical coverage once we extend it to *which* phrases. See footnote 16 for a preliminary survey of this issue.

functions has been developed (Reinhart 1993). Revising the problem and the intended solution will give us the "state of the art" of the choice function approach to *which* phrases in the literature.

Subsections 4.2 and 4.3 will provide data arguing for an architecture of choice functions different from the one entertained by Reinhart. In 4.2, I will present examples of local presupposition accommodation from Romero (1997e) and conclude that choice functions yield individual concepts more often than usually thought. This leads to *which* phrases eliciting intensional answers, the topic of section 4.3: based on new examples of *which* phrases with transparent restrictors eliciting intensional answers, I will propose a new definition of intensional choice functions.

In light of the new definition of intensional choice functions, subsection 4.4 examines the frequent transparency effect of the N' restrictor of a *which* phrase. It will be argued that --as already indicated by the Spanish/Catalan Subjunctive Relative Clause examples-- opaque restrictors are certainly an option and that several factors hinder their detection: glogal presupposition accommodation, the equivalence between some transparent and opaque interpretations, and other pragmatic factors prevent opaque N-bars from being more visible.

3.4.1 The Problem of Weak Truth Conditions

Reinhart (1993) observes that interpreting *which* phrases (or their N' restrictor) under the scope of certain embedded operators yields incorrect truth conditions in the (un)selective binding-Hamblin approach. In particular, when the *which* phrase is located in a downward entailing context at LF --in the restrictor of a universal in (41)-(42) and under negation in (43)-(44)--, (un)selective binding derives the denotations in (41a)-(44a). Assuming that each of the propositions in the denotation of a question is a

felicitous (true or false) answer to that question,[19] the sentences in (41b,c)-(44b,c) are wrongly predicted to be acceptable true answers for (41)-(44).

(41) Which linguist read every book by which philosopher? (Reinhart 1993:(6))

a. {p: ∃x,y [p = λw. linguist(x)(w) & ∀z [book(z)(w) & by(y)(z)(w) & **philosopher(y)(w)** → read(z)(x)(w)]]}

b. # Patricia a linguist and Patricia read every book such that Audrey Hepburn wrote it and Audrey Hepburn is a philosopher.

c. # Patricia read every book by Audrey Hepburn.

(42) Who will be offended if we invite which philosopher? (Reinhart 1993:(4))

a. {p: ∃x,y [p = λw.∀w'[[invite(y)(we)(w') & **philosopher(y)(w/w')** & w' is (maximally) similar to w in any other respect] → offended(x)(w')]] }

b. # Patricia will be offended if we invite Audrey Hepburn and Audrey Hepburn is a philosopher.

c. # Patricia will be upset if we invite Audrey Hepburn.

(43) Which philosopher did nobody introduce John to?

a. {p: ∃x [p = λw.¬∃y [introduce(x)(j)(y)(w) & **philosopher(x)(w)**]]

b. # There is nobody such that that person introduced John to Audrey Hepburn and Lewis Carrol is a philosopher.

c. # Nobody introduced John to Audrey Hepburn.

[19] I think this is a fairly standard assumption (see, e.g. Hamblin (1973:52)), though the reverse does not hold. That is, propositions other than the ones in the question denotation may be felicitous answers too. That is the case, for instance, of partial answers (see Groenendijk-Stokhof (1984: Ch. 4)).

(44) Which politician didn't Max assume that the bursar bribed?

a. {p: ∃x [p = λw. ¬(Max assumed in w (λw'. bribed(x)(b)(w') & **politician(x)(w')/(w)**))] }[20]

b. # Max didn't assume that James Dean is a politician and that the bursar brided James Dean.

c. # Max didn't assume that the bursar bribed James Dean.

Against this criticism, one could argue that the *which* phrases in (40)-(44) are placed outside the downward entailing contexts at LF.[21] The *which* phrases are still interpreted under C^0, though. The resulting denotations bring a slight improvement over the previous ones: now the prediction is that (45b,c)-(46b,c) are felicitous false answers for (45)-(46). This, at least, is closer to people's intuitions that something went wrong in this information exchange (though I still think that the oddity of these answers is due to infelicity rather than to falsity: *cf.* (45d)-(46d), taken as false in the actual world).

(45) Which linguist read every book by which philosopher?

a. {p: ∃xy [p = λw. linguist(x)(w) & **philosopher(y)(w)** & ∀z [book(z)(w) & by(y)(z)(w) → read(z)(x)(w)]]}

b. # Audrey Hepburn is a philosopher and Patricia read every book by Audrey Hepburn.

c. # Patricia read every book by Audrey Hepburn.

d. Patricia read every book by Aristotle.

[20] Here and in the rest of the chapter, I will pretend that attitude verbs take propositions as their arguments instead of self-ascribed properties. I will do so for readability purposes. Nothing of what I have to say hinges on this choice.

[21] For (41)-(42), this extraction would involve accepting island free *wh*-movement at LF.

(46) Which philosopher did nobody introduce John to?

a. {p: ∃x [p = λw. **philosopher(x)(w)** & ¬∃y [introduce(x)(j)(y)(w)]]

b. # Audrey Hepburn is a philosopher and there is nobody that introduced John to Audrey Hepburn.

c. # Nobody introduced John to Audrey Hepburn.

d. Nobody introduced John to Quine.

However, this escape hatch will not work for the examples in (47)-(50). In a parallel way to the previous cases, (47)-(48) have a *which* phrase in the restrictive clause of a universal quantifier and (49)-(50) have one potentially in the scope of negation. The difference is that, in the new cases, the N' restrictor of the *which* phrase contains a variable that needs to be bound **within** those downward entailing contexts. This is so because, under the intended readings, the binders themselves take scope inside those contexts (the Negative Polarity NPs in (48)-(50)), or because the binder is the universal itself ((47) and maybe (48)). If the Reconstructed Scope of a *which* phrase is achieved by Syntactic Reconstruction --as I argued in section 3 of this chapter--, we are forced to place these *which* phrases inside the downward entailing contexts at LF. This brings us back to the weak truth conditions of the first examples: the (un)selective binding-Hamblin approach (with skolem functions)[22] wrongly predicts (47b,c)-(50b,c) to be perfect true answers for (47)-(50).

[22] *Vid*. the details of the computation in (13). Note, in particular, that there is no doubly indexed trace --unlike in Engdahl's (1986) skolem function approach-- and that variable binding is achieved by LF c-command. I spell out the complete question denotation in (47) and give slightly abridged versions for (48)-(50).

(47) Who appeased every linguist$_1$ that got angry at which philosophical rival of his$_1$?

a. {p: ∃x∈ D_e ∃f∈ $D_{<e,e>}$ [p = λw. ∀y [linguist(y)(w) & ∃r (angry(r)(y)(w) & f(y)=r & **∀z∈ Dom(f) [phil-riv-of(z)(f(z))(w)]**)] → appease(y)(x)(w)] }

b. # Sylvia appeased every linguist that got angry at his dog and whose dog is a philosophical rival of his.[23]

c. # Sylvia appeased every linguist that got angry at his dog.

(48) Who would be surprised if a/any lady$_1$ invited which of her$_1$ philosophical rivals?

a. {p: ∃x∈ D_e ∃f∈ $D_{<e,e>}$ [p = λw. ∀w' [∃y [lady(y)(w') & invite(f(y))(y)(w') & **∀z∈ Dom(f) [phil-riv-of(z)(f(z))(w)/(w')]** & w' is (maximally) similar to w in any other respect]] → surprised(x)(w')] }

b. # Kyle would be surprised if a/any lady invited her dog and her dog was her philosophical rival.

c. # Kyle would be surprised if a/any lady invited her dog.

(49) Which of her$_1$ philosophical rivals did no boy introduce any lady$_1$ to t?

a. {p: ∃f∈ $D_{<e,e>}$ [p = λw. ¬∃yz [boy(y)(w) & lady(z)(w) & introduce(f(z))(z)(y)(w) & **∀z'∈ Dom(f) [phil-riv-of(z')(f(z'))(w)]**]] }

b. # No boy is such that there is a lady that he introduced to her dog and whose dog is a philosophical rival of her

c. # No boy introduced any lady to her dog.

(50) Which political ally of hers$_1$ didn't Max assume that somebody/anybody$_1$ bribed t?

a. {p: ∃x∈ D_e ∃f∈ $D_{<e,e>}$ [p = λw. ¬(x assumed in w (λw'. ∃y [bribed(f(y))(y)(w') & **∀z∈ Dom(f) [pol-all-of(z)(f(z))(w)/(w')]**]))] }

[23] This and the next (b)-(c) answers are infelicitous if dogs are not philosophical rivals or political allies of anybody.

b. # Max didn't assume that there is somebody that bribed his dog and whose dog is his political ally.

c. # Max didn't assume that somebody/anybody bribed his dog.

The reason why all these examples yield weak truth conditions is that the denotation of the N' restrictor of the *which* phrase is applied to an object within the question nucleus. As soon as we scope the *which* phrase outside the question nucleus (as in the wide scope line), we get the right truth conditions. This can be seen in the denotations (43d) and (49d), which correctly fail to contain the propositions expressed by (43b,c) and (49b,c) respectively.

(43) Which philosopher did nobody introduce John to?

d. {p: ∃x [**philosopher(x)(w)** & p = λw.¬∃y [introduce(x)(j)(y)(w)]] }

(49) Which of her$_1$ philosophical rivals did no boy introduce any lady$_1$ to t?

d. {p: ∃f∈ $D_{<e,e>}$ [**∀z'∈Dom(f) [phil-riv-of(z')(f(z'))(w)]** & p = λw. ¬∃yz [boy(y)(w) & lady(z)(w) & introduce(f(z))(z)(y)(w)]] }

From these data, the following generalization arises:

(51) Non-assertionality of the N' restrictor of a *which* phrase:

The property denoted by N' is not asserted of any individual inside the question nucleus.

Reinhart (1993), developing the notion of selection function found in Engdahl (1980:135), proposes a strategy to maintain the N' restrictor of a *which* phrase in base

position without violating the generalization in (51): she proposes to use choice functions. The basic notion of choice function is given in (52):

(52) Basic choice function definition:

A function f is a choice function (CH(f)) if, for every set P in its domain, f(P) is a member of P.

She proposes that *which* phrases introduce a variable ranging over choice functions[24] and that this variable takes the N' denotation as its argument. Both the choice function variable and the N' restrictor are interpreted under *Q* --and, hence, will end up in the question nucleus. However, they do not form a subformula on their own, but just a term that does not interfere in the computation of the truth condition of the downward entailing context. The reader can see this illustrated in (43e) and (49e):

(43) Which philosopher did nobody introduce John to?

e. {p: ∃f∈ $D_{<et,e>}$ [CH(f) & p = λw.¬∃y [introduce (**f([[*philosopher*]](w))**) (j) (y) (w)]] }

(49) Which philosophical rival of hers$_1$ did no boy introduce any lady$_1$ to t?

e. {p: ∃f∈ $D_{<et,e>}$ [CH(f) & p = λw. ¬∃yz [boy(y)(w) & lady(z)(w) & introduce (**f([[*philosophical rival of hers*$_1$]]$^{g[z/1]}$(w))**) (z) (y) (w)]] }

[24] More accurately, *which* phrases introduce a variable ranging over functions from individuals to choice functions. This is proposed in Kratzer (1997:7ff) for *a certain N'* in order to account for the (marginal) availability of functional readings when there is no overt bound variable in N' and for the problem of coextensional N-bars. Reinhart (1997: fn27) incorporates this idea into her treatment of indefinites, too. The same issues arise in *which* phrases and, hence, Kratzer's solution should be extended to them. For the sake of simplicity and since nothing in this chapter hinges on it, I will not include the subscripted index (the argument of such functions) in the forthcoming formulae.

Once the non-assertionality of *which* phrases has been guaranteed, Reinhart (1993:§2.2; 1997:§6.5.2) worries about one more issue. She claims that we still "have to make sure that the given function selects always from the extension of the N-set in the actual world" (p.393). She illustrates the problem with (53): even though the N' *millionaire* occurs under the scope of *want*, the question is not ambiguous and the choice function can only choose from the set of actual millionaires. That means that the kind of denotation in (53b) needs to be excluded.[25]

(53) [[*Who wants to marry which millionaire*]](w) =

a. {p: ∃g,f∈ $D_{<et,e>}$ [CH(g) & CH(f) & p = λw'. g(person) wants in w' (λw". marry (**f([[*millionaire*]](w))**) (g(person)) (w"))] }

b. {p: ∃g,f∈ $D_{<et,e>}$ [CH(g) & CH(f) & p = λw'. g(person) wants in w' (λw". marry (**f([[*millionaire*]](w"))**) (g(person)) (w"))] }

To secure the transparency of the N' restrictor, Reinhart departs from the basic choice function idea defined in (52). She proposes to modify the notion of choice function as in (54) and to define the range of choice functions that we are quantifying over as in (55):

[25] The example (53) can be modified to make sure that the N' restrictor is within the scope of *want* at LF, as in (i). The same argument applies.
(i) Who wants every boy_1 to contact which millionaire in his_1 neighborhood?

(54) Generalized "Choice" function:[26] (von Stechow 1996:13)

A function $f_{<<s,et>, e>}$ is a generalized choice function (GCH(f)) if, for every P in its domain, f(P) is a member of P(w), for some w.

(55) Defining the range of quantification for f: [27] (Reinhart 1993:(23); 1997:394)

G = {f: ∀$P_{<s, et>}$ [f(P) ∈ **P(w_0)**] }

Though I agree that, in most cases, the N' restrictor of a *which* phrases is necessarily transparent, it is not clear to me that this is always so. We already saw some indication that at least part of the N' restrictor can be opaque, namely the examples of Spanish/Catalan Subjunctive Relative Clauses from subsection 3.2. If we want to account for these opaque cases, Reinhart's restriction on the domain of quantification (55) should be abandoned. Then, of course, the question arises why transparency is overwhelmingly preferred. I will have some suggestions about this issue in subsection 4.4.

Up to this point, I have reviewed the choice function analysis for *which* phrases existing in the literature. This is the "state of the art" that we find. In the next two sections, I will present data that challenge it. I will argue for an architecture of choice functions that follows the basic choice function idea, but implemented in a higher type: < <se,t>, <se> >. Once the new choice function analysis has been motivated, I will return to opaque N' restrictors and the frequent transparency effect, and, finally, to the way the correlation between Principle C and opacity is derived (section 5).

[26] Though the idea is Reinhart's, the full-fledged definition in (54) --and the terminology "generalized choice function"-- is taken from von Stechow (1996).

[27] In the case of direct questions, transparent N-bars are evaluated in w_0; in the case of embedded questions, they are evaluated under the world variable of the +wh COMP that binds *f*.

3.4.2 Local Presupposition Accommodation Cases

Now I turn to the first set of data challenging the current choice function treatment of *which* phrases in the literature. Since the criticism applies both to the basic extensional choice function type <et,e> and to the generalized "choice" function type <<s,et>, e>, I will use a neutral notation all through this subsection 4.2. The notation e.g. in (56) can be read as (56a) or as (56b):

(56) f (philosopher)

a. $f_{<et,e>}$ ([[*philosopher*]](w_0)), *f* ranging over basic choice functions.

b. $f_{<<s,et>,e>}$ ([[*philosopher*]]), *f* ranging over generalized "choice" functions belonging to G in (55).

This section is organized as follows. First, I examine two possible strategies to deal with empty set N' restrictors. Second, building on Romero (1997), I present data on local presupposition accommodation and show that neither of those strategies can be extended to cover the local presupposition cases without running into the weak truth conditions problem. Third, I propose a solution based on choice functions that yield individuals concepts.

3.4.2.1 Empty Set N' Restrictors

What happens when the N' restrictor in the *which* phrase denotes the empty set, as in (57)? How could a choice function possibly select an individual out of the empty set?

(57) Who checked every law that which American king had sanctioned?

a. { p: ∃g,f [CH(g) & CH(f) & p = λw.∀x [(law(x)(w) & sanction(x)(f(American king))(w)) → checked(x)(g(person))(w)]] }

Two main strategies to handle empty N' restrictors are possible.

The first one is to consider that choice functions are partial functions and that the empty set is not in their domain (that is, we keep the definitions (52) and (54) intact). Then, in a world w where the set of American kings is empty, f(American king) is undefined for any f, which will make the implication in (57a) undefined for some values of x, and, as a result, will make the whole proposition (57a) undefined too.[28] That is, (57) presupposes the existence of a non-empty set of American kings.

The second possibility is to consider that a choice function is a total function and that it yields a falsifying object when the N' restrictor is empty, as von Stechow (1996:4f), Reinhart (1997:391ff) and Winter (1997:434ff) have proposed in their analysis of indefinites. Let us take, for the sake of illustration, Winter's definition of a choice function:

[28] In Kleene's three-valued logic, the truth value of an implication with an undefined antecedent is true if the consequent is true and undefined otherwise. This means that, unless g(person) checked absolutely all the (relevant) laws in w, there will be some values of x for which the implication within (57a) will be undefined. Assuming that ∀ amounts to multiple conjunction and ∃ amounts to multiple disjunction and assuming Kleene's three-valued system of connectives, we have that the universally quantified formula within (57a) is undefined for a world w with no American kings and so is the whole proposition (57a). Reinhart (1997:390-1) arrives at other resulting truth values (actually, at both T and F) using other three-valued logical systems and different truth conditions for ∃xϕ.

(58) A function $f \in D_{<<et><et,t>>}$ is a choice function iff:

(i) for all $P \in D_{<et>}$ such that $P \neq \emptyset$, $\exists x_e[P(x) \& f(P)=\lambda A_{<et>}.A(x)]$ (i.e., f(P) is the generalized quantifier corresponding to some individual in P), and

(ii) $f(\emptyset)=\emptyset_{<et,t>}$ (the trivial generalized quantifier which does not include any set of individuals).

Assuming that there are no American kings in w, the definition (58) makes the antecedent of the conditional in (57a) false for any pair of f and x. Hence, the whole existential quantification is trivially true in w. That is, for any value of *f*, the proposition in the question nucleus of (57a) is true in a world w where there is no American king.

Judgments about the felicity of (57) are subtle and it is not the aim of this chapter to discuss which of the two alternatives is empirically more accurate. In the next subsection, I present some local presupposition accommodation examples and show that neither the partial choice function strategy nor an extension of the falsifying object strategy can account for them. Hence, they pose a problem for the current implementation of the choice function line to *which* phrases.

3.4.2.2 Local Presupposition Accommodation in the Choice Function Approach

The following examples involve local accommodation (e.g., in the sense of Heim (1983)) of the existence presuppositions triggered by the definite NPs *his$_1$ younger sister* and *his$_1$ dog*, namely the presuppositions "that there is a (unique) x that is g(1)'s younger sister" and "that there is a (unique) x that is g(1)'s dog". Under one possible reading of (59) --the one favored by the annotated continuation--, the sentence can be paraphrased as "Mary didn't assume that any boy in the class has a younger sister and that he would bring her". That is, the existence presupposition "that there exists a younger sister of his" is locally accommodated under the scope of negation, of the attitude verb and of the

existential, rather than projecting to Mary's doxastic alternatives or being globally accommodated into the background context.[29]

(59) Mary didn't assume that any boy$_1$ in the class would bring his$_1$ younger sister --since she knows perfectly well that no boy in the class has a younger sister.

a. $\lambda w.\neg$[Mary assumed in w ($\lambda w'.\exists x$ [boy(x)(w') & $\exists y$ [sister(x)(y)(w') & brought(y)(x)(w')]])]

Another example of local presupposition accommodation is given under (60). Under its more normal reading, (60) does not presuppose that every relevant boy (presumably, every boy at today's contest) has a dog, or that at most one boy has a dog. (60) does not even presuppose that there is a boy (from today's contest) that has a dog at all. The existence presupposition "there is a dog of his" seems, instead, to be accommodated under the scope of the quantifier.[30]

[29] To see the contrast, let us examine what presupposition projection --instead of local accommodation-- would yield. In Heim's s (1983, 1992) system, normal presupposition projection would yield the presupposition "that every boy in the class has a younger sister" for the quantified embedded clause in (59), a presupposition that has to be satisfied by the immediate context (i.e., Mary's doxastic alternatives) and, in addition, may or may not be globally accommodated in the background context. This is clearly not the reading we are after. In Beaver's (1995:ch.9) system for quantified presuppositions, the embedded sentence would presuppose "that there is a boy in the class that has a younger sister". Then, Heim's choices apply: this presupposition can be locally accommodated under negation and under the attitude verb --this would the same reading as in (59a)--, or it can project to the subject's doxastic alternatives (and, in addition, be globally accommodated or not).

[30] (60) can be felicitously uttered in the following scenario, which does not entail the existence of a dog-owning-boy at today's contest:
(i) Scenario: We know that Lucie gets really mad at boys mistreating their dogs, to the point that she screams at them until she gets a sore throat. We don't know which kinds of pets were competing in today' contest. We just know that, after the contest, her voice is in good condition. We estimate that she must have scolded at most one misbehaved dog-owning-boy, if any.
Beaver (1995:214) provides other examples for which he concedes the same claim is tenable. The sentence in (ii), e.g., is compatible with there being no priceless Modigliani owners. Since his semantic rules do not derive this reading and I do not know of any other solution, I will consider that it arises from local presupposition accommodation under the scope of the quantifier.
(ii) No man discovered / regretted that he owned a priceless Modigliani.

(60) Lucie scolded at most one boy$_1$ that mistreated his$_1$ dog (at today's contest).

a. $\lambda w.\exists_{\leq 1} x$ [boy(x)(w) & scold(x)(l)(w) & $\exists y$ [dog-of(x)(y)(w) & mistreated(y)(x)(w)]]

Parallel examples of local presupposition accommodation occur with *which* phrases:

(61) Q: Who didn't assume that any boy$_1$ in the class would bring which relative of his$_1$ -- since that person knew that no boy in the class has such a relative?

A: √ Mary didn't assume that any boy$_1$ in the class would bring his$_1$younger sister -- since Mary knows that no boy in the class has a younger sister.

(62)Q: Who scolded at most one boy$_1$ that mistreated which pet of his$_1$?

A: Lucie scolded at most one boy$_1$ that mistreated his$_1$ dog.

These examples present a problem for the current choice function approach to *which* phrases: we need to allow for these local accommodation readings, but neither the partial function approach nor the extension of the falsifying object approach that we saw in the previous subsection can derive (61)-(62) without yielding truth conditions that are too weak.[31]

Let us first look at the **partial choice function line**. The local presupposition accommodation reading of (61) could be represented as in (63a):[32]

[31] The argumentation that follows applies to Reinhart's (1997) and Winter's (1997) choice function analysis of indefinites too, as I discuss in Romero (1997). The case against their particular implementation of choice functions is actually easier to make --and to follow-- with indefinites.

[32] For the logical representations used in illustrating the partial choice function line, I assume Kleene's (1952) three-valued system, where conjunction of the value 0 and the value "undefined" yields 0. The same result can be achieved with Bochvar's system (where $\wedge(0,\#) = \#$) if we modify the logical representations given in the text. E.g. (i) would replace (63a):

(63) Who didn't assume that any boy$_1$ in the class would bring which relative of his$_1$?

a. {p: $\exists$g,f [CH(g) & CH(f) & p = $\lambda w.\neg$[g(person) assumed in w ($\lambda w'.\exists x$ [boy(x)(w') & f(relative of x) is defined & bring(f(relative of x))(x)(w')])]] }

The problem with (63a) is that the formula in the question nucleus has truth conditions that are too weak, a problem that we already encountered in the unselective binding approach. First, let us take a partial choice function that systematically chooses people's younger sister when it can and that is undefined when the argument set does not contain any such sister. This function, $f_{ysister}$, is defined in (64a). Let us take this function as one of the possible values for *f* (and a random function g for *g*). This means that the proposition described under (63b) below is a member of the question denotation (63a). Furthermore, the proposition (63b) is true in a world w where younger sisters are relatives and g(person) did not assume that any boy in the class had a younger sister. Hence, in such a world w --which, for all I know, could be the actual one--, a sentence expressing the proposition (63b) would be a felicitous true answer to the question. That is, the existence of the function $f_{ysister}$ correctly elicits (63A) as a felicitous true (in w) answer for the local presupposition accommodation reading of (63).

(63) Who didn't assume that any boy$_1$ in the class would bring which relative of his$_1$?

a. {p: $\exists$g,f [CH(g) & CH(f) & p = $\lambda w.\neg$[g(person) assumed in w ($\lambda w'.\exists x$ [boy(x)(w') & f(relative of x) is defined & bring(f(relative of x))(x)(w')])]] }

b. $\lambda w.\neg$[g(person) assumed in w ($\lambda w'.\exists x$ [boy(x)(w') & $f_{ysister}$(relative of x) is defined & bring(f(relative of x))(x)(w')])]

(i) {p: $\exists$g,f [CH(g) & CH(f) & p = $\lambda w.\neg$[g(person) assumed in w ($\lambda w'.\exists x$ [boy(x)(w') & $\exists y$[f(relative of x)=y & bring(y)(x)(w')]])]] }

A: √ Mary didn't assume that any boy$_1$ in the class would bring his$_1$younger sister (i.e. the relative of his$_1$ that is his$_1$ younger sister) --since Mary knows that no boy in the class has a younger sister.

(64) Examples of partial extensional choice functions <<s,et>, e> (similarly for <et,e>):

a. $f_{ysister}$: for all the N' *P*:

$f_{ysister}([[P\ of\ his_1]]^g)$ = g(1)'s younger sister if there is a (unique) younger sister of g(1) in $[[P\ of\ his_1]]^g(w_0)$;

$f_{ysister}([[P\ of\ his_1]]^{gx})$ is undefined otherwise.

b. f_{cat}: for all the N' *P*:

$f_{cat}([[P\ of\ his_1]]^g)$ = g(1)'s cat if there is a (unique) cat of x in $[[P\ of\ his_1]]^g(w_0)$;

$f_{cat}([[P\ of\ his_1]]^g)$ is undefined otherwise.

However, taking the function f_{cat} in (64b) as a possible value of *f* would make the proposition in (63c) below a member of the question denotation too. The problem is that this proposition is true in some circumstances as well. In particular, it is true in a world w with the following characteristics: cats are not relatives in w (and g(person) does not think in w that they are, either), every boy has some relatives in w, g(person) actually assumes in w that all the boys would bring all their relatives, and g(person) didn't assume the impossible proposition in w. In that world --which could be ours, for all I know--, the existence of f_{cat} elicits (63A') as a felicitous true answer for (63) under its local presupposition accommodation reading. This result is contrary to our intuitions.

(63) Who didn't assume that any boy$_1$ in the class would bring which relative of his$_1$?

a. {p: ∃g,f [CH(g) & CH(f) & p = λw.¬[g(person) assumed in w (λw'.∃x [boy(x)(w') & f(relative of x) is defined & bring(f(relative of x)(x)(w')])]] }

c. λw.¬[g(person) assumed in w (λw'.∃x [boy(x)(w') & f_{cat}(relative of x) is defined & bring(f(relative of x))(x)(w')])]

A': # Mary didn't assume that any boy$_1$ in the class would bring his$_1$cat (i.e. the relative of his$_1$ that is his$_1$ cat).

Note that a partial choice function choosing people's cats is as natural as a partial choice function choosing people's younger sister. I do not see a way to set up the domain of quantification for choice functions so that we exclude the former and include the latter. This is exactly the same problem that the (un)selective binding approach faced (and that choice functions were intended to solve). Compare the (un)selective binding semantic representation of the example (65) (=44) with the choice function semantic representation of the current example (66) (=63). In both cases, a quantifier binds a variable on which, later on, in a downward entailing context, a restriction is imposed: in (65), the property of being a politician is predicated of the individual variable *x*; in (66), definedness is asserted of the choice function variable *f* for a given argument. The problem, common to both representations, is that this is schema yields weak truth conditions: under a value of *x* / *f* that does not meet the restriction, the proposition in the question nucleus simply says that Max (or g(person)) did not assume the impossible proposition. Hence, the values James Dean and f_{cat} for *x* and *f*, respectively, make (65A') and (66A') felicitous answers and true proposition in any world where Max (or g(person) does not have inconsistent beliefs.

(65) Which politician didn't Max assume that the bursar bribed?

a. {p: ∃x [p = λw. ¬(Max assumed in w (λw'. bribed(x)(b)(w') & **politician(x)(w')/(w)**))] }

A'. # Max didn't assume that the bursar bribed James Dean.

(66)a. Who didn't assume that any boy$_1$ in the class would bring which relative of his$_1$?

b. {p: ∃g,f [CH(g) & CH(f) & p = λw.¬[g(person) assumed in w (λw'.∃x [boy(x)(w') & **f(relative of x) is defined** & bring(f(relative of x))(x)(w')])]] }

A': # Mary didn't assume that any boy$_1$ in the class would bring his$_1$cat .

The same problem arises with the example (62Q), repeated as (67) and with the local presupposition reading represented in (67a):

(67) Who scolded at most one boy$_1$ that mistreated which pet of his$_1$?

a. {p: ∃g,f [CH(g) & CH(f) & p = λw.∃$_{\leq 1}$x [boy(x)(w) & scold(x)(g(person))(w) & f(pet of x) is defined & mistreated(f(pet of x))(x)(w)]] }

Let us take a function like f_{cat} in (64b), except that it chooses dogs instead of cats. Let us call it f_{dog}. Under this value of *f*, we obtain a proposition --(67b), member of (67a)-- which is true in a world where dogs are pets and where g(person) scolded at most one boy that owned a dog and mistreated it. This value of *f* correctly derives the felicitous answer (68A), which is true in such a world. The problem is, again, that a function like $f_{ysister}$ is predicted to yield a felicitous true answer as well. In particular, taking $f_{ysister}$ as the value of *f* in the question nucleus, we get a proposition --(67c)-- that is true in a world w where sisters are not pets, every boy mistreated all his pets and g(person) scolded all the boys. In that world, the sentence (67A') expressing that proposition is predicted to be a felicitous true answer. This is an unwelcome result.

(67) Who scolded at most one boy$_1$ that mistreated which pet of his$_1$?

a. {p: ∃g,f [CH(g) & CH(f) & p = λw.∃$_{\leq 1}$x [boy(x)(w) & scold(x)(g(person))(w) & f(pet of x) is defined & mistreated(f(pet of x))(x)(w)]] }

b. λw.∃$_{\leq 1}$x [boy(x)(w) & scold(x)(g(person))(w) & f_{dog}(pet of x) is defined & mistreated(f(pet of x))(x)(w)]

A: Lucie scolded at most one boy$_1$ that mistreated his$_1$ dog.

c. λw.∃$_{\leq 1}$x [boy(x)(w) & scold(x)(g(person))(w) & $f_{ysister}$(pet of x) is defined & mistreated(f(pet of x))(x)(w)]

A': # Lucie scolded at most one boy$_1$ that mistreated his$_1$ younger sister.

Let us now try to extend the **falsifying object strategy** to cover these cases. Take a choice function that systematically chooses people's younger sisters when it can and that yields the falsifying object when the argument set does not contain any younger sister, as defined in (69a):

(69) Extension of Winter's falsifying object strategy:

a. $f'_{ysister} \in D_{<<et><et.t>>}$: for all the N' *P*:

$f'_{ysister}([[P\ of\ his_1]]^g(w_0)) = \lambda Q.\iota y(\text{younger-sister-of}(x)(y) \& Q(y))$, if there is a (unique) younger sister of g(1) in $[[P\ of\ his_1]]^g(w_0)$;

$f'_{ysister}([[P\ of\ his_1]]^g) = \varnothing_{<et.t>}$ (i.e. the generalized quantifier that, for any predicate that combines with it, yields 0) otherwise.

b. $f'_{cat} \in D_{<<et><et.t>>}$: for all the N' *P* and for all relevant individuals x:

$f'_{cat}([[P\ of\ his_1]]^g) = \lambda Q.\iota y(\text{cat-of}(x)(y) \& Q(y))$, if there is a (unique) cat of g(1) in $[[P\ of\ his_1]]^g(w_0)$;

$f'_{cat}([[P\ of\ his_1]]^g) = \varnothing_{<et.t>}$ otherwise.

Under this value of *f*, the question nucleus in (70b) is a proposition that is true in a world w where sisters are relatives and g(person) did not assume that any boy was such that he had a younger sister and he would bring her. This are, indeed, right truth conditions for

the local accommodation reading we are after. This value of *f* elicits (71A) as a felicitous true answer for (71Q).

(70)a. Who didn't assume that any boy_1 in the class would bring which relative of his_1?

b. {p: ∃g,f [CH(g) & CH(f) & p = λw.¬[g(person) assumed in w (λw'.∃x [boy(x)(w') & bring(f(relative of x))(x)(w')])]] }

(71) Q: Who didn't assume that any boy_1 in the class would bring which relative of his_1?

A: √ Mary didn't assume that any boy_1 in the class would bring his_1younger sister -- since Mary knows that no boy in the class has a younger sister.

However, we get similar truth conditions for a function that systematically chooses people's cats when it can and the falsifying object otherwise, namely, f'_{cat} in (69b): a world w where cats are not relatives, where g(person) believes cats are not relatives and where g(person) does not believe the impossible proposition suffices to make the question nucleus true, indepedently of g(person)'s beliefs about boys and their actual relatives. That is, even if g(person) assumes that every boy has relatives and will bring them all, the answer (71A') is predicted to be a felicitous true answer for the local presupposition accommodation reading of (71Q).

(71) Q: Who didn't assume that any boy_1 in the class would bring which relative of his_1?

A': # Mary didn't assume that any boy_1 in the class would bring his_1cat .

In this subsection 4.2.2, we have seen that local presupposition accommodation readings arise for *which* phrases too. In order to derive them, we appealed to two strategies that had been proposed within the current choice function account for

independent purposes: the partial choice function strategy and the falsifying individual strategy. We saw that neither of them can derive the local presupposition projection readings without running into the problem of weak truth conditions that choice functions were intended to solve. This is so because, in deriving the local accommodation readings, the same schema that posed a problem for the (un)selective binding account recurs: the variable *f* is bound outside a given downward entailing context, and a property or condition (in this case, definedness) is "predicated" of *f(P)* within that downward entailing context.

The next subsection presents a proposal that derives the aforementioned local presupposition accommodation readings while avoiding the problem of weak truth conditions.

3.4.2.3 Proposal

The success of the account that I will present in this subsection lies in the fact that the trigger of the presupposition is not identified with the definedness conditions of the choice function. The choice function itself is a total function, as Winter (1997) proposes for indefinites.[33]

The presupposition --to be locally accommodated-- arises, instead, from the definedness conditions of something else. I propose that, in all the above cases, the value of a choice function for a given argument is a function itself and that it is the definedness conditions of this latter function that can be locally accommodated. In particular, I propose that choice functions involved in local presupposition accommodation cases are not extensional choice functions yielding individuals (basic choice function type <et,e> or

[33] If we need to allow choice functions to be partial for independent reasons, we would have to postulate that it is not possible to locally accommodate the presupposition that their value for a given argument is defined.

of generalized "choice" function type <<s,et>,e>), but **intensional** choice functions yielding **individual concepts** (type <se>). The resulting individual concept may be a partial function from worlds to individuals; locally accommodating that it is defined amounts to the local presupposition accommodation readings that we saw above.

Let us see how choice functions yielding individual concepts may help us. Such functions have been independently proposed in order to deal with *which* phrases that elicit intensional answers.[34] A first attempt to define them is done in Heim (1994):

(72) Heim's definition of intensional "choice" function: (TO BE REVISED)

A function $f \in D_{<<e,st>, <se>>}$ is an intensional "choice" function (ICH(f)) iff for all P in the domain of f and for all w in the domain of f(P):

$P(f(P)(w))(w)=1$

Let f be an intensional "choice" function meeting this definition. When applied to the property $[[\textit{relative of his}_1]]^g$, its output could be any of the individual concepts in (73), but none of the ones in (74), according to the definition in (72). Let us see this with an example. The partial individual concept "the relative of g(1) that is g(1)'s father" yields, for any world w where there is a (unique) individual x that is g(1)'s father in w and that is a relative of g(1)'s in w, that individual x; its value is undefined otherwise. Hence, for every pair <w, x> in this individual concept function, x is a relative of g(1) in w. This means that this concept can be the output of $f([[\textit{relative of his}_1]]^g)$. Technically, the same holds for the options (73m-n), all of which amount to the impossible individual concept, i.e., to the empty set of world-individual pairs (given that, e.g., cats cannot possibly be

[34] I will examine the use of intensional "choice" functions for intensional answers in the next subsection. For the time being, I will concentrate on how individual concepts may help us in the local presupposition accommodation cases.

people's relatives). That is, the empty individual concept can be the value of a choice function for any property since it vacuously satisfies the condition in (72). Note, instead, that the individual concept "the cat of g(1)" is excluded. Since this concept contains pairs <w, x> such that x is the (unique) individual that is g(1)'s cat in w, regardless of whether x is a relative of g(1)'s in w or not, this individual concept cannot be the output of $f([[\textit{relative of his}_1]]^g)$.

(73) Possible values of f ($[[\textit{relative of his}_1]]^g$):

a. the partial individual concept "the relative of g(1) that is g(1)'s younger sister"

b. the partial individual concept "the relative of g(1) that is g(1)'s brother"

c. the partial individual concept "the relative of g(1) that is g(1)'s father"

...

m. the partial individual concept "the relative of g(1) that is g(1)'s cat"

n. the partial individual concept "the relative of g(1) that is g(1)'s dog"

o. the partial individual concept "the relative of g(1) that is g(1)'s chair"

(74) Impossible values of f ($[[\textit{relative of his}_1]]^g$):

m. the partial individual concept "g(1)'s cat"

n. the partial individual concept "g(1)'s dog"

o. the partial individual concept "g(1)'s chair"

Equipped with this notion of intensional choice function, we can go back to our local accommodation examples. The first example is repeated under (75). Its local presupposition accommodation reading under the new analysis is represented in (75a). Note that, this time, we accommodate that $f_{<<s,et><se>>}([[\textit{relative of his}_1]]^g)(w')$ is defined --not that $f_{<<s,et>e>}([[\textit{relative of his}_1]]^g)$ is defined. That is, provided that the choice

function itself is a total function, we accommodate that the value of the resulting individual concept is defined for w'.

(75) Q: Who didn't assume that any boy_1 in the class would bring which relative of his_1 -- since that person knew that no boy in the class has such relative?

a. { p: ∃g ∃f ∈ $D_{<<s,et><se>>}$ [CH(g) & ICH(f) & p = λw.¬[g(person)(w) assumed in w (λw'.∃x [boy(x)(w') & f([[*relative of his*$_1$]]$^{g^{x/1}}$)(w') is defined & brought (f([[*relative of his*$_1$]]$^{g^{x/1}}$)(w')) (x) (w')])]] }

A: √ Mary didn't assume that any boy_1 in the class would bring his_1younger sister -- since Mary knows that no boy in the class has such relative.

A': # Mary didn't assume that any boy_1 in the class would bring his_1(relative) cat -- since Mary knows that no boy in the class has such relative.

We want to account for the fact that (75A) is a felicitous true answer for (75Q) whereas (75A') is not. Let us first derive (75A). Let us take a function $f^i_{ysister}$ such that, for all the individuals x in the domain of quantification, $f^i_{ysister}$([[*relative of his*$_1$]]$^{g^{x/1}}$) is the partial individual concept "the relative of x that is x's younger sister". The existence of this function in the domain of quantification makes the proposition in (76) a member of the question denotation in (75a). Since this proposition is true in a world w where g(person) knows that no boy in the class has a younger sister, the answer (75A) expressing this proposition is a felicitous true answer for (75Q) in w.

(76) λw.¬[g(person) assumed in w (λw'.∃x [boy(x)(w') & $f^i_{ysister}$([[*relative of his*$_1$]]$^{g^{x/1}}$)(w') is defined & brought ($f^i_{ysister}$([[*relative of his*$_1$]]$^{g^{x/1}}$)(w')) (x) (w')])]

The same reasoning would generate the answer A' if we assumed that there is a function f^i_{cat} in the domain of quantification such that, for all the relevant individuals x,

f^i_{cat}([[*relative of his*$_1$]]$^{g^{x/1}}$) is the partial individual concept "the relative of x that is x's cat". However, this function can be excluded from the domain of choice functions we are quantifying over on purely pragmatic grounds, since, as I said, it yields the impossible or empty individual concept. That is, as in any quantificational structure, a contextual restriction applies to the domain of quantification, to the effect that only choice functions yielding plausible or natural concepts are considered. On these grounds, $f^i_{ysister}$, which yields the concept "the relative of x that is x's younger sister", can be discriminated from f^i_{cat}, which yields the impossible concept "the relative of x that is x's cat".[35]

Recall that this type of contextual restriction did not help in the accounts described in the previous subsection 4.2.2, since a choice function choosing people's cats is as natural as a a choice function choosing people's younger sister. What the new analysis with intensional choice functions does for us is precisely to eliminate the option of a function choosing people's cats, as we saw in (74): a function assigning the (natural) individual concept "the cat of g(1)" to the property [[*relative of his*$_1$]]^g is not an intensional choice function, to begin with.

The same reasoning applies to the second local presupposition accommodation example (62), repeated in (77). I will not go through the argumentation again, but I would like to point out to the reader that the same intensional choice function strategy would be used, despite the fact that there is no embedded intensional context. Hence, independently

[35] The contextual restriction on the domain of choice functions rules out not only functions choosing the empty concept, but also functions choosing implausible concepts, as in (iA'):

(i) Q: Who didn't assume that any $professor_1$ in the department would criticize which rival of his_1?
A: Mary didn't assume that any $professor_1$ in the department would criticize his_1 officemate.
A': # Mary didn't assume that any $professor_1$ in the department would criticize his_1 hairdresser.

The sentences (iA) and (iA') have a reading that does not necessarily presuppose that any professor has an officemate and any professor has a hairdresser, respectively. However, the two sentences differ in their degree of acceptability as answers to (iQ). (iA) is felicitous under the relatively plausible assumption that officemate professors develop some rivality (this presuppostion would elicit the individual concept "the rival of his_1 that is his_1 officemate" as plausible). The assumption that a professor's haidresser is typically his rival is less plausible and so is the individual concept "the rival of his_1 that is his_1 hairdresser". This accounts for the relative oddity of (iA').

of the need of intensional choice functions to elicit intensional answers in intensional contexts, I propose to use intensional choice functions to derive local presupposition accommodation readings, no matter whether there is an embedded intensional context or not.

(77)Q: Who scolded at most one boy$_1$ that mistreated which pet of his$_1$?

A: Lucie scolded at most one boy$_1$ that mistreated his$_1$ dog.

A': # Lucie scolded at most one boy$_1$ that mistreated his$_1$ younger sister.

3.4.2.4 Conclusions and Possible Extensions

As I mentioned above, individual concepts as the value of choice functions are needed independently in order to account for *which* phrases eliciting intensional answers. The conclusion of section 4.2 is simply that we need them more often than we thought. Namely, we also need them in order to derive some local presupposition projection readings without running into the problem of weak truth conditions.

Once we have seen that intensional choice functions are not limited to questions containing an intensional operator, we can speculate and use them to cover the case of the empty set N' restrictor that we described in the subsection 4.2.1. Instead of developing special conditions for the empty set --lifting the choice function type to <<et><et,t>> or postulating the existence of an absurd individual--, we would have an intensional choice function that takes the property "American king" as its argument, as represented in (78a). A possible value for that function is an intensional choice function --f^i_{oldest}-- that yields the individual concept "the oldest American king" when applied to that property. The existence of this function makes the proposition in (78b) a member of the question denotation (78a). However, in a world like ours where there are no American kings, this

proposition will yield the value undefined (unless local accommodation is possible, as in the former examples). Hence, the sentence (78A) expressing that proposition is unfelicitous. Since all the propositions in the question denotation run into the same problem, there is no felicitous answer for (78) and, hence, the question (78) is itself unfelicitous under its normal presupposition projection reading.[36]

(78) Who checked every law that which American king had sanctioned?

a. $\{ p: \exists g,f [CH(g) \& ICH(f) \& p = \lambda w.\forall x [(law(x)(w) \& sanction (x) (f([[\textit{American king}]])(w)) (w)) \rightarrow checked(x)(g(person))(w)]] \}$

b. $\lambda w.\forall x [(law(x)(w) \& sanction (x) (f_{oldest}([[\textit{American king}]])(w)) (w)) \rightarrow$ checked(x)(g(person))(w)]

A: # Martin checked every law that the oldest American king had sanctioned.

3.4.3 Transparent *Which* Phrases Eliciting Intensional Answers

As I mentioned above, Heim (1994) proposes to use intensional "choice" functions in order to account for *which* phrases eliciting intensional answers, like the ones in the dialogs (79)-(80):

(79) Q: Which of your classmates do you want to be friends with?

A: The one with the best grades --whoever that may be.

(80) Q: Which book of his$_1$ did Tobi believe that every author$_1$ would read from?

A: From his$_1$ latest one --whichever that may be.

[36] If we were able to accommodate the definedness presupposition within the restrictor of the universal quantifier, all felicitous answers would be also trivially true. This may still be a reason for the infelicity --or, at least, oddity-- of the question.

Heim's definition of intensional choice functions is repeated under (81). (82) illustrates how the use of these functions derives the intensional reading of (80).[37]

(81) Heim's definition of intensional "choice" function: (TO BE REVISED)

A function $f \in D_{<<e,st>, <se>>}$ is an intensional "choice" function (ICH(f)) iff for all P in the domain of f and for all w in the domain of f(P):

$$P(f(P)(w))(w)=1$$

(82) Which book of his_1 did Tobi believe that every $author_1$ would read from?

a. {p: ∃f [ICH(f) & p = λw. Tobi believes in w (λw'. ∀x(author(x)(w') → read **$(f([[book\ of\ his_1]]^{g^{x/1}})(w'))$** (x) (w'))]}

However, Heim's notion of intensional "choice" function does not capture other examples of intensional answers. In particular, it does not account for intensional answers elicited by *which* phrases with transparent N' restrictors. Let us see this with some examples.

[37] Heim (1994) starts with Reinhart's generalized "choice" function definition and domain restriction -- repeated under (i) and (ii)-- and shows that this analysis does not derive the intended intensional answers. In Reinhart's approach, the denotation of (80Q) would be (iii), a set that only contains propositions expressing Tobi's belief about an actual book for each author. (iii) does not account for the intensional answer (80A).

(i) A function $f_{<<s,et>, e>}$ is a generalized choice function (GCH(f)) if, for every P in its domain, f(P) is a member of P(w), for some w.

(ii) Domain of quantification for f:

$G = \{f: \forall P_{<s, et>}\ [f(P) \in P(\mathbf{w_0})]\ \}$

(iii) {p: $\exists f_{<<s,et>e>}$ [GCH(f) & f∈G & p = λw. Tobi believes in w (λw'. ∀x(author(x)(w') → read $(f([[book\ of\ his_1]]^{g^{x/1}}))$ (x) (w'))]}

However, we already saw some indication that the domain of choice functions is not always restricted as in (ii). If we go back to the basic choice function type <et,e> and allow for opaque N' restrictors, we can, in fact, derive the intended reading of (80) without the need of Heim's intensional "choice" functions: in (iv), $f([[book\ of\ his_1]]^{g^{x/1}}(w'))$ may yield different books for different worlds w' in Tobi's doxastic alternatives.

(iv) {p: $\exists f_{<et,e>}$ [CH(f) & p = λw. Tobi believes in w (λw'. ∀x(author(x)(w') → read $(f([[book\ of\ his_1]]^{g^{x/1}}\mathbf{(w')}))$ (x) (w'))]}

The data that I wil present is this subsection as a problem for Heim's definition will challenge this basic choice function approach as well.

Let us take the dialog in (83):

(83) Q: Which animal that may give him_1 rabies does Monica want every $friend_1$ of hers to play with?

A: The oldest dog in his_1 neighborhood --whatever that may be.

The dialog in (83) can be readily understood as describing Monica's desire that every friend of hers will play with the oldest dog of his neighborhood --whatever that dog may be-- together with Monica's unawareness that that animal may give him rabies. To account for this reading, we need an intensional choice function f such that f([[*animal that may give him_1 rabies*]]^g) is the individual concept "the oldest dog in g(1)'s neighborhood". The problem is that, under the definition of intensional choice function given above, there is no possible value of *f* that would yield such result. The closest individual concept that an intensional choice function would yield when applied to [[*animal that may give him_1 rabies*]]^g is "the animal that may give g(1) rabies that is the oldest dog in g(1)'s neighborhood". Hence, we cannot derive the (most plausible) reading of (83), where Monica simply has a *de dicto* desire about the oldest dog in everybody's neighborhood and the description *animal that may give him_1 rabies* is interpreted as transparent.

Another example presenting the same problem is given under (84). The dialog in (84) can be uttered in the following scenario: Martin is looking for the Dean of the University of Barcelona, whoever that may be. Martin does not know that such Dean is a civil servant depending on the Catalan Government (called "Generality") and not on the Spanish Goverment. In fact, Martin has no beliefs about the Dean's affiliation. He also has no beliefs about which person in particular is the actual Dean (e.g., he has not narrowed down the possibilities to any set of people). If the dialog (84) is uttered in this

scenario, the N' *Generality civil servant* is taken as a transparent description and the answer *The Dean of the University of Barcelona* is taken as *de dicto*:

(84)Q: Which Generality civil servant does Martin want to talk to?

A: The Dean of the University of Barcelona.

The problem is that, according to the definition in (81), there is no intensional choice function f such that f([[*Generality civil servant*]]) yields the individual concept "the Dean of the University of Barcelona". Let us see why. If we take the N' *Generality civil servant* to express the property λxλw.Gen-servant(x)(w), f([[*Generality civil servant*]]) may yield the individual concepts "the Generality civil servant that is the Dean of U.B.", "the Generality civil servant that is the Provost of U.B.", "the Generality civil servant that is the head of the Linguistics Department of U.B.", etc. It may not yield, though, the concepts "the Dean of the U.B.", "the Provost of U.B.", "the head of the Linguistics Department of U.B.", etc. But Martin's desire did not concern the individual concept "the Generality civil servant that is the Dean of U.B.", but the individual concept "the Dean of U.B.", since the Dean of the U.B. is not a Generality civil servant in some of Martin's doxastic alternatives, to begin with. The same problem arises if we take the N' *Generality civil servant* to express the (transparent) property λxλw.Gen-servant(x)(w_0). In this case, f(λxλw.Gen-servant(x)(w_0)) would yield the individual concept h such that, for every world w in the domain of h, h(w) is the unique individual that is the Dean of U.B. in w and that belongs to a certain set of people, namely the set of actual Generality civil servants. Still, this concept h would not make the dialog in (84) felicitous in the intended scenario, where Martin does not believe that the Dean must be one out of a particular set of people.

We need a more liberal notion of intensional choice function. I propose to return to the basic notion of choice function --where an object is selected out of a set-- and define intensional choice functions in a similar way: a basic intensional choice function selects an individual concept out of a set of individual concepts. The complete definition is given under (85):

(85) Basic intensional choice function definition:

A function $f \in D_{<<se,t>, <se>>}$ is a basic intensional choice function (BICH(f)) iff for all P in the domain of f: P(f(P))

Furthermore, I have to assume that (many) natural language predicates are ambiguous: they can express a property of individuals (<s, <e, t>>) or a property of individual concepts (<s, <se, t>>). Let us take the N' restrictor *Generality civil servant* to illustrate this point. In a world w that supports the dialog (84) --i.e., in a world w where the Dean of the University of Barcelona happens to be affiliated to the Catalan Government--, its two denotations may be, e.g., the following:

(86) [*Generality cicil servant*] is ambiguous:

a. $[[[\textit{Generality cicil servant}]_{<s, <e, t>>}]]^g (w) =$

{Ramona, Andres, Rosa, Ramon, Magdalena, ...}

b. $[[[\textit{Generality cicil servant}]_{<s, <se, t>>}]]^g (w) =$

{ the partial individual concept "the Dean of the U.B.",
the partial individual concept "the Generality civil servant that is the Dean of the U.B.",
the partial individual concept "the Provost of the U.B.",
the partial individual concept "the Generality civil servant that is the Provost of the U.B.",

the partial individual concept "the head of the Linguistics Dept. of U.B.",
the partial individual concept "the Generality civil servant that is the Head of the Linguistics Department of the U.B.",
... }

Certainly, the meaning of [*Generality civil servant*]$_{<s, <se, t>>}$ is related to the meaning of [*Generality civil servant*]$_{<s, <e, t>>}$. For example, (87) seems a reasonable way to constraint the meaning of [*Generality civil servant*]$_{<s, <se, t>>}$ (and the meaning of natural language expressions of type <s, <se,t>> in general):[38]

(87) For any $w \in D_s$ and any $\underline{x} \in D_{<se>}$,
if [[[*Generality civil servant*]$_{<s, <se, t>>}$]]$^g(w)(\underline{x}) = 1$, then
$\forall w'[w' \in Sim_w(\lambda w''.\exists y[\underline{x}(w'')=y]) \rightarrow [[[$*Generality civ. serv.* $]_{<s, <e, t>>}]]^g(w')(\underline{x}(w'))]$

Note that (87) does not imply that, for all the worlds w' where $\underline{x}$ is defined, the individual $\underline{x}$(w') is a Generality civil servant in w'. This is exactly what Heim's definition enforces and what we are trying to avoid. Instead, (87) says that, in all the w' **maximally similar to w** where $\underline{x}$(w') is defined, the individual $\underline{x}$(w') is a Generality civil servant in w'.[39]

With this new notion of choice function and the denotations in (86), we can go back to our examples of transparent intensional *which* phrases. Let us recall the dialog in (84) -

[38] More constraints are probably needed. See footnote 42 for some individual concepts that are not ruled out by (87) and need to be excluded.

[39] The new definition and architecture that I just presented for intensional choice functions does not affect the results that we achieved in subsection 4.2.3 with Heim's notion. If the reader has the patience to go back to the example (75), she will see that, crucially, we are still able to rule out the answer (75A') if we take the N' *relative of his*$_1$ as transparent (see section 4.4 for opaque N' restrictors): for any world w where cats are not relatives, a basic intensional choice function cannot select the individual concept "the cat of g(1)" out of [[*relative of his*$_1$ $_{<s, <se,t>>}$]]^g(w).

-repeated as (88)--, felicitously uttered in a world w where the Dean of the University of Barcelona is a Generality civil servant. Its semantic interpretation under the transparent reading of *Generality civil servant* is spelled out in (89a). Note that the basic intensional choice function takes a set of individual concepts as its argument. This set is the denotation of the transparent N' restrictor (of type <s,<se,t>>) in the utterance world w. Since, in the utterance world w, the Dean is affiliated to the Generality, the individual concept "the Dean of U.B." belongs to [[*Generality civil servant* $_{<s, <se,t>>}$]]^g(w). Hence, there exists a basic intensional choice function that selects the concept "the Dean of U.B." out of that set. Let us call this function f^{bi}_{dean}. The existence of this function makes the proposition in (89b) a member of the question denotation (89a) and, hence, derives the intensional answer (88A) without committing the speaker to the thought that Martin believes that the Dean of the University of Barcelona --whoever it may be-- is an employee of the Generality.

(88)Q: Which Generality civil servant does Martin want to talk to?
A: The Dean of the University of Barcelona.

(89) a.[[*Which Generality civil servant does Martin want to talk to*]]^g(w) =
{ p: $\exists f \in D_{<<se,t>, <se>>}$ [BICH(f) & p = λw'.Martin wants in w'
(λw". talk (f([[*Gen. civil servant* $_{<s, <se,t>>}$]]^g(**w**))(w")) (m) (w")] }
b. λw'.Martin wants in w'
(λw". talk (f^{bi}_{dean}([[*Gen. civil servant* $_{<s, <se,t>>}$]]^g(**w**))(w")) (m) (w"))

The same reasoning applies to the example (83).[40]

[40] In dealing with the examples (83) and (84), I have assumed that their answers were intensional, that is, that the output of the choice functions were individual concepts. I have not explored the possibility that their choice functions were extensional and selected kinds, namely the (single-token) kinds "oldest dog in g(1)'s neighborhood" and the kind "Dean of the University of Barcelona". This second approach, though, may

Before concluding this subsection, I would like to address the following question: can intensional choice functions derive purely extensional answers? Can they, for instance, account for the truth of the answer (90A) in the scenario (90c)?

(90) Q: Which student does Rosa want to meet?

A: Antonia.

c. Scenario: Rosa wants to meet Antonia. Rosa does not know that Antonia is a student.

Heim's definition of intensional choice function does not derive this reading. Like in the examples before, the closest reading we get is one concerning the individual concept "the student Antonia", but not the concept "the individual Antonia". With the new definition, instead, the denotation of [[*student* $_{<s, <se,t>>}$]] in the utterance world w contains the constant individual concept "the individual Antonia". This is enough to generate an answer like (90A) that will be true in the aforementioned scenario.

In sum, we have seen that we need intensional choice functions more often than usually thought. We also needed a new, more liberal definition of intensional choice function. Once this new definition has been adopted, purely extensional answers follow from it, too. In conclusion, the analysis of *which* phrases in terms of basic intensional choice functions that I have proposed can uniformly account for all the readings of *which*

prove problematic if we consider that singular definite descriptions can name only a limited class of recognized kinds, as the contrast between Carlson's (1977) examples (i) and (ii) (attributted to B. Partee) shows. Some of the kinds that the singular definite descriptions in the aforementioned answers would refer to are not standardly established kinds.

(i) The bottle has a narrow neck.

(ii) # The green bottle has a narrow neck.

phrases that we have seen. I, hence, propose that *which* phrases unambiguously range over basic intensional choice functions.

3.4.4 Opaque N' Restrictors and the Frequent Transparency Effect

The discussion in the subsections 4.2 and 4.3 has led us to a new architecture of choice functions for *which* phrases. In light of the new definition of basic intensional choice functions, I will examine now the frequent transparency effect of their N' restrictor.

Recall that we already saw some indication in subsection 3.2 that the N' restrictor of a *which* phrase can sometimes be opaque. First, we saw that Subjunctive mood in Spanish and Catalan Relative Clauses indicates that the Relative Clause at issue is taken as opaque with respect to some intensional operator. Then, we saw that *which* phrases can contain a Subjunctive Relative Clause to the same effect. I repeat the first relevant example in (91), which gives what is descriptively called "extensional" answer. The dialog in (91) does not imply that Peter's cousin Paco is about to get married in the utterance world; it simply implies that, in all possible worlds where Paco is about to get married, where he doesn't call Peter to tell him and where everything else is maximally similar to the utterance world, Peter would get upset. This contrast with the Indicative version given in (92), which does imply that Paco is about to get married in the actual world.

(91)Q: [Quien se enfadaria si que familiar suyo que estuviera (**Sub**) a punto de casarse]

Who would-be-upset if which relative of-his that was-**Sub** about to-get-married

no le llamara para decirselo?

not him/her called to tell-him/her

"Who would be upset if which relative of his that was-**Sub** about to get married didn't call him to tell him?"

A: Pedro se enfadaria si su primo Paco estuviera a punto de casarse y no le llamara para decirselo.
"Peter would be upset if his cousin Paco was about to get married and didn't call him to tell him."

(92)Q: [Quien se enfadaria si que familiar suyo que esta (**Ind**) a punto de casarse] no le llamara para decirselo?
"Who would be upset if which relative of his that is-**Ind** about to get married] didn't call him to tell him?"
A: Pedro se enfadaria si su primo Paco no le llamara para decirselo / decirle que esta a punto de casarse.
"Peter would be upset if his cousin Paco didn't call him to tell him / to tell him that he is about to get married."

The Subjunctive *vs*. Indicative distinction contributes the same contrast in examples with purely intensional answers. Let us compare (93) and (94). Neither example guarantees that there exists an individual that meets the description given in the answer in the actual world; both dialogs are compatible with a world where no such animals exist but Susana thinks they do (or that they might exist). However, the two examples differ in one respect: in the Subjunctive example, the property described by the Relative Clause has to hold of that animal in the doxastic/bouletic alternatives of Susana where such an animal exists (hence, answers of the form "the one (=animal that may give him rabies) that..." are the best); in the Indicative case, instead, that property has to hold of that animal (if it exists) in the actual world, and not necessarily in Susana's belief worlds. That is, the Subjunctive dialog in (93) necessarily portrays Susana as wishing John some harm, whereas (94) may be understood as describring Susana's *de dicto* desire about the oldest dog in John's neighborhood and her unawareness that that animal may be harmful.

(93) Q: [Con que animal que pueda (**Sub**) contagiarle la rabia] quiere Susana
With what animal that may-**Sub** give-him rabies wants Susana
que Juan juegue?
that Juan plays (Sub)
"With what animal that may-**Sub** give him rabies does Susana want Juan to play?"
A: Con el que tenga los colmillos mas afilados --sea el que sea.
With the-one that has-Sub the teeth sharpest -- be whatever may-be.
With the one with sharpest teeth --whatever that may be.

(94) Q: [Con que animal que puede (**Ind**) contagiarle la rabia] quiere Susana que Juan juegue?
"With what animal that may-**Ind** give him rabies does Susana want Juan to play?"
A: Con el perro mas viejo de su vecindario --sea el que sea.
With the dog oldest of his neighborhood -- be whatever may-be.
With the oldest dog in his neighborhood --whatever that may be.

We have seen that, in the Subjunctive examples, the property described by the Relative Clause does not need to hold of an individual in the actual world, but it holds of an individual in some other worlds under consideration. This is exactly the effect that Subjunctive has in Relative Clauses embedded in non-*wh* phrases, an effect that is explained in terms opacity, as we saw in section 3.2. Hence, I take Subjunctive mood in the above *which* phrases as a marker of opacity, too. The semantic interpretations that I propose for the questions in (91)-(94) are spelled out under (91'a)-(94'a); the basic intensional choice function that gives rise to each answer is described (in the relevant aspects) in (91'b)-(94'b):

(91') "Who$_1$ would be upset if which relative of his$_1$ that was-**Sub** about to get married didn't call him$_1$ to tell him$_1$?"

a. [[(91Q)]](w) =

{p: ∃g,f [BICH(g) & BICH(f) & p = λw'.∀w" [f([[*r-his$_1$-marry*$_{<s<se,t>>}$]]^g(**w"**)) (w") is defined & ¬call (g([[person]](w))(w")) (f([[*r-his$_1$-marry*$_{<s<se,t>>}$]]^g(**w"**)) (w")) (w") & w" is otherwise maximally similar to w' → upset (g([[*person*]](w))(w)) (w")]] }

b.For all the w" under consideration for which the antecedent of the conditional holds:

f ([[*r-his$_1$-marry*$_{<s<se,t>>}$]]^g(**w"**)) =

the partial individual concept "the relative of g(1) about to get married that is g(1)'s cousin Paco", or, rather,

the partial individual concept "g(1)'s cousin Paco".[41]

(92') "Who$_1$ would be upset if which relative of his$_1$ that is-**Ind** about to get married] didn't call him$_1$ to tell him$_1$?"

a. [[(92Q)]](w) =

{p: ∃g,f [BICH(g) & BICH(f) & p = λw'.∀w" [f([[*r-his$_1$-marry*$_{<s<se,t>>}$]]^g(**w**)) (w") is defined & ¬call (g([[person]](w))(w")) (f([[*r-his$_1$-marry*$_{<s<se,t>>}$]]^g(**w**)) (w")) (w") & w" is otherwise maximally similar to w' → upset (g([[*person*]](w))(w)) (w")]] }

[41] For the individual concept "g(1)'s cousin Paco" to be chosen out of [[*r-his$_1$-marry*$_{<s<se,t>>}$]]^g(**w"**), Paco has to be g(1)'s cousin in w" and, crucially, he has to be about to get married in w". Since this individual concept turns out to be chosen out of that set in all the w" under consideration that are maximally similar to w', we are left with two options: either Paco is about to get married in w', to begin with, or we contextually restrict the domain of worlds under consideration to the set of worlds minimally different from w' where Paco is about to get married. This last possibility would derive the intended reading of (91). The same reasoning holds for the individual concept "the relative of g(1) about to get married that is g(1)"s cousin Paco" (see footnote 42).

b. f ([[*r-his$_1$-marry*$_{<s<se,t>>}$]]^g(**w**)) =

the partial individual concept "g(1)'s cousin Paco".[42]

(93') "With what animal that may-**Sub** give him rabies does Susana want Juan to play?"

a. [[(93Q)]](w) =

{p: ∃f [BICH(f) & p = λw'.Susana wants in w' (λw". play-with (f([[*animal-rab*$_{<s<se,t>>}$]]^g(**w"**))(w")) (j) (w"))] }

b. For all the w" under consideration for which the proposition (λw". ...) holds:

f ([[*animal-rab*$_{<s<se,t>>}$]]^g(**w"**)) =

the partial individual concept "the animal with sharpest teeth that may him rabies".

(94') "With what animal that may-**Ind** give him rabies] does Susana want Juan to play?"

a. [[(94Q)]](w) =

{p: ∃f [BICH(f) & p = λw'.Susana wants in w' (λw". play-with (f([[*animal-rab*$_{<s<se,t>>}$]]^g(**w**))(w")) (j) (w"))] }

b. f ([[*animal-rab*$_{<s<se,t>>}$]]^g(**w**)) =

the partial individual concept "the oldest dog in Juan's neighborhood".

[42] I need to guarantee that, if Paco exist in w and is not about to get married in a world w, the partial individual concept in (i) cannot be selected out of [[*r-his$_1$-marry*$_{<s,<se,t>>}$]]^g(w) by any choice function. Otherwise, the denotation of the Indicative question would contain propositions that amount to the opaque reading; that is, (91Q) could be answered with a sentence expressing the proposition in (ii), contrary to the facts.

(i) the partial individual concept "the relative of g(1) about to get married that is g(1)'s cousin Paco".

(ii) "that Pedro would be upset if there existed an individual that was his cousin Paco and was about to get married and that individual did not call him to tell him".

I think that this problem stems from a bigger problem, namely, the problem of how to constraint the set of individual concepts that a given expression of type <s,<se,t>> denotes in a given world. In (86) in section 4.3, I gave some examples of individual concepts that seemed natural and would work. Now, we have an example of an individual concept that should be excluded: for any world w where g(1)'s cousin Paco is not about to get married, (i) does not belong to [[*r-his$_1$-marry*$_{<s,<se,t>>}$]]^g(w). I have no explanation for this discrimination. It may be related to the more general problem of possible and impossible meanings for natural language expressions (see Goodman 1983).

Now that we have seen that opaque N' restrictors are an option for *which* phrases, I will get back to their frequent transparency effect. The (now falsified) generalization that *which* phrases take only transparent restrictors stems from examples like (95Q)-(96Q), which, when evaluated in the actual world, accept the A-answers but not the A'-answers:

(95) Q: Who will be offended if we invite which philosopher? (Reinhart 1993:(4))
A: Patricia will be offended if we invite Wittgenstein.
A': # Patricia will be offended if we invite Audrey Hepburn.

(96) Q: Who wants to marry which millionaire? (Reinhart 1997:(97))
A: Ariadna wants to marry Rockefeller.
A': # Ariadna wants to marry Gandhi.

I propose, contrary to Reinhart (1993:§2.3; 1997:393-4), that nothing in the syntax or semantics of these examples excludes the possibility of interpreting their *which* phrase restrictors as opaque. Note that the previous examples (91) and (93)) had the same type of intensional context (conditional and attitude contexts, respectively) and did allow for opaque restrictors. I suggest that, though opacity is certainly an option in all cases, several factors may hinder its detection and the final effect may be indistinguishable from the transparent reading of the N' restrictor.

I will briefly discuss some of these factors to conclude this subsection.

The first circumstance that plays a role is the fact that, in attitude contexts, global presupposition accommodation is the preferred option (Heim 1992:206ff, Sharvit 1998; see Cresti (1997) and Rullmann-Beck (1997) for different presuppositional accounts of

which phrases). For instance, when the sentence (97) is uttered and we want to update our background context with it, we tend to assume --unless we have a reason to think otherwise--, that there exists a king of Spain in the actual world, not just in Jordi's doxastic alternatives. As Rullmann-Beck (1997) suggest, the same happens in questions. Let us take, for example, the dialog in (98): no matter whether the N' restrictor in the *which* phrase is opaque (as represented in (98c)) or transparent, if we do not have any reason to think that the utterer of the question mistrusts Jordi's beliefs, we tend to accommodate globally and consider that she is asking for an individual concept whose value is defined for all the worlds of the common ground.

(97) Jordi wants to see the King of Spain.

(98) Q: Which king does Jordi want to see?
A: The king of Spain.
c. [[98Q]](w) =
{p: ∃f [BICH(f) & p = λw'. Jordi wants in w' (λw". see (f ([[*king*]](**w"**)) (w")) (j)(w"))] }
d. For all of Jordi's bouletic alternatives w":
f ([[$king_{<s<se,t>>}$]](**w"**)) = the partial individual concept "the individual that is the king of Spain".

Even when we do not accommodate globally, it is often the case that we cannot tell whether we are choosing a concept out of a transparent N' restrictor or out of an opaque one. In (99), for instance, we do not take the preferred option of global accommodation, provided that our common ground contains the information that unicorns do not exist. Still, we cannot tell whether we are choosing the partial individual concept "the unicorn

that has the longest horn" out of the actual world denotation of *unicorn*$_{<s<se,t>>}$ --as in (99c-d)--, or out of its denotation in John's doxastic alternatives --as in (99e-f).

(99) Q: Which unicorn does John want to catch? (Q from Rullmann-Beck 1997:(42))

A: The unicorn with the longest horn --whichever that may be.

c. [[99Q]](w) =
{p: ∃f [BICH(f) & p = λw'. John wants in w' (λw". catch (f ([[*unicorn*]](**w**)) (w")) (j)(w"))] }

d. f ([[*unicorn*$_{<s<se,t>>}$]](**w**)) = the partial individual concept "the unicorn that has the longest horn".

e. [[99Q]](w) =
{p: ∃f [BICH(f) & p = λw'. John wants in w' (λw". catch (f ([[*unicorn*]](**w"**)) (w")) (j)(w"))] }

f. For all of John's doxastic alternatives w":
f ([[*unicorn*$_{<s<se,t>>}$]](**w"**)) = the partial individual concept "the unicorn that has the longest horn".

The same situation arises whenever the intensional answer can be derived with Heim's definition of intensional "choice" function in (81), that is, whenever the individual concept chosen out of $P_{<s<se,t>>}$ has the corresponding property $P_{<s<e,t>>}$ in all the worlds for which its value is defined. That is true of (93), too, repeated as (100): if we did not have Subjunctive mood marking opacity, we could not decide whether the individual concept "the dog with the sharpest teeth that may give him rabies" has been selected out of [[*animal que pued-Ind/Sub contagiarle la rabia*]]^{g}(**w**) (w being the actual world) or out of [[*animal que pued-Ind/Sub contagiarle la rabia*]]^{g}(**w"**) (w" being any world in Susana bouletic alternatives).

(100) Q: [Con que animal que pueda (**Sub**) contagiarle la rabia] quiere Susana
With what animal that may-**Sub** give-him rabies wants Susana
que Juan juegue?
that Juan plays (Sub)
"With what animal that may-**Sub** give him rabies does Susana want Juan to play?"
A: Con el que tenga los colmillos mas afilados --sea el que sea.
With the-one that has-Sub the teeth sharpest -- be whatever may-be.
With the one with sharpest teeth --whatever that may be.

Since Heim's kind of intensional answer is the most common one, it is hard to find examples of intensional answers that, independently of the mood indicator, could only be derived if the N' restrictor of the *which* phrase is opaque. These examples are complex and rare, but not impossible. Here there is one, compatible with the scenario described in (101):

(101) Scenario: Susana has turned down all her many boyfriends. Patricia, who does not like Susana very much, would be amused if, suddenly, Susana decided to marry whoever her richest ex-boyfriend may be and that ex-boybriend turned out to be about to marry somebody else, unbeknownst to Susana.

(102) Q: Quien se divertiria si, de repente, Susana quisiera casarse con que
Who would-be-amused if suddenly Susana wanted to-get-married with which
ex-pretendiente suyo que estuviera (**Sub**) a punto de casarse con otra?
ex-boyfriend of-hers that was-**Sub** about-to get-married with other
"Who would be amused if, suddenly, Susana wanted to marry which ex-boyfriend of hers that was (**Sub**) about to get married with somebody else?"

A: Patricia se divertiria si Susana quisiera casarse con su ex-pretendiente mas rico y su ex-pretendiente mas rico estuviera a punto de casarse con otra.
"Patricia would be amused if Susan wanted to marry the richest ex-boyfriend of hers and the richest ex-boyfriend of hers was about to marry someone else."

c. [[(102Q)]](w) =
{p: ∃g,f [BICH(g) & BICH(f) & p = λw'.∀w" [Susana wants in w" (λw'". marry (f([[*exb-to-marry*$_{<s<se,t>>}$]]^{g}(**w"**))(**w"'**)) (s) (w'")) & w" is otherwise maximally similar to w' → amused (g([[*person*]](w))(w)) (w")]] }

b. For all the w" under consideration for which the antecedent of the conditional holds:[43]
f ([[*exb-to-marry*$_{<s<se,t>>}$]]^{g}(**w"**)) =
the partial individual concept "the richest ex-boyfriend of Susana's".

According to the scenario in (101), we are considering worlds w" where Susana has a *de dicto* desire about the richest ex-boyfriend of hers (whoever that may be), and not about the richest ex-boyfriend of hers that is about to marry somebody else. In order to derive this reading, we need to be able to select the individual concept "the richest ex-boyfriend of Susana" out of the extension of the N' restrictor [*ex-pretendiente suyo que est-Ind/Sub a punto de casarse con otra*]$_{<s<se,t>>}$ (= "ex-boyfriend of hers that is about to marry somebody else") in some set of worlds. This set of worlds cannot be set of worlds of the common ground, since, under the intended reading, it is not part of the assumptions shared by the speakers that the richest ex-boyfriend of Susana is indeed about to get married. What we need, instead, is the extension of the N' restrictor in the worlds that the conditional context quantifies over. That is, we need to take the N' restrictor as opaque, as spelled out in (102c).

[43] The worlds w" under consideration are contextually restricted to the worlds where the richest ex-boyfriend of Susana is about to get married with somebody else. See footnote 41 on this issue.

Finally, it seems that some individual concepts are selected out of opaque N' restrictors more successfully than others. Compare (91) with (95), repeated below:

(103)Q: [Quien se enfadaria si que familiar suyo que estuviera (**Sub**) a punto de casarse] no le llamara para decirselo?
Who would-be-upset if which relative of-his that was-**Sub** about to-get-married not him/her called to tell-him/her
"Who would be upset if which relative of his that was-**Sub** about to get married didn't call him to tell him?"
A: Pedro se enfadaria si su primo Paco estuviera a punto de casarse y no le llamara para decirselo.
"Peter would be upset if his cousin Paco was about to get married and didn't call him to tell him."

(104) Q: Who will be offended if we invite which philosopher?
A: Patricia will be offended if we invite Wittgenstein.
A': # Patricia will be offended if we invite Audrey Hepburn.
A": # Patricia will be offended if we invite Audrey Hepburn and Audrey Hepburn is a philosopher.

In (103), it is possible to select the individual concept "g(1)'s cousin Paco" (or "the relative of g(1) about to get married that is g(1)'s cousin Paco") out of the extension of the N' in the conditional worlds. The reading we get for the dialog is, then, compatible with a world where Paco is not about to get married; the dialog as a whole simply asserts that, in all the worlds similar to the actual one where Paco is about to get married and does not call Peter, Peter is upset. The example (104), instead, does not have a parallel reading:

neither (104A') or (104A'') are felicitous answers. I think that the difference between the two examples lies purely in pragmatic factors. Among the worlds maximally similar to the actual one where there are relatives of g(1) about to get married, it is plausible to include worlds where g(1)'s cousin Paco is about to get married; among the worlds maximally similar to the actual one where there are philosophers (possibly different from the actual philosophers), it is less plausible to include worlds where Audrey Hepburn is a philosopher if nothing in the previous discourse hinted at that possibility.

The conclusions of this subsection 4.4 are the following: **(i)** *which* phrases can take opaque N' restrictors, and **(ii)** several factors hinder the detection of opaque N' restrictors: global accommodation, the equivalence between some transparent and opaque interpretations, and pragmatic factors determining the range of possible worlds quantified over in conditionals prevent opaque N' restrictors from being more noticeable.

To summarize and conclude section 4, I have pursued the choice function base position approach to *which* phrases. Choice functions allow us to interpret the N' restrictor of a *which* phrase in base position, --within the scope of embedded operators if necessary-- without falling into the problem of weak truth conditions. However, I argued that the current choice function account of *which* phrases cannot account for a certain array of data, namely, data involving local presupposition accommodation, transparent *which* phrases eliciting intensional answers and opaque N' restrictors. I developed an alternative implementation of the choice function line using basic intensional choice functions.

In the next section, I will show that the proposed analysis also derives the correlation between opacity and Principle C straightforwardly.

3.5 Back to Principle C

Under the base position - Syntactic Reconstruction line, a *which* phrase (or its N' restrictor) with rescontructed scope under an given operator is within the c-command domain of that operator at LF. As we saw in section 3, this approach to scope reconstruction makes the following correct prediction: *which* phrases containing bound variable pronouns or opaque N' restrictors yield different Principle C violations than *which* phrases containing no bound variable at all. In this section, I will illustrate how this prediction is derived in the particular implementation of the choice function base position line that I proposed.

As Fox (1997:§2.2) shows, the SynR approach derives the correlation between pronoun variable binding and Principle C. The relevant data are repeated under (105) and (106). (105a)-(106a) are the corresponding LF representations under the proposed analysis with basic intensional choice functions. In (105a), the *which* phrase reconstructs into the scope of *every student*, but not any lower; no Principle C violation arises since *her* does not c-command *the teacher*. In (106a), the *which* phrase also reconstructs under the Quantificational NP; this time, this move brings the R-expression *the teacher* under the c-command domain of the coindexed pronoun *she*, resulting in a Principle C violation.

(105) √ [Which of the papers that he_1 gave the $teacher_2$] did every $student_1$ ask her_2 to read carefully? (Fox 1997: (37a))

a. $[_{CP}\ Q_4\ [_{IP}$ every $student_1\ [_{IP}\ [_{WhP}\ f_{4,<<se,t><se>>}\ [_{NP,<s,<se,t>>}$ paper that he_1 gave **the $teacher_2$**$]\ ]_{3,<se>}\ [_{VP}$ ask **her_2** to read $t_{3,<se>}$ carefully $]\ ]\ ]\ ]$

(106) * [Which of the papers that he_1 gave the $teacher_2$] did she_2 ask every $student_1$ to revise? (Fox 1997: (37b))

a. [$_{CP}$ Q_4 [$_{IP}$ **she$_2$** [$_{IP}$ every student$_1$ [$_{IP}$ [$_{WhP}$ $f_{4,<<se,t><se>>}$ [$_{NP,<s,<se,t>>}$ paper that he$_1$ gave the **teacher$_2$**]]$_{3,<se>}$ [$_{VP}$ asked t_1 PRO to revise $t_{3,<se>}$]]]]

Let us now recall the data showing the correlation between opacity and Principle C: in (107a), the Relative Clause is transparent (since its verb is in the Indicative mood) and there is no Principle C violation; in (107b), instead, the verb is in Subjunctive, the whole Relative Clause is opaque and the sentence is ungrammatical.

(107) Correlation between opacity and Principle C:

a. √ [Con que hombre que Eva$_1$ conocio (**Ind**) en los suburbios] quiere pro$_1$ tener
With which man that Eva$_1$ met-Ind in the suburbs wants she$_1$ to-have
una cita?
a date
[With which man that Eva$_1$ met for the first time in the suburbs] does she$_1$ want to have a date?

b. * [Con que hombre que Eva$_1$ haya (**Sub**) conocido en los suburbios] quiere pro$_1$
With which man that Eva$_1$ has-Sub met in the suburbs wants she$_1$
tener una cita?
to-have a date
[With which man that Eva$_1$ met for the first time in the suburbs] does she$_1$ want to have a date?

The corresponding LF representations (done with English words to help the reader) are spelled out under (108a)-(109a). In (108a), the *which* phrase does not need to reconstruct at all, since it does not contain any bound pronoun and its N' restrictor is evaluated with respect to the actual world. No Principle C violation arises. In (109a), there is no bound

pronoun either, but the N' restrictor is evaluated with respect to Eva's desire worlds. Hence, the *which* phrase has to reconstruct under the scope of the attitude verb *want*. This brings the whole *which* phrase into the c-command domain of the subject *she*, inducing a Principle C violation.

(108) √ [With which man that Eva$_1$ met-Ind for the first time in the suburbs] does she$_1$ want to have a date?

a. [$_{CP}$ Q_4 [$_{IP}$ [$_{WhP}$ $f_{4,<<se,t><se>>}$ [$_{NP,<s,<se,t>>}$ man that **Eva$_1$** met-Ind for the first time in the suburbs]]$_{3,<se>}$ [$_{IP}$ **she$_1$** wants to have a date with $t_{3,<se>}$]]]

(109) * [With which man that Eva$_1$ met-Sub for the first time in the suburbs] does she$_1$ want to have a date?

a. [$_{CP}$ Q_4 [$_{IP}$ **she$_1$** wants [$_{CP}$ [$_{WhP}$ $f_{4,<<se,t><se>>}$ [$_{NP,<s,<se,t>>}$ man that **Eva$_1$** met-Ind for the first time in the suburbs]]$_{3,<se>}$ [$_{IP}$ to have a date with $t_{3,<se>}$]]]]

Note that, in all these LF representations, the trace of movement is of type <se> and not of type e. It does not really matter for these examples whether the individual concept denoted by the moved constituent takes its world argument at the reconstruction site -- then, the trace is of type e-- or at a lower site --then, the trace is of type <se>. But there are examples where we do need to use a trace of type <se>. Recall that we had examples of transparent *which* phrases eliciting intensional answers. I give one more under (111), containing a name within the transparent N' restrictor:

(110) Scenario: Eva, a four year old child, wants me to bring her the oldest Guinea pig, the oldest parrot and the oldest snake in the neighborhood, whichever those may be. The interlocutors of dialog (111) have reasons to believe that Eva may be allergic to furry animals. Eva has no belief about potential allergies of hers.

(111) Q: Que animal que puede (**Ind**) producirle una reaccion alergica a Eva_1 quiere pro_1

Which animal that may-**Ind** cause a reaction allergic to Eva wants (she)

que le traigas?

that to-her bring-2sg

"Which animal that may-**Ind** cause her an allergic reaction does Eva want you to bring her?"

A: La cobaya mas vieja del vecindario.

"The oldest Guinnea pig in the neighborhood."

The crucial observation is that the sentence does not have a Principle C violation. This means that the transparent *which* phrase is not under the scope of *want*. But, then, we need a trace of individual concept type <se> under the scope of *want*, since Eva does not have a *de re* desire about a particular Guinea pig; she has the *de dicto* desire that I will bring her the oldest Guinea pig in the neighborhood, whichever that may be.

3.6 Conclusions

I started this chapter recalling some *prima facie* contradictory characteristics of *which* phrases. On the one hand, *which* phrases seem to be located in base position at LF -- possibly within the scope of operators embedded within the question--, since there is a correlation between their Reconstructed Scope and their Principle C violations. On the other hand, *which* phrases are not asserted of any object in the question nucleus (i.e., in base position).

To account for this paradoxical situation, I pursued, following Reinhart (1993), the choice function implementation of the base position line. However, I argued that the current choice function approach in the literature does not have the adequate empirical

coverage. It does not account for local presuppositions projections cases, for transparent *which* phrases eliciting intensional answers and for opaque N' restrictors in Spanish/Catalan. I developed an alternative account that covers these data. Its crucial feature is that *which* phrases introduce a function variable ranging over basic intensional choice functions, as defined in (112):

(112) Basic intensional choice function definition:

A function $f \in D_{<<se,t>, <se>>}$ is a basic intensional choice function (BICH(f)) iff for all P in the domain of f: P(f(P))

Using this definition, the local presupposition accommodation cases follow from the fact that the choice function yields individual concepts, which may be partial; we can, then, locally accommodate that the value of the resulting individual concept is defined for a given world. The examples of transparent *which* phrases eliciting intensional answers are also accounted for thanks to the higher semantic type of these functions: we select an individual concept out of the extension of a property of individual concepts in the actual world. As for opaque N' restrictors of *which* phrases, the proposed account correctly predicts that they are possible. I mentioned, however, several factors that may hinder their detection. This explains the frequent transparency effect of *which* phrases as a tendency, instead of as a rule.

BIBLIOGRAPHY

Abusch, D. (1994). 'The Scope of Indefinites.' *Natural Language Semantics* **2**: 83-135.

Bach, E. and B. Partee (1980). "Anaphora and Semantic Structure." in J. Freiman and A. Ojeda (eds.) *Papers from the Parasession on Pronouns and Anaphora*. Chicago Linguistic Society, University of Chicago, Chicago.

Baker, C. L. (1970). "Notes on the Description of English Questions. The Role of an Abstract Question Morpheme." In *Foundations of Language.*

Barss, A. (1986). *Chains and Anaphoric Dependence.* Ph.D. Dissertation, MIT, Cambridge, MA.

Bäuerle, R. (1983). "Pragmatisch-semantische Aspekte der NP-Interpretation." In M. Faust, R. Harweg, W. Lehfeld, and G. Wienold (eds.) *Allgemeine Sprachwissenschaft, Sprachtypologie und Textlinguistik. Festschrift für Peter Hartmann*. Narr, Tübingen: 121-131.

Beaver, D. (1995). *Presupposition and Assertion in Dynamic Semantics*. Ph.D. Dissertation, University of Edinburgh.

Beck, S. (1996). *Wh-constructions and Transparent Logical Form*. Ph.D. Dissertation, Eberhard-Karls-Universität Tübingen.

Beck, S. and H. Rullmann (1996). "Degree Questions, Maximal Informativeness and Exhaustivity." In *Proceedings of the Tenth Amsterdam Colloquium.*

Beil, F. (1997). "Antecedent Contained Deletion vs. Transitive Verb Phrase Ellipsis." In F. Corblin, D. Godard, and J.-M. Marandin (eds.) *Empirical Issues in Formal Syntax and Semantics.* Peter Lang, Bern: 151-170.

Berman, S. (1991). *On the Semantics and Logical Form of Wh-Clauses.* Ph.D. Dissertation, University of Massachusetts at Amherst. Distributed by the GLSA, Department of Linguistics, University of Massachusetts at Amherst.

Carlson, G. (1977). *Reference to Kinds in English*. Ph.D. Dissertation, University of Massachusetts at Amherst. Published 1980 by Garland, New York.

Chierchia, G. (1989). "Anaphora and Attitudes *de se*." In R. Bartsch, J. van Bethem, and P. van Emde Boas (eds.) *Semantics and Contextual Expression*. Foris, Dordrecht.

Chierchia, G. (1993). "Questions with Quantifiers." *Natural Language Semantics* **1**: 181-234.

Chierchia, G. (1995). *Dynamics of Meaning. Anaphora, Presupposition and the Theory of Grammar*. The University of Chicago Press, Chicago, London.

Chomsky, N. (1981). *Lectures on Government and Binding.* Foris, Dordrecht.

Chomsky, N. (1986a). *Knowledge of Language, ist Nature, Origin, and Use.* Praeger, New York.

Chomsky, N. (1986b). *Barriers*. MIT Press, Cambridge, MA.

Chomsky, N. (1993). "A Minimalist Program for Linguistic Theory." In K. Hale and S. Keyser (eds.) *The view from Building 20: Essays in Linguistics in Honor of Sylvain Bromberger*. MIT Press, Cambridge, MA.

Chomsky, N. (1995). *The Minimalist Program*. MIT Press, Cambridge, MA.

Chung, L., W. Ladusaw, and J. McCloskey (1995). "Sluicing and Logical Form." *Natural Language Semantics* **3**: 1-44.

Cinque, G. (1990). *Types of A'-Dependencies*. MIT. Press, Cambridge, MA.

Comorovski, I. (1988). "Discourse Linking and the *wh*-island Constraint." In *Proceedings of NELS 19*. GLSA, Department of Linguistics, University of Massachusetts at Amherst.

Condoravdi, C. and J. M. Gawron (1996). "The Context-dependency of Implicit Arguments". In M. Kanazawa, C. J. Pinon, and H. de Swart (eds.) *Quantifiers, Deduction and Context*. Stanford (Ca.): CSLI.

Corblin, F. 1995. "Cases and Relativization in Discourse." Ms. U.H.B. Rennes 2 and URA 1028 CNRS.

Cresswell, M. and A. von Stechow (1982). "*De re* Belief Generalized." *Linguistics and Philosophy* **5**: 503-535.

Cresti, D. (1995). "Extraction and Reconstruction.“ *Natural Language Semantics* **3**: 79-122.

Cresti. D. (1995). *Indefinite Topics*. Ph.D. Dissertation, MIT, Cambridge, MA.

Cresti, D. (1997). "Some Considerations on *wh*-decomposition and Unselective Binding." In *Proceedings of the Tübingen Reconstruction Workshop*. Eberhard-Karls-Universität Tübingen.

Dahl, Ö. (1973). "On so-called 'Sloppy Identity'." *Synthese* **26**: 81-112.

Dowty, D. (1981). "Quantification and the Lexicon: A Reply to Fodor and Fodor." In M. Moortgat, H. van der Hulst and T. Hoekstra (eds.), *The Scope of Lexical Rules*. Foris, Dordrecht: 79-106.

Enç, M. (1986). "Towards a Referential Analysis of Temporal Expressions." *Linguistics and Philosophy* **9**: 405-426.

Engdahl, E. (1980). *The Syntax and Semantics of Questions in Swedish*. Ph.D. Dissertation, University of Massachusetts at Amherst. Distributed by the GLSA, Department of Linguistics, University of Massachusetts at Amherst.

Engdahl, E. (1986). *Constituent Questions*. Kluwer, Dordrecht.

Evans, G. 1980. "Pronouns." *Linguistic Inquiry* **11**: 337-62.

Farkas, D. (1982). *Intensionality and Romance Subjunctive Relatives*." IULC, Bloomington.

Farkas, D. (1993). 'Modal Anchoring and NP Scope.' Manuscript UCSC.

Farkas, D. (1997). "Evaluation Indices and Scope." In A. Szabolcsi (ed.) *Ways of scope taking*. Kluwer, Dordrecht.

Fiengo, R. and R. May (1994). *Indices and Identity*. MIT Press, Cambridge, MA.

Fillmore, C. J. (1986). "Pragmatically Controlled Zero Anaphora." In *Proceedings of the 14th Meeting of the Berkeley Linguistic Society*. Berkeley Linguistic Society, Berkeley, California: 35-55.

von Fintel, K. (1994). *Restrictions on Quantifier Domains*. Ph.D. Dissertation, University of Massachusetts at Amherst. Distributed by the GLSA, Department of Linguistics, University of Massachusetts at Amherst.

Fodor, J. A., and J. D. Fodor (1980). "Functional Structure, Quantifiers, and Meaning Postulates." *Linguistic Inquiry* **11**: 759-770.

Fodor, J. D. (1979). *The Linguistic Description of Opaque Contexts.* (1970 Ph.D. Dissertation.) Garland New York.

Fodor, J. D. and I. Sag (1982). 'Referential and Quantificational Indefinites.' *Linguistics and Philosophy* **5**: 355-398.

Fox, D. (1994). "Economy, Scope and Semantic Interpretation -- Evidence from VP Ellipsis". In *Proceedings of NELS 25*. GLSA, Department of Linguistics, University of Massachusetts at Amherst.

Fox, D. (1995a). "Condition C Effects in ACD." In *Papers on Minimalist Syntax, MIT Working Papers in Linguistics* **27**: 105-119.

Fox, D. (1995b). "Economy and Scope." *Natural Language Semantics*.

Fox, D. (1997). "Reconstruction, Binding Theory and the Interpretation of Chains." Manuscript, MIT, Cambridge, MA.

Frampton, J. (1991). "Relativized Minimality: A Review." *The Linguistic Review* **8**: 1-46.

Frazier, L. and C. Clifton (1995). "Comprehension of Sluiced Sentences." Manuscript, University of Massachusetts at Amherst.

Gamut, L. T. F. (1991). *Logic, Language, and Meaning (Vol. I and II)*. The University of Chicago Press, Chicago.

Ginzburg, J. (1992). *Questions, Queries and Facts: A Semantics and Pragmatics for Interrogatives.* Ph.D. Dissertation, Stanford University.

Goodman, N. (1983). *Fact, Fiction and Forecast.* Harvard University Press, Cambridge, MA.

Groenendijk, J. and M. Stockhof. (1984). *Studies on the Semantics of Questions and the Pragmatics of Answers*. Dissertation, University of Amsterdam.

Haji•ová, E. (1983). "On some Aspects of Presuppositions and Questions. In F. Kiefer (ed.) *Questions and Answers*. Reidel Publishing Company: 85-96.

Hamblin, C. L. (1973). "Questions in Montague English." *Foundations of Language* **10**: 41-53.

Hankamer, J. (1971). *Constraints on Deletion in Syntax.* Ph.D. Dissertation, Yale University.

Hardt, D. (1993). *Verb Phrase Ellipsis: Form, Meaning and Processing.* Ph.D. Dissertation, University of Pennsylvania.

Heim, I. (1982). *The Semantics of Definite and Indefinite Noun Phrases*. Ph.D. Dissertation, University of Massachusetts at Amherst. Distributed by the GLSA, Department of Linguistics, University of Massachusetts at Amherst.

Heim, I. (1983). "On the Projection Problem for Presuppositions." In D. Flickinger et al. (eds.) *Proceedings of the Second West Coast Coference on Formal Linguistics.* Stanford University Press, Stanford, CA: 114-125.

Heim, I. (1992). "Presupposition Projection and the Semantics of Attitude Verbs." *Journal of Semantics* **9**.

Heim, I. (1994a). "Interrogative Semantics and Karttunen's Semantics for *know*." In A. Mittwoch et al. (eds.) *Proceedings of the Israeli Association for Theoretical Linguistics.* Jerusalem.

Heim, I. (1994b). "Lecture Notes on Questions." University of Massachusetts, Amherst.

Heim, I. and A. Kratzer (1998). *Introduction to Semantics*. Blackwell, Oxford, Cambridge.

Heim, I., H. Lasnik and R. May (1991). "Reciprocity and Plurality." *Linguistic Inquiry* **22**: 63-101.

Hestvik, A. (1995). "Reflexives and Ellipsis". *Natural Language Semantics* **2**: 1-27.

Heycock, C. (1995). Asymmetries in Reconstruction. *Linguistic Inquiry* **26**: 547-570.

Heycock C. and A. Kroch (1996). Pseudocleft Connectivity: Implications for the LF Interface Level." *Edinburgh Occasional Papers in Linguistics, 96-1.*

Higgins, F.R. (1979). *The Pseudo-Cleft Construction in English*. Garland, New York.

Hirschbühler, P. (1982). "VP-deletion and across-the-board Quantifier Scope". In *Proceedings of NELS 12.* GLSA, Department of Linguistics, University of Massachusetts at Amherst: 132-139.

Hornstein, N. (1995). *Logical Form. From GB to Minimalism*. Blackwell, Oxford, Cambridge.

Huang, J. (1993). "Reconstruction and the Structure of VP: Some theoretical consequences." Linguistic Inquiry **24**: 103-138.

Jacobson, P. (1992). "Antecedent-contained deletion in a variable-free semantics." In C. Barker and D. Dowty (eds.) *Proceedings from the Second Conference on Semantics and Linguistic Theory*. Department of Linguistics, Ohio State University, Columbus, Ohio: 193-214.

Johnson, K. (1996). "Gapping." Manuscript, Univerity of Massachusetts, Amherst.

Johnson, K. (1997). "What VP Ellipsis Can Do, and What it Can't, but not Why." Manuscript, University of Massachusetts, Amherst.

Kadmon, N. (1987). *On Unique and Non-unique Reference and Asymmetric quantification*. Ph.D. Dissertation, University of Massachusetts at Amherst. Distributed by the GLSA, Department of Linguistics, University of Massachusetts at Amherst.

Kamp, H. (1984). "A Theory of Truth and Semantic Representation." In: J. Groenendijk, T. Janssen and M. Stokhof (eds.) *Truth, Interpretation and Information*. Foris, Dordrecht: 277-322.

Karttunen, L. (1977). "Syntax and Semantics of Questions." *Linguistics and Philosophy* **1**: 3-44.

Kibble, R. (1994a). Dynamics of epistemic modality and anaphora. In *Proceedings of the International Workshop on Computational Semantics.* ITK, Tilburg.

Kibble, R. (1994b)."Modal Subordination, Focus and Complement Anaphora." Manuscript, University of Edinburgh.

Kim, Shin-Sook. (1996). "Bindungsrekonstruktion vs. Skopusrekonstruktion." Manuscript, Eberhard-Karls-Universität Tübingen.

Kleene, S. C. (1952). *Introduction to Mathematics*. North-Holland, Amsterdam.

Kratzer, A. (1997a). "Scope or Pseudoscope? Are there Wide Scope Indefinites?" Manuscript, University of Massachusetts at Amherst.

Kratzer A. (1997b). "Lecture Notes, Semantics Seminar (Spring 1997)." University of Massachusetts, Amherst.

Krifka, M. (1992). "Definite NPs aren't quantifiers." *Linguistic Inquiry* **23**: 156-163.

Kroch, A. (1989). "Amount Quantification, Referentiality and long *wh*-movement." Manuscript, Univ. of Pennsylvania.

Lahiri, U. (1991). *Embedded Interrogatives and Predicates that Embed Them*. Ph.D. Dissertation, MIT, Cambridge, MA.

Larson, R. (1985). "On the Syntax of Disjunction Scope." *Natural Language and Linguistic Theory* **3**: 217-264.

Lebeaux, D. (1990). "Relative Clauses, Licensing and the Nature of Derivation." In *Proceedings of NELS 20*. GLSA, Department of Linguistics, University of Massachusetts at Amherst.

Lebeaux, D. (1994). "Where does the Binding Theory Apply?" Manuscript, University of Maryland, College Park.

Lechner, W. (1995). "On Syntactic and Semantic Reconstruction." Manuscript, University of Massachusetts, Amherst.

Lechner, W. (1997). "On Certain Disparities between Scope and Binding Domains". In *Proceedings of the Tübingen Reconstruction Workshop*. Eberhard-Karls-Universität, Tübingen.

Levin, L. (1982). "Sluicing: A Lexical Interpretation Procedure." In J. Bresnan (ed.) *The mental representation of grammatical relations*. MIT Press, Cambridge, MA.

Lewis, D. K. (1979). "Attitudes *de dicto* and *de se*." *Philosophical Review* **8**: 513-543.

Link, G. (1983). "The logical analysis of plurals and mass terms: A lattice theoretical approach." In R. Bäuerle et al. (eds.) *Meaning, Use and Interpretation of Language.* De Gruyter, Berlin.

Loebner, S. (1987). "Natural Language and Generalized Quantifier Theory." In P. Gärdenfors (ed.) *Generalized Quantifiers.* Reidel Publishing Company: 181-201.

Longobardi, G. (1987). "Extraction from NP and the Proper Notion of Head Government." In A. Giorgi and G. Longobardi (eds.) *The Syntax of Noun Phrases*. Cambridge University Press, Cambridge: 57-112.

May, R. (1985). *Logical Form: Its Structure and Derivation*. MIT Press, Cambridge, MA.

May, R. (1988). "Ambiguities of Quantification and Wh: A Reply to Williams." *Linguistic Inquiry* **19**: 118-135.

Mittwoch, A. (1982). "On the Difference between *Eating* and *Eating Something*: Activities versus Accomplishments." *Linguistic Inquiry* **13**: 113-122.

Moxey, L. and A. J. Sanford (1987). "Quantifiers and Focus." *Journal of Semantics* **5**: 189-206.

Musan, R. (1995). *On the Temporal Interpretation of Noun Phrases.* Ph.D. Dissertation, MIT, Cambridge, MA.

Partee, B.H. (1975). "Deletion and Variable Binding." In E. Keenan (ed.*) Formal Semantics of Natural Language*. Cambridge University Press, Cambridge.

Percus, O. (1998). "The Worldly Concerns of Adverbial Quantifiers." To appear in *Proceedings of the West Coast Conference in Formal Linguistics 17.*

Pesetzky, D. (1987). "Wh-in-situ: Movement and Unselective Binding" In E. Reuland and A. ter Meulen (eds.) *The Representation of (In)definites.* MIT Press, Cambridge, MA.

Pinkal, M. (1995). *Logic and Lexicon. The Semantics of the Indefinite*. Kluwer, Dordrecht.

Postal, P. (1992). "Overlooked Extractions Distinctions." Manuscript, IBM Watson Research Center, Yorktown Heights, NY.

Quer, J. (1998). *Mood at the Interface*. Ph.D. Dissertation, Utrecht Institute of Linguistics.

Quine, W. V. O. (1956). "Quantifiers and Propositional Attitudes." *The Journal of Philosophy* **53**: 183-194.

Ramos-Santacruz, M. (1995), "On the Derivation and Interpretation of Sluicing", talk presented at ESCOL'95.

Reinhart, T. (1981). "Definite NP-anaphora and c-command" *Linguistic Inquiry* **12**:605-635.

Reinhart, T. (1992). „Wh-in-situ: An apparent paradox.“ In: P. Dekker et al. (eds.) *Proceedings of the Eight Amsterdam Colloquium.*

Reinhart, T. (1997a). "Quantifier scope: How labor is divided between QR and choice functions." *Linguistics and Philosophy* **20**: 335-397.

Reinhart, T. (1997b). “Strategies of Anaphora Resolution”. To appear in: UiL OTS Working Papers.

Reinhart, T. and M. Rooth (1986). "The Ellipsis Group". Report ms. for the Syntax and Semantics Workshop, CUNY, July 1986.

Reinhart, T. and E. Reuland. (1993). "Reflexivity." Linguistic Inquiry **24**: 657-720.

Rizzi, L. 1990. *Relativized Minimality*. MIT Press, Cambridge, MA.

Roberts, C. (1987). *Modal Subordination, Anaphora and Distributivity*. Ph.D. Dissertation, University of Massachusetts at Amherst. Distributed by the GLSA, Department of Linguistics, University of Massachusetts at Amherst.

Roberts, C. (1995). "Information Structure in Discourse: Towards an Integrated Formal Theory of Pragmatics". Manuscript, Ohio State University, Columbus, Ohio.

Roberts, C. (1996). "Anaphora in Intensional Contexts." In S. Lappin (ed.) *The Handbook of Contemporary Semantic Theory*. Blackwell, Oxford, Cambridge, MA.

Romero, M. (1997a). "Recoverability Conditions for Sluicing." In F. Corblin, D. Godard, and J.-M. Marandin (eds.) *Empirical Issues in Formal Syntax and Semantics.* Peter Lang, Bern: 193-216.

Romero, M.(1997b). "Syntactic or Non-Syntactic Reconstruction?" *Proceedings of the Berkeley Linguistic Society* 23. Berkeley Linguistic Society, Berkeley, California.

Romero, M. (1997c). "The correlation between Scope Reconstruction and Connectivity Effects." In *Proceedings of the West Coast Conference in Formal Linguistics 16.*

Romero, M. (1997d). "Two Problems for a Semantic Account of Scope Reconstruction". In *Proceedings of the Tübingen Reconstruction Workshop*. Eberhard-Karls-Universität, Tübingen.

Romero, M. (1997e). "A problem for choice functions: local presupposition contexts." In P. Dekker et al. (eds.) *Proceedings of the Eleventh Amsterdam Colloquium.*

Rooth, M. (1985). *Association with Focus*. Ph.D. Dissertation, University of Massachusetts at Amherst. Distributed by the GLSA, Department of Linguistics, University of Massachusetts at Amherst.

Rooth, M. (1992a). "A Theory of Focus Interpretation". *Natural Language Semantics* **1**: 75-116.

Rooth, M. (1992b). "Ellipsis Redundancy and Reduction Redundancy". In S. Berman and A. Hestvik (eds.) *Proceedings of the Stuttgart Ellipsis Workshop*. IBM, Heidelberg.

Rooth, M. (1995). "Focus". In S. Lapin (ed.) *Semantics Handbook*. Blackwell, Oxford, Cambridge.

Rooth, M. (1997). "Focus Licensing of Ellipsis". Paper presented at the Jerusalem Conference on Semantics, Dec 14 - 17, 1997.

Rosen, C. (1976). "Guess what about". In *Proceedings of NELS 6.* GLSA, Department of Linguistics, University of Massachusetts at Amherst: 205-211.

Ross, J. R. (1967). *Constraints on Variables in Syntax.* Ph.D. Dissertation, MIT. Cambridge, MA.

Ross, J. R. (1969). "Guess who?". In R. Binnick et al. (eds.) *Papers from the Fifth Regional Meeting of the Chicago Linguistics Society*. Chicago Linguistic Society, University of Chicago: 252-286.

Rullmann, H. (1995). *Maximality in the Semantics of wh-constructions*. Ph.D. Dissertation, University of Massachusetts at Amherst. Distributed by the GLSA, Department of Linguistics, University of Massachusetts at Amherst.

Rullmann, H., and S. Beck. (1997). Reconstruction and the interpretation of *which* phrases. In *Proceedings of the Tübingen Reconstruction Workshop*. Eberhard-Karls-Universität Tübingen.

Ruys, E.G. (1992). *The Scope of Indefinites*. PhD Dissertation, Utrecht University.

Sag, I. (1976). *Deletion and Logical Form*. Ph.D. Dissertation, MIT, Cambridge, MA.

Sauerland, U. (1998). "Index Identity vs. Copy Identity." To appear in *Proceedings of SALT 8.*

Schwarzschild, R. (1995). "On Givenness." Talk presented at the University of Massachusetts, Amherst, November 10, 1995.

Schwarzschild, R. (1997a). "Givenness and Optimal Focus." Manuscript. Rutgers University.

Schwarzschild, R. (1997b). "Interpreting accent." Manuscript. Rutgers University.

Selkirk, E. O. (1995). "Sentence Prosody: Intonation, Stress and Phrasing." In J. Glodsmith (ed.) *The Handbook of Phonological Theory.* Basil, Blackwell, London.

Sharvit, Y. (1998a). "*How many* questions and Attitude Verbs." Manuscript, University of Pennsylvania.

Sharvit, Y. (1998b). "(Individual) Concepts and Attitude Reports." To appear in *Proceedings of SALT 8.*

Shopen, T. (1973). "Ellipsis as Grammatical Indeterminacy." *Foundations of Language* **10**: 65-77.

von Stechow, A. (1996a). "Against LF Pied-Piping." *Natural Language Semantics* **4**: 57-110.

von Stechow, A. (1996b). "Some remarks on choice functions and LF-movement". Manuscript, Eberhard-Karls-Universität Tübingen.

Stowell, T. and H. Lasnik (1989). "Weakest Crossover – Summary." Lecture Notes, Vienna.

Strawson, P. F. (1952). *Introduction to Logical Theory*. Methuen, London.

Szabolcsi, A (1997). 'Quantifiers in Pair-list Readings.' In A. Szabolcsi (ed.) *Ways of scope taking*. Kluwer, Dordrecht.

Takano, Y. (1995). "Predicate Fronting and Internal Subjects." Linguistic Inquiry **26**: 327-340.

Thomas, A. L. (1979). "Ellipsis: The Interplay of Sentence Structure and Context." *Lingua* **47**: 43-68.

Tomioka. S. (1995). "Focus restricts scope: Quantifer in VP-Ellipsis." In *Proceedings of SALT V*.

Tomioka, S. (1997). *Focusing Effects in VP Ellipsis and NP Interpretation.* Ph.D. Dissertation, University of Massachusetts at Amherst. Distributed by the GLSA, Department of Linguistics, University of Massachusetts at Amherst.

Truckenbrodt, H. (1995). *Phonological Phrases: Their Relation to Syntax, Focus and Prominence*. Ph.D. Dissertation, MIT. Cambridge, MA.

Wald, D. (1995). "Pitch Accent and the Nuclear Stress Rule". Manuscript, MIT.

Williams, E. (1977). "Discourse and Logical Form." *Linguistic Inquiry* **8**: 101-139.

Winter, Y. (1997). "Choice Functions and the Scopal Semantics of Indefinites." *Linguistics and Philosophy* **20**: 399-466.