A Direct Compositionality Approach to Condition C Effects under Reconstruction and their Exceptions

Manfred Krifka[1]
Humboldt-Universität Berlin
Zentrum für Allgemeine Sprachwissenschaft (ZAS) Berlin

Condition C effects under reconstruction, as the lack of a coreferring reading of *Mary wondered* [[*which picture of Tom*] *he liked* _], have been discussed as evidence for an LF account in which the moved expression is reconstructed in the position of its trace (cf. e.g. Fox 1993). This paper develops an alternative explanation under a Direct Compositionality account, which assumes competition with structures that involve syntactically bound readings, e.g. [[*which picture of him*] *Tom liked* _], in line with Reinhart (1983). It shows that a number of exceptions to Condition C effects under reconstruction are due to factors that mitigate against syntactically bound readings, and hence weakens the competitive structure.

1.   Condition C effects and the Syntax/Semantics interface

1.1 Surface Interpretation, LF Interpretation, and Reconstruction

This article is concerned with a set of phenomena related to the way how syntactic structures are interpreted. There are two competing types of approaches to this issue. The first approach, called "Direct Compositionality", or "Surface Interpretation", assumes that syntactic rules, independently motivated by syntactic constituency tests, create strings of words; these syntactically structured strings are then interpreted by semantic rules that are guided by the syntactic structure. The second approach assumes that those strings first are transformed to distinct syntactic structures that deviate from the surface structures, called "Logical Forms", or "LFs". Semantic interpretation then uses such LFs as input, and hence I will call this approach "LF Interpretation".

There is an ongoing controversy about which approach should be preferred (cf. e.g. Barker & Jakobson eds., 2007). There is a certain tradeoff between the two approaches: Surface Interpretation simplifies syntactic structure, but needs more complex semantic interpretation rules; LF Interpretation allows for simpler semantic interpretation rules, but requires a more complex syntax to prepare the input for interpretation. Therefore, com-

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plexity measures that would lead to a preference of one theory over the other are not easy to apply.

In this situation it is important to consider phenomena that one account cannot handle in a natural way, whereas the other can. The current article discusses one such phenomenon that involves so-called Reconstruction phenomena, which was brought forward as an argument against the Surface Interpretation approach most prominently in Fox (1999).

Reconstruction concerns cases in which a constituent α occurs in one position in the string but is also related to another one, resulting in a structure like $[\alpha [\ldots t_\alpha \ldots]]$, where α is the syntactic constituent in its surface position, and t_α is the other, or "base" position. Reconstruction phenomena are cases in which the constituent α appears to be interpreted in its base position, t_α; they suggest that the input to semantic interpretation is not the surface structure $[\alpha [\ldots t_\alpha \ldots]]$, but rather a derived structure $[\_ [\ldots \alpha \ldots]]$ in which α is moved back, or "reconstructed", into its base position.

While the term "Reconstruction" is motivated by the first variant of the second approach, it is used here as a theory-neutral term to cover the relevant, phenomena of the syntax/semantics interface in general. A more theory neutral term would be "connectivity," but this is also used in cases in which no movement is involved.

This article will discuss Condition C effects, as they have been acknowledged to pose a serious problem for Surface Interpretation even by the proponents of that approach (cf. Jacobson 2004). I will discuss these effects, which are notoriously difficult to judge, and can be present or absent depending on a number of factors that are quite unclear in their nature. I will argue for an explanation of these effects following a suggestion in Jacobson's paper, and earlier proposals by Sharvit (1999), Sternefeld (2001) and Cechetto (2001) rooted in work by Reinhart (1983), that sees Condition C effects emerge due to a competition with syntactic structures involving bound pronouns. The novel contribution of the current paper is an explanation of the various exceptions to these apparent Condition C effects. It takes inspiration from the last line of Jacobson's article: "a faith in direct compositionality should inspire us to look for a more explanatory account of things like Condition C effects," and I hope that it contributes to an understanding of these effects beyond the architectonical issues concerning the syntax/semantics interface.

But first we will have a more detailed look at the two approaches towards reconstruction, which we will call the "semantic" vs. the "syntactic" account, respectively.

1.2 Reconstruction: Syntactic Accounts

Consider again the hypothetical structure $[\alpha [\ldots t_\alpha \ldots]]$, where α is a syntactic constituent in surface position, and t_α is the related position of α in the underlying structure. In the syntactic account, α will first be related to its base position, resulting in the structure $[\ldots \alpha \ldots]$, which then will be interpreted. Hence, the syntactic expression α would figure in the computation of the meaning of $[\ldots \alpha \ldots]$. This means that purely structural features of α could be of relevance for the interpretation, and even for the grammaticality, of the expression $[\alpha [\ldots t_\alpha \ldots]]$.

In the Minimalist Framework, this approach is presented in the copy theory of movement (cf. Chomsky 1993, Corver & Nunes 2007). In this theory, a structure [α [...α...]] is generated, with two copies of the string α. It is then assumed that in the phonological realization, the second copy is deleted, resulting in [α [... ɑ̶ ...]], whereas a structure in which the first copy is deleted, [ɑ̶ [... α ...]], serves as the input to semantic interpretation.

For the purpose of this paper, I will present the syntactic account of reconstruction within the first framework, as there is a worked-out treatment for model-theoretic, semantic interpretation within this framework (Heim & Kratzer 1998). However, this choice should not affect the general argument. As an example, consider the following sentence and its two possible interpretations (cf. also Fox 1999):

(1) *Someone from New York is likely to win the lottery*.
      a) 'There is a person from New York, and this person is likely to win the lottery.'
      b) 'It is likely that there is a person from New York that will win the lottery.'

The phrase *someone from New York* can be understood as specific, referring to a particular person that can be identified beforehand – either by the speaker or by the assumption that there exists some other identification procedure (cf. e.g. Yeom 1998). For example, if there is a person from New York that bought 90% of the lottery tickets, and the speaker knows that and knows who this person is, (1) is true under reading (a). The phrase can also be understood as non-specific, not referring to a particular person. For example, if 90% of the lottery tickets have been bought by New Yorkers, (1) is true under reading (b). Of course, (1)(b) would also be true in the first scenario, but the second scenario does not verify reading (1)(a).

The two readings can be generated by assuming that the syntactic structure of (1) is mapped to two distinct Logical Forms, which are given schematically below:

(2) a. [QP *someone from NY*] [1[*is likely* [t1 *to win the lottery*]]]
     b. __ *is likely* [[QP *someone from NY*]1 *to win the lottery*]

We first consider (2)(a). This corresponds to the surface form, which records the fact that the quantifier phrase *someone from New York* is both the subject of the raising predicate, *likely*, and the subject of the infinitive construction. The mechanism of relating the quantifier phrase to the subject position of the infinitive construction follows the textbook account how syntactic movement is dealt with in Heim & Kratzer (1998). That is, if a constituent α is moved, this is indicated by an indexed trace at the base position and at the sister constituent of α; the sister constituent of α at the site where α is moved to is marked by the index of the trace. The semantic interpretation rules would lead to a wide-scope interpretation of *someone from New York*, relative to the modal adverb *likely*. This is illustrated in the sketch of a derivation in (3), which follows the convention that $[\![.]\!]$ is a recursive interpretation function, where $[\![...]\!]^{i \rightarrow x}$ means that expressions with the index i in [...] are to be interpreted as the variable x. In our case, this affects the interpretation of the trace, t_i.

(3) $⟦[\textit{someone from NY}]\ [1\ [\textit{be likely}\ [t_1\ \textit{to win the lottery}]]]⟧$
  a. $= ⟦\textit{someone from NY}⟧(⟦[1\ [\textit{be likely}\ [t_1\ \textit{to win the lottery}]]]⟧)$
  b. $= ⟦\textit{someone from NY}⟧(\lambda x_1⟦\textit{be likely}\ [t_1\ \textit{to win the lottery}]⟧^{1\to x_1})$
  c. $= ⟦\textit{someone from NY}⟧(\lambda x_1⟦\textit{be likely}⟧^{1\to x_1}(⟦t_1\ \textit{to win the lottery}⟧^{1\to x_1})$
  d. $= \lambda P\exists x[\text{Person}(x) \land \text{from NY}(x) \land P(x)](\lambda x_1[\text{LIKELY}(x_1\ \text{wins lottery})])]$
  e. $= \exists x[\text{Person}(x) \land \text{from NY}(x) \land \text{LIKELY}(x\ \text{wins the lottery})]$

In the transition from (b) to (c), a rule is applied that interprets an indexed expression $[1\ [...t_i...]]$ as $\lambda x_i⟦[...t_i...]⟧^{i\to x_i}$, a function from x_i to the meaning of $[...t_i...]$, where all expressions with index i are interpreted as x_i. The raising predicate *be likely* is interpreted here for simplicity as an operator that scopes over a clausal structure, an infinitive construction with a trace in its subject position.

In (2)(b), the subject phrase is reconstructed into its base position, and applying semantic rules would lead to a narrow-scope interpretation with respect to the modal.

(4) $⟦[\textit{be likely}\ [[\textit{someone from NY}]\ [\textit{to win the lottery}]]]⟧$
  a. $= ⟦\textit{be likely}⟧(⟦\textit{someone from NY}⟧(⟦\textit{win the lottery}⟧))$
  b. $= \text{LIKELY}(\lambda P\exists x[\text{Person}(x) \land \text{from NY}(x) \land P(x)](\lambda x[x\ \text{wins lottery}]))$
  c. $= \text{LIKELY}(\exists x[\text{Person}(x) \land \text{from NY}(x) \land x\ \text{wins lottery}])$

In the copy-theory of movement (cf. Chomsky 1995, Sauerland 1998), the subject appears in two copies, and can be interpreted either in the higher or in the lower position, cf. (5)(a,b). For the wide-scope reading, we would have to assume that the lower copy is interpreted as a bound variable, which would involve a type change. We then can assume similar semantic interpretation rules as above.

(5) a. [*someone from NY*]$_1$ *is likely* [[~~*someone from NY*~~]$_1$ *to win the lottery*]
  b. [~~*someone from NY*~~]$_1$ *is likely* [[*someone from NY*]$_1$ *to win the lottery*]

What both versions of the syntactic approach have in common is that the input to semantic interpretation is enriched, in some way or other: The reconstructed version of the LF in (2)(b) is not a possible surface form, and neither are the syntactic structures generated by the copy theory of movement in (5). Their only raison d'être is to allow for the generation of the observed readings.

1.3 Reconstruction: Semantic Accounts

We now turn to Surface Interpretation, of which there are various versions. Here, I will assume a version that assumes syntactic traces, in order to make possible a direct comparison with LF interpretation. This means that we assume a structure $[\alpha\ [...\ t_\alpha\ ...]]$, but now this structure is interpreted directly: Its meaning $⟦[\alpha\ [...\ t_\alpha\ ...]]⟧$ is computed compositionally from the meanings of the intermediate parts $⟦\alpha⟧$ and $⟦[...\ t_\alpha\ ...]⟧$. In the subsequent process, the computation of the meaning of the latter expression will involve the meaning of $⟦t_\alpha⟧$. Under this architecture of semantic interpretation, it is not the syntactic expression α that is related to the base position t_α in the computation of $⟦[...\ t_\alpha\ ...]⟧$. Rather, it is the meaning of α, rendered as $⟦\alpha⟧$, that is related to the way how the base position t_α is interpreted, namely as $⟦t_\alpha⟧$. The interpretation cannot refer to purely structural syntactic features of α within the interpretation of $[...t_\alpha...]$.

It is important to realize that the semantic approach is more restrictive, in the following sense. The expression α contains more information than its meaning, $[\![α]\!]$, as distinct expressions α, α′ can have the same meaning: $[\![α]\!] = [\![α′]\!]$. So, structural differences between α and α′ might result in differences of acceptability between [α [… $t_α$ …]] and [α′ [… $t_α$ …]] in the syntactic account – after syntactic reconstruction, [… α …] might be grammatical, but [… α′ …] may fail to be grammatical. But such purely structural differences cannot result in differences of acceptability in the semantic account, simply because they are not reflected in the meanings $[\![α]\!]$, $[\![α′]\!]$, and these meanings are all that the semantic approach to reconstruction can work with. As a consequence, with the semantic account we have to assume that all differences between expressions α, α′ that lead to differences in grammaticality judgements in reconstruction contexts must have a reflex in the semantic interpretation, that is, it must hold that $[\![α]\!] \neq [\![α′]\!]$.

Let us consider first how the second reading of (1) is derived. First, we should assume a slightly more liberal way of combining meanings, which makes reference to the semantic types of the meanings to be combined:

(6) $[\![[α\ β]]\!] = \{[\![α]\!], [\![β]\!]\}, = [\![α]\!]([\![β]\!])$ or $[\![β]\!]([\![α]\!])$, whichever is well-formed.

Let us consider the two readings of example (1) again. One implementation of the ambiguity is that the base position of the subject, represented as a trace in (2)(a), is semantically interpreted in an ambiguous way: It either is of type of entities, **e**, or of the type of quantifiers, **(et)t** (cf. Strigin 1994, Sternefeld 2001). This can be expressed by assuming type-ambiguous traces in syntax, e.g. t_1 for traces of type **e**, and T_1 for traces of type **(et)t**. Alternatively, we could assume that the base positions are not ambiguous, but underspecified; they are compatible with either a type **e** interpretation, or a type **(et)t** interpretation. However, we would then predict that in cases of VP ellipsis cases like (7) have a reading in which the subject quantifiers might differ in scope, which is not the case.

(7)   *Someone from NY is likely to win a big price in the lottery, and someone from Philadelphia is, too.*

For this reason, I assume the first option here. Also, notice that with the second option, the interpretation $[\![.]\!]$ would not be a function anymore, but a relation, leading to a more complex architecture of the syntax/semantics interface. Assuming traces of different semantic type, the wide-scope interpretation is as in (8), whereas the narrow-scope interpretation is as in (9).

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(8) $[[someone\ from\ NY]\ [1\ [be\ likely\ [t_1\ to\ win\ the\ lottery]]]]$

    a. $= \{[\![someone\ from\ NY]\!], [\![1\ [be\ likely\ [t_1\ to\ win\ the\ lottery)]]]\!]\}$

    b. $= \{[\![someone\ from\ NY]\!], \lambda\xi_1[\![be\ likely\ [t_1\ to\ win\ the\ lottery]]]\!]^{1\to\xi1}\}$

    c. $= \{[\![someone\ from\ NY]\!], \lambda\xi_1[\{[\![be\ likely]\!]^{1\to X1}, [\![t_1\ to\ win\ the\ lottery]\!]^{1\to\xi1}\}]\}$

    d. $= \{[\![someone\ from\ NY]\!], \lambda\xi_1[\{LIKELY, \{[\![to\ win\ the\ lottery]\!]^{1\to\xi1}, [\![t_1]\!]^{1\to\xi1}\}\}]\}$

    e. $= \{[\![someone\ from\ NY]\!], \lambda x_1[\{LIKELY, \{[\![to\ win\ the\ lottery]\!]^{1\to x1}, x_1\}\}]\}$

    f. $= \{[\![someone\ from\ NY]\!], \lambda x_1[\{LIKELY, \{\lambda x[win\text{-}lottery(x)], x_1\}\}]\}$

    g. $= \{[\![someone\ from\ NY]\!], \lambda x_1[\{LIKELY, \lambda x[win\text{-}lottery(x)](x_1)\}]\}$

    h. $= \{[\![someone\ from\ NY]\!], \lambda x_1[LIKELY, win\text{-}lottery(x_1)]\}$

    i. $= \{\lambda P\exists x[Person(x) \wedge from\ NY(x) \wedge P(x)], \lambda x_1[LIKELY(win\text{-}lottery(x_1))]\}$

    j. $= \lambda P\exists x[Person(x) \wedge from\ NY(x) \wedge P(x)](\lambda x_1[LIKELY(win\text{-}lottery(x_1))])$

    k. $= \exists x[Person(x) \wedge from\ NY(x) \wedge LIKELY(win\text{-}lottery(x))]$

In contrast to (3), which uses the type **e** variable x_1, this derivation uses a variable ξ_1 that is initially undetermined with respect to its type. The variable is determined as of type **e** at the transition from (d) to (e), as the trace t_1 is of type **e**. As a consequence, the quantifier in subject position, which is of type **(et)t**, is applied to the resulting predicate, and gets wide scope over the operator LIKELY.

The narrow-scope reading of the quantifier is achieved with a trace T_1 of type **(et)t**:

(9) $[[someone\ from\ NY]\ [1\ [be\ likely\ [T_1\ to\ win\ the\ lottery]]]]$

    a. $= \{[\![someone\ from\ NY]\!], [\![1\ [be\ likely\ [T_1\ to\ win\ the\ lottery)]]]\!]\}$

    b. $= \{[\![someone\ from\ NY]\!], \lambda\xi_1[\![be\ likely\ [T_1\ to\ win\ the\ lottery]]]\!]^{1\to\xi1}\}$

    c. $= \{[\![someone\ from\ NY]\!], \lambda\xi_1[\{[\![be\ likely]\!]^{1\to X1}, [\![T_1\ to\ win\ the\ lottery]\!]^{1\to\xi1}\}]\}$

    d. $= \{[\![someone\ from\ NY]\!], \lambda\xi_1[\{LIKELY, \{[\![to\ win\ the\ lottery]\!]^{1\to\xi1}, [\![T_1]\!]^{1\to\xi1}\}\}]\}$

    e. $= \{[\![someone\ from\ NY]\!], \lambda Q_1[\{LIKELY, \{[\![to\ win\ the\ lottery]\!]^{1\to Q1}, Q_1\}\}]\}$

    f. $= \{[\![someone\ from\ NY]\!], \lambda Q_1[\{LIKELY, \{\lambda x[win\text{-}lottery(x)], Q_1\}\}]\}$

    g. $= \{[\![someone\ from\ NY]\!], \lambda Q_1[\{LIKELY, Q_1(\lambda x[win\text{-}lottery(x)])\}]\}$

    h. $= \{[\![someone\ from\ NY]\!], \lambda Q_1[LIKELY(Q_1(\lambda x[win\text{-}lottery(x)]))]\}$

    i. $= \{\lambda P\exists x[Person(x) \wedge from\ NY(x) \wedge P(x)], \lambda Q_1[LIKELY(Q_1(\lambda x[win\text{-}lottery(x)]))]\}$

    j. $= \lambda Q_1[LIKELY(Q_1(\lambda x[win\text{-}lottery(x)])](\lambda P\exists x[Person(x) \wedge from\ NY(x) \wedge P(x)])$

    k. $= LIKELY(\lambda P\exists x[Person(x) \wedge from\ NY(x) \wedge P(x)](\lambda x[win\text{-}lottery(x)]))$

    l. $= LIKELY(\exists x[Person(x) \wedge from\ NY(x) \wedge win\text{-}lottery(x)])$

The distinct semantic type of the trace as T_1 leads to a different way in which the meanings are combined. In the transition from line (d) to (e), the variable ξ_1 is specified as Q_1, a variable of type **(et)t**. Due to type-driven interpretation, Q_1 does not satisfy the argument of $\lambda x[win\text{-}lottery(x)]$, but rather is applied to that predicate in line (g). Further down in line (j) the meaning of *likely to win the lottery* is applied to the quantifier, which then results in a narrow-scope interpretation of the quantifier.

Notice that in (9) reconstruction happens, in a sense, in semantics: As the trace is of a higher type, it enforces a different way of combining the meaning of syntactically moved item and the expression out of which it is moved: Now, the meaning of the constituent out of which the movement happened is applied to the meaning of the moved constituent, not the other way round. Effectively, lambda conversion brings it about that the moved item is interpreted in its base position. But notice that no syntactic reconstruction is re-

quired. In the current version of semantic theory, all that syntax has to afford is two distinct types of traces.

1.4 Overview: What is to come?

In this paper I will develop an argument that apparent Condition C effects under reconstruction can be accounted for within Surface Interpretation. I will not argue against LF Interpretation except for a minor conceptual point at the very end. But the explanation of the variability of the Condition C effects may be integrated into an LF interpretation account.

The argument will involve several steps. In section 2, I will distinguish between different ways in which pronouns can find their reference, in particularly discourse-bound pronouns and syntax-bound pronouns, and discuss implementations of syntactic binding within syntactic structures or within semantic interpretation. In section 3 we will discuss the known observations concerning the presence of absence of Condition C effects under reconstruction. Section 4 will then develop a theory in which Condition C effects can be captured within Surface Interpretation, and will in particular explain the various cases in which such effects are absent. Section 5 concludes.

2. Binding of Pronouns and Reconstruction

Before we discuss Condition C phenomena in reconstruction, we will first consider the binding of pronominal expressions – that is, Condition A, which deals with reflexives and reciprocals, and Condition B, which deals with other pronouns.

2.1 Types of pronouns

We have to distinguish three cases of how pronominal expressions get their meaning. First, pronouns sometimes have no linguistic antecedent at all. For example, at a police interview, a speaker might point to a man and utter (10), referring with *he* to the man, and with *it* to a an event that is salient in the situation of utterance. I call such pronouns **situation-bound**.

(10) *He did it.*

Secondly, pronouns may be **discourse-bound**, as in intra-sentential pronouns, but also within a sentence in pronouns occurring in different non-subordinated subclauses, as in donkey sentences:

(11) *A man$_1$ came in. He$_1$ sat down.*

(12) *Always, when a man$_1$ came in, he$_1$ sat down.*

In (11), the pronoun *he* picks up the discourse referent introduced by *a man* in the first clause. The text is interpreted under a general existential closure, stating that there is a mapping of the discourse referents to entities in the actual world such that the properties of the discourse referents expressed in the sentence are true. For the example at hand, this means that the discourse referent d_1 must be a man, it must have the property of having

come in, and it must have the property of having sat down. In (12), the indefinite *a man* also introduces a discourse referent that is picked up by *he*, but now this is bound under the scope of the universal quantifier *always*. This means that the actual world must support it that for all ways of mapping d_1 to an entity such that d_1 is a man and d_1 came in, it also must hold that d_1 sat down.

The third way of interpreting pronouns is as bound by an antecedent that stands in a particlar syntactic configuration to the pronoun. This syntactic configuration includes, most prominently, syntactic c-command. I will call such pronouns **syntax-bound** because syntactic configuration of binder and bindee is essential. In this case, the antecedent may also be a quantifier that binds the pronoun as a variable:

(13) *John$_1$ / Every man$_1$ talked to a woman that smiled at him$_1$.*

See Reinhart (1983) and Grodzinsky & Reinhart (1993), who distinguish between syntactic binding in cases like (13) and what they call "coreference" in cases like (12). Notice that quantifier binding is not possible in the discourse-bound case in which the antecedent does not c-command the pronoun:

(14) *#Every man$_1$ came in. He$_1$ sat down.*

However, this statement has to be qualified. There are cases in which a quantifier appears to discourse-bind a pronoun, which are treated as modal subordination (cf. Kadmon 1987, Sells 1987), as in (15). Such cases require special treatment, and we ignore them here.

(15) *Every farmer owns a donkey. He uses it to plough the fields.*

Particular pronominal forms may correlate with syntactic binding or discourse binding, but these correspondences is not one-to-one. The best-known case are reflexive and reciprocal pronouns, which are typically understood as syntactically bound by a c-commanding expression that is a co-argument:

(16) *John$_1$ / Every man$_1$ talked to himself$_1$.*

One piece of evidence for syntactic binding is that we necessarily find the sloppy reading in ellipsis contexts in coordinated structures, cf. (17). (For the strict reading in subordinated structures see Hestvik 1995).

(17) *John talked to himself, and Bill did, too.*

However, there are syntactically bound pronouns that are not reflexive:

(18) *Every man$_1$ thinks that there is a woman that loves him$_1$.*

And there are so-called logophoric reflexives as complements of representational nouns like *picture* that seem to allow for discourse binding to express a perspective shift (cf. Pollard & Sag 1992), as in (19). For the purpose of this paper, such uses of reflexives will be ignored.

(19) *The mayor$_1$ was furious. A picture of himself$_1$ in the museum had been mutilated.*

On the other hand, there are pronominal elements that cannot be syntactically bound. I take it that epithets like *the guy* or *the bum* belong to this class, cf. (20).

(20) *Every man₁ thinks that there is a woman that loves the guy*₁.*

Dubinsky & Hamilton have argued that epithets can be bound provided that they do not logophoric, referring to the carrier of a perspective from which a proposition is reported, as in (21)(a) However, notice that binding does not work in this case with quantified antecedents, cf. (b), and hence we should assume that (a) is a case of discourse binding.

(21) a. *John ran over a man who was trying to give the idiot directions.*
    b. *Every player ran over a man who was trying to give the idiot / him directions.*

Another type of pronoun that resists syntactic binding are d-pronouns in German, cf. Patel-Grosz & Grosz (2010); this will be taken up below.

(22) *Jeder Mann₁ denkt, dass es eine Frau gibt, die ihn₁/den*₁ liebt.*
    'Every man thinks that there is a woman that loves d-PRON'

The generally received condition for syntactic binding is that the antecedent c-commands the anaphoric expression. However, there are cases in which quantifiers can bind pronouns that they do not c-command, e.g. from the position of a specifier of a DP, cf. (23) (a) or an of-phrase of an indefinite DP, cf. (b), but also less well-known ones, e.g. from within a tensed clause, for quantifiers headed by each (cf. c):

(23) a. *Everyone₁'s mother thinks that he₁ is a genius.*
    b. *One page of every₁ book has something written on it₁.*
    b. *The grade that each student₁ receives is recorded in his₁ file.*

This has lead Barker (2012) to give up syntactic c-command as a condition, and assume that the only condition is that a quantifier must have semantic scope over a pronoun in order to be able to bind it. Then the issue arises under which conditions semantic scope is possible. If one wants to stick with c-command for conceptual reasons, one would have to assume that the quantifier is moved to a position in which it c-commands the pronoun in the LF account. In Surface Interpretation, one would have to assume other ways in which the quantifier can achieve a wide-scope interpretation, and in which binding of the pronoun is guaranteed. It also may be that the cases in (23) do not represent syntactic binding, but discourse binding, as in donkey sentences; for example, they allow for epithets (Larson 1989), and for d-pronouns in German:

(24) a. *Every boy₁'s mother thinks that the little darling₁ is flawless.*
    b. *Die Mutter jedes Jungen₁ glaubt, dass dieser₁ ohne Fehler ist.*
      'every boy's mother thinks that d-pronoun is without flaws'

I will leave the issue of non c-commanding antecedents open, but return to it shortly in section 4.3.

2.2 Syntactically bound pronouns, syntactic approach

Let us focus here on syntactically bound pronouns, as in the following examples:

(25) a. *Diana₁ remembered her₁ brother.*
    b. *Every girl₁ remembered her₁ brother.*

Here, (25)(a) can be understood as discourse-bound or as syntactically bound, whereas (b), with a quantifier as antecedent, can only be understood as syntactically bound. Let us consider the textbook treatment in Heim & Kratzer (1998, chapter 10), who assume that syntactic binding is like the variable binding we have considered in example (3). That is, it is mediated by a coindexed trace:

(26) [*Diana* [1 [t_1 *remembered her₁ brother*]]]

The variable assignment serves not only for the interpretation of traces, but also for the interpretation of syntactically bound pronouns:

(27) $[\![she_1]\!]^{1 \to x1} = x_1$, provided that x_1 is female, otherwise undefined.

The possessive pronoun in our example is derived from that; we assume the following representation, where R is a relation of type **eet**:

(28) $[\![her_1]\!]^{1 \to x1} = \lambda R \iota z[R([\![she_1]\!]^{1 \to x1})(z)]$

We then get the following derivation of *her brother*, here given in a bottom-up fashion, somewhat simplified:

(29) a. $[\![brother]\!]^{1 \to x1} =$ brother, type **eet**
     b. $[\![her_1 \ brother]\!]^{1 \to x1} = [\![her_1]\!]^{1 \to x1}([\![brother]\!]^{x \to x1}) = \iota z[brother(x_1)(z)]$, x_1: female

This is the unique z such that z is brother of x_1, where x_1 is restricted to females. The derivation of (25)(a) then is as follows:

(30) $[\![[Diana \ [1 \ [t_1 \ remembered \ [her_1 \ brother]]]]]\!]$
     a. $= [\![[1 \ [t_1 \ remembered \ [her_1 \ brother]]]]\!]([\![Diana]\!])$
     b. $= \lambda x_1 [\![[t_1 \ remembered \ [her_1 \ brother]]]\!]^{1 \to x1}(Diana)$
     c. $= \lambda x_1 [[\![remembered]\!]^{1 \to x1}([\![her_1 \ brother]\!]^{1 \to x1})([\![t_1]\!]^{1 \to x1})](Diana)$
     d. $= \lambda x_1 [remember(\iota z[brother(x_1)(z)])(x_1)](Diana)$
     e. $= remember(\iota z[brother(Diana)(z)])(Diana)$

We assume that the subject, Diana, is moved, leaving a trace. This is interpreted as usual, as a functional expression. If the pronoun is coindexed with the trace, syntactic binding ensues: The trace and the pronoun covary. Notice that, if the subject is a quantifier, we get a bound variable reading:

(31) $[\![[every \ girl \ [1 \ [t_1 \ remembered \ [her_1 \ brother]]]]]\!]$
     $= [\![every \ girl]\!]([\![[1 \ [t_1 \ remembered \ [her_1 \ brother]]]]\!])$
     $= [\![every \ girl]\!](\lambda x_1 [\![[t_1 \ remembered \ her_1 \ brother]]\!]^{1 \to x1})$
     $= \lambda P \forall x[girl(x) \to P(x)](\lambda x_1[remember(\iota z[brother(x_1)(z)])(x_1)])$
     $= \forall x[girl(x) \to remember(\iota z[brother(x)(z)])(x)]$

Let us now consider cases in which we find syntactic binding of pronouns under reconstruction.

(32) [*Which story about her₁ brother*]₂ *did Diana₁ / every girl₁ remember* t_2?

LF interpretation would assume that the moved constituent, *which story about her₁ brother*, is reconstructed in its trace position, in which *Diana* or *every girl* would c-command the pronoun *her₁*. From this position, syntactic binding is obviously possible.

(33) [_ *did* [*Diana / every girl* [1 [t_1 *remember* [*which story about her$_1$ brother*]]]]]]

2.3 Syntactically bound pronouns, semantic approach I

The question is: Does the way of treating pronoun binding also work for the Surface Interpretation approach? It does not. To see this, let us consider the same example as before, but under the assumption that the trace of the *wh*-phrase is of a higher type T_2 that leads to semantic reconstruction via lambda-conversion.

(34) [*which story about her$_1$ brother*] [2 [*did* [*Diana / every girl* [1 [t_1 *remember* T_2]]]]]]

The meaning of the moved phrase, ⟦*which story about her$_1$ brother*⟧, is interpreted via lambda-conversion in the position of the trace T_2. Can the pronoun *her* get bound then? Let us consider this in detail. (35) is the interpretation of the noun phrase of the *wh*-constituent. It contains a free variable x_1, by virtue of the indexed pronoun *her$_1$*.

(35) ⟦*story about her$_1$ brother*⟧ = $\lambda y[\text{story}(y) \wedge \text{about}(\iota z[\text{brother}(x_1)(z)])(y)]$

I assume a standard Hamblin semantics for *wh*-constituents. This means that for *which* in direct object position we can assume the following interpretation; we disregard here that we would have to work with intensional representations to get the meaning right.

(36) ⟦*which$_{\text{DO}}$*⟧ = $\lambda P \lambda R \lambda x \exists p \exists y[P(y) \wedge p = R(y)(x)]$

(37) ⟦*which$_{\text{DO}}$ story about her$_1$ brother*⟧
    = ⟦*which$_{\text{DO}}$*⟧(⟦*story about her$_1$ brother*⟧)
    = $\lambda P \lambda R \lambda x \exists p \exists y[P(y) \wedge p = R(y)(x)](\lambda y[\text{story}(y) \wedge \text{about}(\iota z[\text{brother}(x_1)(z)])(y)]$
    = $\lambda R \lambda x \exists p \exists y[\text{story}(y) \wedge \text{about}(\iota z[\text{brother}(x_1)(z)])(y) \wedge p = R(y)(x)]$

For the interpretation of the remnant clause we get the following meaning, where I will work with the variant with a referring subject, *Diana*, and will neglect the auxiliary *did*. I also will assume the correct function-argument structure that is consonant with the type of the traces right from the start, to simplify the derivation.

(38) ⟦[2 [*Diana* [1 [t_1 [*remember* T_2]]]]]⟧
    a. = $\lambda \xi_2$ ⟦[*Diana* [1 [t_1 [*remember* T_2]]]]⟧$^{2 \to \xi 2}$
    b. = $\lambda \xi_2$ [⟦[1 [t_1 [*remember* T_2]]]⟧$^{2 \to \xi 2}$(⟦*Diana*⟧$^{2 \to \xi 2}$)]
    c. = $\lambda \xi_2$ [$\lambda \xi_1$⟦[t_1 [*remember* T_2]]⟧$^{2 \to \xi 2, 1 \to \xi 1}$(Diana)]
    d. = $\lambda \xi_2$ [$\lambda \xi_1$[⟦*remember* T_2⟧$^{2 \to \xi 2, 1 \to \xi 1}$(⟦$t_1$⟧$^{2 \to \xi 2, 1 \to \xi 1}$)](Diana)
    e. = $\lambda \xi_2$ [λx_1[⟦*remember* T_2⟧$^{2 \to \xi 2, 1 \to \xi 1}$($x_1$)](Diana)]
    f. = $\lambda \xi_2$ [⟦*remember* T_2⟧$^{2 \to \xi 2, 1 \to \xi 1}$(Diana)]
    g. = $\lambda \xi_2$ [⟦T_2⟧$^{2 \to \xi 2, 1 \to \xi 1}$(⟦*remember*⟧$^{2 \to \xi 2, 1 \to \xi 1}$)(Diana)]
    h. = λQ_2 [Q_2(remember)(Diana)]

When we now combine the meaning of the moved *wh*-constituent (37) with the remnant clause (38) we see that binding cannot be achieved:

(39) $[\![2\ [$*Diana* $[1\ [t_1\ [$*remember* $T_2]]]]]\!](\![$*which story about her$_1$ brother*$]\!])$

    $= \lambda Q_2[Q_2(\text{remember})(\text{Diana})]$

       $(\lambda R\lambda x \exists p \exists y[\text{story}(y) \wedge \text{about}(\iota z[\text{brother}(x_1)(z)])(y) \wedge p = R(y)(x)])$

    $= \lambda R\lambda x \exists p \exists y[\text{story}(y) \wedge$

         $\text{about}(\iota z[\text{brother}(x_1)(z))(y) \wedge p = R(y)(x)](\text{remember})(\text{Diana})$

    $= \exists p \exists y[\text{story}(y) \wedge \text{about}(\iota z[\text{brother}(x_1)(z)])(y) \wedge p = \text{remember}(y)(x)]$

The problem is that the semantic representation does not record the presence of a bound pronoun in the meaning of the *wh*-constituent. We have to assume a slightly more expressive meaning representation in order to achieve that, and we have to take care that the remnant expression is sensitive to this additional meaning component.

One could object to this move, as this appears to enrich the notion of meaning in such a way as to include aspects that seem to come for free in the syntactic approach, which allows us to scan expressions for the occurrence of indexed pronouns. However, the occurrence of a free pronoun is essential for semantic interpretation, as it signals that a meaning is unsaturated, depending on the setting of a parameter. The standard way of indicating this dependency on a parameter is by a functional expression. Hence we need a representation of bound pronouns as inducing functional expressions.

2.4 Syntactically bound pronouns, semantic approach II

The suggestion at the end of the last section can be implemented along the lines of Hepple (1990), cf. also Jacobson (1999, 2004); see Sternefeld (2001) for a different implementation. In this approach, syntactically bound personal pronouns denote identity functions of type **ee**, that is, functions from entities to entities. For example, the meaning of *she* is a function from female persons u to u:

(40) $[\![$*she*$]\!] = \lambda u{:}\text{female}[u]$

To accommodate such meanings of type **ee**, we have to allow, in addition to the regularly expected type **e**, for a more flexible way of meaning combination. Whenever we have two meanings of type $\sigma\tau$ and σ that can be combined via function composition to a meaning of type τ, then we also can combine two meanings of type $\sigma\tau$ and $\omega\sigma$, and we can combine two meanings of type $\omega\sigma\tau$ and σ, in both cases resulting in a meaning of type $\omega\tau$. The additional argument of type ω is projected from the functor $\sigma\tau$ or the argument σ to the resulting meaning, τ. We can express this combination rule as follows:

(41) in addition to (6):

    $[\![[\alpha\ \beta]]\!]\ =\ \lambda u[[\![\alpha]\!](u)([\![\beta]\!])$ or $\lambda u[[\![\alpha]\!]([\![\beta]\!](u))]$ or

        $\lambda u[[\![\beta]\!](u)([\![\alpha]\!])$ or $\lambda u[[\![\beta]\!]([\![\alpha]\!](u))]$, where u is a variable of type e.

This rule is restricted to meanings where the additional argument ω is of type e, as this is all we need for the current purposes. The rule could be extended for what happens if both the functor and the argument have an additional argument; the additional arguments can either both project, or they can be combined. However, we will not deal with such cases here.

Example (25) then is derived as follows:

(42) a. ⟦*her*⟧ = λu:female λR ιz[z is R of u], type **e(eet)e**
    b. ⟦*brother*⟧ = brother, type **eet**
    c. ⟦[*her brother*]⟧ = λu[⟦*her*⟧(u)(⟦*brother*⟧)]
                        = λu:female ιz[brother(u)(z)], type **ee**
    d. ⟦*remember*⟧ = λyλx[remember(y)(x)], type **eet**
    e. ⟦[*remember* [*her brother*]]⟧ = λu[⟦*remember*⟧(⟦[*her brother*]⟧(u))]
            = λu:female λx[remember(ιz[brother(u)(z)])(x)], type **eet**

This is a point at which the projected argument u can be bound to the subject argument of *remember*. There are several ways to express this binding. For example, we could assume that the binder, *Diana*, has in addition to a quantifier meaning (43)(a) a meaning in which both the projected pronominal argument and the subject argument argument are bound, as in (43)(b).

(43) a. ⟦*Diana*⟧ = λP[P(Diana)]
    b. ⟦*Diana*⟧ = λR[R(Diana)(Diana)]

Alternatively, the binding can be expressed by an operator B, defined as follows:

(44) B(R) = λx[R(x)(x)]

(45) B(λu:female λx[remember(ιz[brother(u)(z)])(x)])
    = λx:female [remember(ιz[brother(x)(z)])(x)], type **et**

By the B operator, the projected argument u is identified with the subject argument, x. In the last step, the subject argument is filled. The operator B can be seen as an operator that applies freely; here, I will assume that it has a reflex in syntax, mainly for perspicuity of presentation.

(46) ⟦[*Diana* [B [*remember her brother*]]]⟧
    = ⟦[B [*remember her brother*]]⟧(⟦*Diana*⟧)
    = λx:female [remember(ιz[brother(x)(z)])(x)](Diana)
    = remember(ιz[brother(Diana)(z)])(Diana), type **t**, provided that Diana is female.

With the subject *every girl*, we get the following interpretation, which gives us the right result.

(47) ⟦[*every girl* [B [*remember her brother*]]]⟧
    = ⟦*every girl*⟧(⟦[B [*remember her brother*]]⟧)
    = λP∀x[girl(x) → P(x)](λx:female [remember(ιz[brother(x)(z)])(x)])
    = ∀x[girl(x) → remember(ιz[brother(x)(z)])(x)], type **t**;
        notice that x: female is satisfied.

The subject, *Diana* or *every girl*, does not really "bind" *her* in an ordinary way. Rather, a binding relation exists between an argument position and the interpretation of the pronoun, mediated by the projection of the additional argument of the pronoun and by the B operator. Notice, also, that no movement of *Diana* or *every girl* is required to express this type of binding, in contrast to the account in section 2.2.

While indices are not required to express syntactic binding, they can be used for other kinds of binding phenomena, in particular discourse binding (if they are not treated as

covert descriptions, as in Elbourne 2005)) One version of this is to assume dynamic interpretation, where meanings are given with respect to input assignments and output assignments, as e.g. in Rooth (1987). Without going into detail, this can be illustrated with the following example:

(48) $\llbracket [Diana_1 \ [B \ [remembered \ [her \ brother]_2]]] \rrbracket$:
   a pair of an input assignment g and an output assignment g′
   such that g′ differs from g insofar as it is defined for the indices 1 and 2,
   such that g′(1) = Diana, g′(2) = ɿz[brother(Diana)(z)], and
       remember(ɿz[brother(Diana)(z)])(Diana).

This allows to pick up these discourse referents in subsequent clauses, as in *She₁ hates him₂*. What is important for current purposes is that *her* in (48) does not carry an index. It is a syntactically bound pronoun, not a discourse-bound pronoun. Once we incorporate discourse pronouns in our formal architecture, this should be possible as well, as in the following case:

(49) $[Diana_1 \ [remembered \ [her_1 \ brother]_2]]$

Here, *Diana* indeed binds the pronoun *her*, and no binding operator B should be required. While (48) and (49) happen to be truth-conditionally equivalent, they are different, and the differences show up in certain cases. For example, for sentences with quantified subjects such as *every girl remembered her brother*, discourse binding of *her* is not possible, as *every girl* does not introduce an index. And under ellipsis, we get the sloppy vs. strict interpretation, cf. (50)(a) and (b), respectively.

(50) *Diana remembers her brother, and Ariane does, too.*
   a. $[Diana_1 \ [B \ [remembers \ her \ brother]] \ and \ Ariane \ [\text{B} \ \text{remembers her brother}]]$
   b. $[Diana_1 \ [remembers \ her_1 \ brother] \ and \ Ariane \ \text{remembers her}_1 \ \text{brother}]$

Reflexive and reciprocal pronouns differ from regular pronouns insofar as they only have a syntactically bound reading, with a locality requirement for their antecedent. This can be expressed within the present account by assuming that they introduce a specialized variable that cannot be passed across a clause. In (51), this allows for *herself* to corefer to *Diana* as in (a), but excludes coreference with *Ariane* as in (b), for which a regular pronoun must be used, as in (c). The use of regular pronouns as in (d) for local coreference is not possible, presumably due to a blocking effect by the reflexive pronoun.

(51) a. *Ariane thinks* [*that Diana* [B *likes herself*]]
   b. *Ariane* [B *thinks* [*that Diana likes herself*]]
   c. *Ariane* [B *thinks* [*that Diana likes her*]]
   d. *Ariane thinks that Diana* [B *likes her*]]

However, as we have seen with picture nouns in (19), reflexives can also refer to the person from whose perspective an event is depicted, which requires the introduction of a perspective parameter that can also bind the variable introduced by the reflexive. I will not go into further details of reflexive and reciprocal pronouns here.

We now consider what happens with syntactically bound pronouns under reconstruction. I will use the same format to handle syntactic movement as above, even though we could

model dependency on traces with the same mechanism as syntactic binding: A trace (of type **e**, or of other types) could create an identity function from entities of its type, where the argument is projected, and ultimately filled by the moved item. This would be the overall more homogenous approach, but in order to keep things as comparable as possible with the LF movement account, I will not pursue this option here.

Let us now reconsider our example:

(52) [w*hich story about her brother*] [1 [*did Diana* [B [*remember* T_1]]]]

Assuming that the anaphoric component of *her* is interpreted as an identity function, λu:female[u], that is projected in semantic composition using the rules in (41), we get the following interpretation for the moved *wh*-constituent:

(53) ⟦*which*$_{DO}$ *story about her brother*⟧ =
     λu:female $\lambda R \lambda x \exists p \exists y$[story(y) $\wedge$ about(ιz[brother(u)(z)])(y) $\wedge$ p = R(y)(x)],
     type **e(eet)et**

In contrast to (37), this representation records the presence of a pronoun that is to be bound syntactically by the argument λu:female[...].

The semantic type of the trace must correspond to this meaning. That is, it is also a function from entities **e** to the type of object quantifiers, **(eet)et**, where the entity argument is projected and ultimately bound by the B operator. Instead of (38), we now have the following derivation:

(54) ⟦[2 [*Diana* [B [*remember* T_2]]]]⟧
     a. $= \lambda \xi_2$⟦[*Diana* [B [*remember* T_2]]]⟧$^{2 \to \xi_2}$
     b. $= \lambda \xi_2$[⟦[B [*remember* T_2]]⟧$^{2 \to \xi_2}$(⟦*Diana*⟧$^{2 \to \xi_2}$)]
     c. $= \lambda \xi_2$[B(⟦[*remember* T_2]⟧$^{2 \to \xi_2}$)(Diana)]
     d. $= \lambda \xi_2$[B(λu[⟦T_2⟧$^{2 \to \xi_2}$(u)(⟦*remember*⟧$^{2 \to \xi_2}$)])(Diana)]
     e. $= \lambda \xi_2$[B(λu[ξ_2(u)($\lambda y \lambda x$[remember(y)(x)])(Diana)])]

Due to the presence of the B operator, the variable ξ_2 must be a function from entities, **e**. As it further combines with a relation, type **eet**, and returns a property, type **et**, it must be of type **e(eet)et**. This is the type provided by the moved constituent, which now can be combined:

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(55) $\llbracket[[which_{DO}\ story\ about\ her\ brother]\ [2\ [Diana\ [B\ [remember\ T_2]]]]]\rrbracket$

    a. $= \llbracket[2\ [Diana\ [B\ [remember\ T_2]]]]\rrbracket(\llbracket which_{DO}\ story\ about\ her\ brother\rrbracket)$

    b. $= \lambda\xi_2[B(\lambda u[\xi_2(u)(\lambda y\lambda x[remember(y)(x)]))(Diana)]$
        $(\lambda u:female\ \lambda R\lambda x\exists p\exists y[story(y) \wedge about(\iota z[brother(u)(z)])(y) \wedge p = R(y)(x)])$

    c. $= [B(\lambda u[\lambda u:female$
           $\lambda R\lambda x\exists p\exists y[story(y) \wedge about(\iota z[brother(u)(z)])(y) \wedge p = R(y)(x)](u)$
           $(\lambda y\lambda x[remember(y)(x)]))$
           $(Diana)]$

    d. $= [B(\lambda u:female$
           $\lambda R\lambda x\exists p\exists y[story(y) \wedge about(\iota z[brother(u)(z)])(y) \wedge p = R(y)(x)]$
           $(\lambda y\lambda x[remember(y)(x)]))$
           $(Diana)]$

    e. $= [B(\lambda u:female$
           $\lambda x\exists p\exists y[story(y) \wedge about(\iota z[brother(u)(z)])(y) \wedge p = remember(y)(x)]))$
           $(Diana)]$

    f. $= [\lambda x:female\exists p\exists y[story(y) \wedge about(\iota z[brother(x)(z)])(y) \wedge p = remember(y)(x)]$
           $(Diana)]$

    h. $= \exists p\exists y[story(y) \wedge about(\iota z[brother(Diana)(z)])(y) \wedge p = remember(y)(Diana)]$

In (55)(a) the meaning of the extraction clause, (54), is applied to the meaning of the *wh*-constituent, (53). By lambda-conversion, the meaning of the *wh*-constituent enters the computation at the place of the meaning of the trace, T_2. This is of a semantic type that introduces a pronoun that is to be bound syntactically, which is achieved by the operator B. In this way, the pronoun *her* in the moved phrase is interpreted as the referent of the subject, Diana.

2.5   Binding into the head of relative clauses

In the section above we have seen how binding under reconstruction can be handled in a Surface Interpretation account, using movement of a *wh*-constituent as an example. Other cases of binding under reconstruction can be explained in a similar way (cf. e.g. Jacobson 1999, 2004). Let us take as an example binding into the head of a relative clause, as in the following example:

(56) [*the* [[*story about her brother*] [*that* [2 [*Diana* [B [*remembered* T_2]]]]]]]

An LF approach that would try to express the binding of the pronoun *her* by *Diana* would have to resort to the head-raising analysis of relative clauses (Vergnaud 1974, Kayne 1994). But this is not necessary. We get a working analysis under Surface interpretation as well.

For the relative clause, we assume that the type of the trace T_2 is **ee**, a function from entities to entities. This leads to the following interpretation, in which T_2 is an argument of the relation $\lambda y\lambda x[remember(y)(x)]$:

(57) ⟦[*that* [2 [*Diana* [B [*remember* T$_2$]]]]]⟧
    a. = λξ$_2$[B(λu[λyλx[remember(y)(x)](ξ$_2$(u)))(Diana)])]
    b. = λξ$_2$[B(λu[λx[remember(ξ$_2$(u))(x)])(Diana)]
    c. = λf[B(λuλx[remember(f(u))(x)])(Diana)
    d. = λf[remember(f(Diana))(Diana)], type **(ee)t**

The type-unspecific variable ξ$_2$ turns out to be a variable of functions from entities to entities, type **ee**, in step (b), and hence I replaced it by a variable f for perspicuity. The resulting meaning is a predicate of functions f such that Diana remembers whatever the function maps Diana to. This means, of course, that Diana must be in the domain of the function.

The head NP [*story about her brother*] is interpreted as follows; the syntactically bound pronoun *her* is projected, as usual.

(58) ⟦[*story about her brother*]⟧
    = λu:female λy[story(y) ∧ about(ιz[brother(u)(z)])(y)], type **eet**

The semantic types of these meanings are slightly different: (57) is a function from functions from entities to entities that maps such functions into truth values (a predicate on functions), (58) is a function from entities to a function from entities to truth values (a two-place relation). We assume general type change mechanism from two-place relations of type **eet** to predicates over functions of type **(ee)t**, which is defined as follows:

(59) F(R) = λf∀u∈DOM(f)[R(f(u))(u)]

This maps every function f of type **ee** to truth iff for every u in the domain of f, the relation R holds between u and f(u). In the case at hand we get the following interpretation, where we again assume that the F operator is represented in syntax, for perspicuity.

(60) ⟦F[*story about her brother*]⟧
    = F(λu:female λy[story(y) ∧ about(ιz[brother(u)(z)])(y)])
    = λf∀u∈DOM(f)[u: female ∧ story(f(u)) ∧ about(ιz[brother(u)(z)])(f(u))]

This is the set of functions f that map entities u to entities f(u) such that u is female, f(u) is a story and f(u) is about the brother of u.

Combining the head noun and a restrictive relative clause is generally by intersection. We assume the following rule, where ξ is a variable of an appropriate type.

(61) ⟦[$_{NP}$ [$_{NP}$ α] [$_{RelCL}$ β]]⟧ = λξ[⟦α⟧(ξ) ∧ ⟦β⟧(ξ)]

Combining the two meanings of (60) and (57) with this rule gives us the following result:

(62) ⟦[$_{NP}$ [$_{NP}$ F [*story about her brother*]] [$_{RelCL}$ *that* [2 [*Diana* [B *remember* T$_2$]]]]]⟧
    a. = λξ[⟦[*that* [2 [*Diana* [B *remember*]]]]⟧(ξ) ∧ ⟦[F *story about her brother*]⟧(ξ)]
    b. = λξ[λf[remember(f(Diana))(Diana)](ξ) ∧
         λf∀u∈DOM(f)[u: female ∧ story(f(u)) ∧ about(ιz[brother(u)(z)])(f(u))](ξ)]
    c. = λf[remember(f(Diana))(Diana) ∧
         ∀u∈DOM(f)[u: female ∧ story(f(u)) ∧ about(ιz[brother(u)(z)])(f(u))]

This is a predicate on functions f such that Diana remembers f(Diana), where f(Diana) is a story about Diana's brother, by the second conjunct. Notice that the interpretation of *her* by Diana is achieved in a rather indirect way here: The pronoun is used to define a function in the NP meaning [F [*story about her brother*]] that then is applied to Diana in the relative clause.

A minimal function f that satisfies this description would be one that maps Diana to the unique story about her brother that she remembers. In this case, the definite article *the* can be applied to the meaning of (62) to single out that function. The standard meaning of the definite article as the iota operator, which is defined if uniqueness is satisfied, has to be slighly amended, however: If $f = \{\langle Diana, s\rangle\}$ is such a function (where s is the unique story about Diana's brother that Diana remembers), then $f' = \{\langle Diana, s\rangle, \langle Ariane, s'\rangle\}$ is an appropriate function as well, if s′ is a story about Ariana's brother that Ariana remembers. In Grosu & Krifka (2008), we have argued for a minimalization operation on the functions that a restrictive relative construction applies to, which in this case would only leave f as the unique minimal function; when such a unique minimal function exists, the definite article can be applied. We have also showed that the same reasoning leads to an explanation of the readings in the following case, where instead of a pronominal binding the index at which *gifted mathematician* is evaluated corresponds to the index introduced by the modal element *claim*.

(63)   *the gifted mathematician that you claim to be*

The proposed treatment also works when the relative clause contains a quantifier, as in the following case:

(64)   [[F [*story about her brother*]] [*that* [2 [*every girl* [B [*remembers* T₂]]]]]]

Here, the first conjunct in the function description of (62)(c) changes, resulting in the following meaning:

(65) $\lambda f[\forall x[girl(x) \rightarrow remember(f(x))(x)] \land$
          $\forall u \in DOM(f)[u: female \land story(f(u)) \land about(\iota z[brother(u)(z)])(f(u))]$

The minimal function f that satisfies this is one that maps every girl x (and nothing else) to the unique story about x's brother.

The derivation proposed here might appear rather complicated, in particular as it involves the operator F that changes a relation to a predicate of functions. However, it gives us precisely the right result. Also, it should be pointed out that the head-raising analysis in an LF framework has its complications as well. For example, if we indeed want to reconstruct the NP *story about her₁ brother* in the position of the trace, then this is of the wrong syntactic category; it is an NP that is interpreted as a predicate, but we require a DP to satisfy the categorial requirements.

(66)   [DP *the* [NP [NP *story about her₁ brother*] [RelCL *that* [*Diana₁* [*remembers* _]]]]]

This problem can be solved, cf. e.g. Sauerland (2003) and Hulsey & Sauerland (2006). But it appears that the added complexity corresponds to the type changer F that the Surface Interpretation account has to assume.

3. Condition C effects and reconstruction

3.1 Condition C effects: A test case?

After having worked through viable accounts of syntactically bound pronouns for semantic reconstruction, and hence for Surface Interpretation, we will consider referential expressions. Their behavior was constructed as an argument against surface interpretation by Fox (1999), and was recognized even by the proponents of surface interpretation as a potential problem (cf. Jacobson 2004). The argument is based on Condition C of binding theory, in the following form:

(67)   Condition C: A r(eferential) expression (proper name, definite description, or specific indefinite) cannot be in the scope of (be c-commanded by) a coreferential expression, especially if this c-commanding expression is a pronoun.

For example, Condition C rules out that *he* or *John* is coreferent with *John*, *the man* or *someone from New York* in the following examples:

(68)   *John / He told Mary*
       [*that John / the man / someone from New York won the lottery*]

This does not mean that *he* and the r-expression cannot refer to the same individual, e.g., in the unlikely event that the subject referent referred to by *he* forgot that he is actually John, or if he presents himself to Mary as another person to hide the fact that he is actually John. Condition C just rules out that the expressions are forced to corefer. This forced coreference is of course possible for syntactically bound pronouns, as in the following examples:

(69)   *John / the man / someone from New York / every dancing partner*
           told Mary that he won the lottery.

These examples clearly have two readings, one in which the subject binds the pronoun *he* and enforces a coreferring reading, and one in which it doesn't, and strongly invites a reading in which *he* refers to a distinct person. The bound reading is especially obvious with quantified antecedents.

In reconstruction configurations, Condition C effects are relevant because it appears that they can be used to check where a constituent is interpreted, at is surface position or at its "reconstructed" position. Consider the following structure:

(70) $[_{DP} ... \text{r-expression}_1 ...]$ $[2 [... \text{pronoun}_1 ... [... t_2 ...] ...]$

If Condition C is checked on Surface Structure, no violation should arise, as the pronoun does not c-command the r-expression. If it is checked on the reconstructed position, however, Condition C should result in ungrammaticality, as then the pronoun will c-command the co-indexed r-expression:

(71)   *$[... \text{pronoun}_1 ... [. . . [_{DP} ... \text{r-expression}_1 ...]_2 ...] ...]$

So, LF Interpretation is, prima facie, compatible with both outcomes: If Condition C is checked on Surface Structure, (70) should be grammatical; if it is checked in the reconstructed position, it should be ungrammatical.

In contrast, Surface Interpretation appears to predict that there should not be a problem with reconstruction if Condition C is checked on Surface Structure, which is the only option that Surface Interpretation can consider in Condition C is a syntactic principle. Under the version of the semantic account that assumes traces of different types, we assume the following syntactic structure and interpretation:

(72) $[\![[_{\text{DP}} ... \text{r-expression}_1 ...] \ [2 [... \text{pronoun}_1 ... [... T_2 ...] ...]]]]\!]$
      $= [\![[2 [... \text{pronoun}_1 ... [... T_2 ...] ...]]]\!]([\![[_{\text{DP}} ... \text{r-expression}_1 ...]\!])$

The meaning $[\![[_{\text{DP}} ... \text{r-expression}_1 ...]\!]$ is a semantic function for which it cannot be recorded that it contains an r-expression. Hence, if it gets interpreted in the position of T_2, nothing can cause the clause to be ruled out because of the linguistic form of an expression within $[_{\text{DP}} ... \text{r-expression}_1 ...]$. To record the presence of an r-expression in the meaning $[\![[_{\text{DP}} ... \text{r-expression}_1 ...]\!]$, which might allow us to check Condition C violations in semantics, would certainly be an otherwise unmotivated move. This is in contrast with signaling the presence of bound pronouns in semantic representation, as proposed in section 2.4, as bound pronouns plausibly lead to meanings that are functionally incomplete, a semantic property that should arguably be recorded in the semantic interpretation of such expressions.

3.2 Condition C effects and reconstruction: Initial observations

Now, what are the facts? They turn out to be rather less straightforward than one would wish. Chomsky (1995) considers examples like (73), for which a coreferring reading of *he* and *Tom* is difficult to achieve.

(73) [*John wondered* [[*which picture of Tom*] [*he liked _*]]]

Chomsky states that "reconstruction seems to be forced", from which it follows that Condition C would rule out the coindexed reading:

(74) [*John wondered* [_ [*he liked* [*which picture of Tom*]]]]

Chomsky assumes a "preference principle" for reconstruction: "Do it when you can (i.e. minimize the restriction on the operator position)". If this is a principle that can be violated, it might well motivate why sentences like (73) are not quite so bad as it might be expected, cf. the hedge in Chomsky's statement that reconstruction *seems* to be forced. However, the motivation of the preference principle – to minimize the restriction in the operator position – is not really clear. See Sauerland (2000) for further empirical motivation for reconstruction, and Sportiche (2006) for an overview of research from the view of LF Interpretation.

There is a potential problem with the idea of a principle that forces reconstruction. This is because it is acknowledged that for Condition A, which governs reflexive and reciprocal pronouns, such a principle would not always hold. For example, Chomsky (1995) observes that (75) has, in addition to the reading in which *himself* is bound by *Bill*, a reading

in which *himself* is bound by *John*; for this reading, it is plausible that the *which* phrase does not reconstruct.

(75) [*John wondered* [*which picture of himself*] [*Bill saw* _]]

However, we do not have to assume that the *which* phrase does not reconstruct in order to explain that reading. Recall that reflexives can also be bound by the person from whose perspective a state of affairs is reported, especially with picture nouns. Hence, even after reconstruction, *John* might bind *himself*. This explanation is viable if *John* can also bind the reflexive in cases in which there is no movement involved, as in (76):

(76) *John believes that Bill saw a picture of himself*.

The reading where *John* binds *himself* might be less prominent than in (75) as a matter of processing: In (76) *Bill* both precedes and c-commands *himself*. But the reading is certainly available, which can be seen when *Bill* is replaced by *Mary*.

Let us wrap up. The initial observation clearly speaks in favor of a version of LF Interpretation, as in this account, we can motivate why Condition C effects arise. To be precise, with a structure like (73) LF interpretation could either not allow for coreference of *Tom* and *he* (in case the *which*-phrase is interpreted in its surface position), or it could allow for it (in case the *which*-phrase is interpreted in the position of the gap). The remaining problem is to come up with a convincing motivation for the preference principle, that is, why the second option is possible. In contrast, Surface Interpretation predicts that Condition C should not be violated, regardless whether the *which* phrase is interpreted in surface position or after "semantic" reconstruction by functional application gets the meaning of *which picture of Tom* to be fed into the meaning composition at the position of the gap. In the first case, *Tom* does not c-command *he*, and in the second, it is not "visible" for *he* that the meaning of *which picture of Tom* contains a referential expression.

3.3 Exceptions to Condition C effects under reconstruction

As indicated in the last section, the data concerning Condition C effects in reconstruction contexts are less clear than proponents of LF Interpretation could wish for. This is because there are a number of cases that are generally received to be exceptions. Unfortunately, there is no empirical study of the phenomena beyond introspective judgements of the researchers, and in this article I will also not be able to provide a more thorough empirical basis. However, while the judgements of data in isolation are often unclear, the judgements of minimal pairs of sentences often are quite evident, and might constitute a sufficient basis for initial attempts at an explanation.

One important class of exceptions is the argument/adjunct asymmetry that is widely discussed (cf. Riemsdijk & Williams 1981, Freidin 1986, Lebeaux 1990).

(77) a. [*Which claim that Mary had offended John*] *did he repeat?*
     b. [*Which claim that offended John*] *did he repeat?*

Notice that in (77)(a), the *that*-clause is an argument of *claim*, whereas in (b), it is an adjunct. The received judgement of such sentences is that in (a) *he* cannot corefer with *John*, whereas in (b), *he* can. The received explanation, due to Lebeaux (1990), is that ad-

juncts enter the syntactic and semantic recursion later, which for some reason exempts them from being reconstructed.

But in addition to r-expressions that occur in adjuncts to heads, Condition C effects are sometimes absent if the r-expression occurs within an argument of the head. These exceptions often are of somewhat reduced grammaticality, but they have been recorded by authors in spite of the fact that they are not predicted by the proposed theories, which we should take as serious evidence that they are a real phenomenon.

Safir (1999) has collected a number of such judgements in the literature that were deemed grammatical – the following examples are by Ross, Higginbotham, Kuno, Postal, Culicover and Heycock, respectively. He calls this the "anti-reconstruction" effect.

(78)   a. *That Ed$_1$ was under surveillance he$_1$ never realized.*
       b. *Which biography of Picasso$_1$ do you think he$_1$ wants to read?*
       c. *Most articles about Mary, I am sure she hates.*
       d. *Whose allegation that Lee$_1$ was less than truthful did he$_1$ refute vehemently?*
       e. *That John$_1$ had seen the movie he$_1$ never admitted.*
       f. *Which picture of John$_1$ does he$_1$ like best?*

Under Surface Interpretation, such anti-reconstruction cases can be easily explained, but we would have to explain why examples like (73), which are taken to represent the base case, are ungrammatical. Under LF interpretation, we can assume that Condition C can be checked on surface structure, but again we would have to explain why checking is sometimes on the surface position, and sometimes on the reconstructed position.

Safir assumes that Condition C is always checked in the reconstructed position, but that there is the phenomenon of "vehicle change" (cf. Fiengo & May 1994). This allows that in the lower copy of the reconstructed expression, the r-expression in replaced by a pronoun. Using (78)(a) as example, we can represented this as follows under the copy theory of movement:

(79)   [~~*That Ed$_1$ was under surveillance*~~ [*he$_1$ never realized* [*that he$_1$ was under surveillance*]]]

In the lower copy, the r-expression *Ed* is changed to the pronoun *he*, which avoids Condition C violation. Presumably, the second occurrence of *he* is motivated by the fact that the pronoun *he* has an antecedent, *Ed*, to which it can refer. This change from a name to a pronoun is motivated in Fiengo & May (1994) by data concerning ellipsis, as in the following example, in which the referring expression *Sol* has to be replaced by *him* in the elided clause to get the intended binding right.

(80)   *Lara* [*loves Sol$_1$*] *and he$_1$ thinks that Sara does* [~~*love him$_1$*~~] *too.*

With this move, what we have to explain is not when reconstruction applies or not, or whether Condition C is checked at the first position or at the second, but when the r-expression is changed to a pronoun, and when it remains an r-expression.

Safir (1999) mentions as one potential factor Kuno's Logophoric NP constraint (published in Kuno 2006), which blocks coreference between a c-commanding expression α and a name in a constituent that represents the thoughts or an utterance of the referent of

α. This should explain why coreference in (73) is not possible, as *wonder* is a predicate denoting a thought. But this argument implies that examples (78) do not involve utterance or thought predicates, and therefore should be good. However, these very examples involve predicates like *realize, want, hate, refute, admit* that presumably all fall under Kuno's Logophoric NP constraint. One may argue that for some examples, negation prevents a logophoric reading, but, presumably (81) does not differ in grammaticality from (78)(a).

(81) *That Ed was under surveillance he certainly realized.*

Also, the Logophoric NP constraint should not be applicable to (78)(f), as liking involves a thought concerning the liked object. It also cannot explain the contrast to the following example, as recognized by Safir.

(82) *??Which picture of John does he like?*

Hence we conclude that the exceptions to Condition C effects under reconstruction are not explained in Safir (1999).

3.4 The role of verbs of creation

Fox (1999) considers a different set of data that lack Condition C effects, and argues that there is no reconstruction in the first place. His argument elaborates on the argumentation in Heycock (1995).

Heycock shows that the nature of the predicate of a clause sometimes enforces a reconstructed reading. For example, *invent* implies that the object of invention does not exist independently of the invention effect, favoring a narrow-scope reading, whereas *reinvent* or *recall* presuppose that the object of invention does exist independently, allowing for a wide-scope reading. That is, *invent* is a verb of creation, whereas *reinvent* is not. This leads to different interpretations with quantifier phrases headed by *how many* that result in determiner phrases in which asking for the number and the scope of an existential determiner can be dissociated. Consider the following examples and their possible readings:

(83) [*How many stories*] *is Diana likely to invent?*
    a. 'What's the number n such that Diana is likely to invent n-many stories?'
    b. *'What's the number n s.th. there are n-many stories that D. is likely to invent?'

(84) [*How many stories*] *is Diana likely to reinvent / recall?*
    a. 'What's the number n such that Diana is likely to reinvent n-many stories?'
    b. 'What's the number n s.th. there are n-many stories that D. is likely to reinvent?'

Notice that the reading (83)(b) is unavailable, as the existential quantifier has wide scope over a proposition even though it originates as the object of the narrow-scope enforcing predicate *invent*.

Now, if we construct examples that involve a potential Condition C violation under reconstruction, examples like (83) that enforce reconstruction should turn out to be bad. This is indeed the case:

(85) **How many stories about Diana₁'s brother is she₁ likely to invent?*

(86)   *How many stories about Diana$_1$'s brother is she$_1$ likely to reinvent / recall?*
      b. 'What's the number n s.th. there are n-many stories about Diana's brother
          that Diana is likely to re-invent?'

Example (85), which enforces reconstruction of the quantified subject, leads to ungrammaticality due to Condition C violation. Example (86), which allows for the non-reconstructed reading, is grammatical, or at least much better than (85), but only under the non-reconstructed reading.

A word about data: Heycock's original example was the following, with her own grammaticality judgement:

(87) $^?$*How many stories about Diana$_1$ was she$_1$ really upset by?*

Example (86) is due to Fox (1999), and it appears to be better than (87), presumably because *Diana* is in a more subordinated position. We will come back to this point.

Example (85) differs from cases in which no Condition C violation can occur even under reconstruction such as (88). Here, the reconstructed reading reappears, even though the pronoun *her* linearly precedes its antecedent.

(88)   *How many stories about her$_1$ brother is Diana$_1$ likely to invent?*
      a. 'What is the number n such that Diana is likely to invent n-many stories
          about her (= Diana's) brother?'

We find similar differences with other verbs of creation, as the following examples show, where (89)(a) is due to Fox (1999). While these examples are not always perfect, the versions with a creation verb are clearly much worse.

(89)   a. *How many houses in John$_1$'s city does he$_1$ think should be *built / demolished?*
      b. *How many proofs for John$_1$'s innocence is he$_1$ likely to *fabricate*
          / bring up again?
      c. *How many poems of Sue$_1$ is she$_1$ likely to *write / get published?*
      d. *How many of this couple's children will they$_1$ *have / manage to nourish?*

The constructions we have considered so far were concerned with wh-movement. The same point can be made with relative clauses, under the assumption of the head-raising analysis of relative clauses (cf. Vergnaud 1974, Kayne 1994).

(90)   **the (dozens of) stories about Diana$_1$'s brother that she$_1$ is likely to invent*

As *invent* enforces a narrow-scope reading of quantificational phrases, the head of the relative clause construction, *(dozens of) stories about Diana's brother*, must reconstruct into the object position of *invent*. This results in a Condition C violation, resulting in ungrammaticality. This contrasts with cases like (91), in which the verb does not enforce a narrow-scope interpretation.

(91)   *the dozens of stories about Diana$_1$'s brother that she$_1$ is likely to reinvent / recall*

Here the head of the relative clause does not have to reconstruct into the object position, allowing for a reading without Condition C violation.

The same asymmetries with relative clauses show up with other verbs of creation:

(92) *the houses in John$_1$'s city that he$_1$ thinks should be *build / demolished*

Fox (1999) also points out that tense can make a difference. Present or future tense with verbs of creation implies that the object being created does not exist yet, whereas past tense does not imply that. This explains the following difference, in which the verb of creation appears within the relative clause:

(93) *How many papers that John$_1$ *writes / *will write / wrote does he$_1$ think will be published?*

(94) [*the dozens of papers of John$_1$*] *that he$_1$ *will write / wrote*

We can summarize the findings of this section as follows: If in a configuration like (95) the referent of the moved constituent α that contains an r-expression does not come into existence by the event denoted in the clause β, then this does not result in a Condition C violation, or at least the Condition C violation is much weaker.

(95) [$_α$ … r-expression$_1$ …]$_2$ [$_β$ … pronoun$_1$ [… t$_2$ …] …]

3.5 Idiomaticity in Condition C violations?

Before we investigate these exceptions to Condition C violations more closely, we should have a look at a class of examples that has been suggested by Munn (1994). He contrasts examples like the following:

(96) *the picture of Bill$_1$ that he$_1$ *took / likes* ‗

Munn explains this contrast within a copy theory of movement, as follows:

(97) a. [*the picture of Bill$_1$*] [[*which picture of Bill$_1$*] [*he$_1$ took* [*which picture of Bill$_1$*]]]
       b. [*the picture of Bill$_1$*] [[*which picture of Bill$_1$*] [*he$_1$ likes* [~~which picture of Bill~~$_1$]]]

According to Munn, in (97)(a) he idiomatic expression *take a picture* enforces spelling out the lowest copy, resulting in a Condition C violation, and hence, ungrammaticality. In (b), however, there is no need to spell out the lower copy, which then can be deleted, with the result that a Condition C violation can be avoided. The intermediate position of *which picture of Bill$_1$* would be turned into an operator, by an independent rule.

But notice that *take*, in its idiomatic meaning in *take a picture*, is a verb of creation; it meas the same as *make a (photographic) picture*. Hence the Condition C violation might be attributable to the same factors as with examples like (90). Notice that we have the same effect with the non-idiomatic way of expressing this notion:

(98) **the picture of Bill$_1$ that he$_1$ made*

And for idioms or collocations that do not imply creation, we find that they pattern with non-idiomatic cases:

(99) a. *the picture of Bill$_1$ that he$_1$ touched up / framed*
       b. *the impression about Bill$_1$ that he$_1$ thinks counts most*
       c. *the old-standing grievances about Bill$_1$'s enemies that he$_1$ aired again*

So it appears that idiomaticity is not an independent reason that leads to Condition C effects after all.

3.6 Taking Stock

In this section, we arrived at certain intermediary results concerning the issue what Condition C violations tells us about the nature of semantic interpretation.

Let us first take LF interpretation. Recall that LF Interpretation allows for the interpretation of an expression $[\ldots \alpha_i \ldots]_j$ with a referential term α_i either in surface position or in the reconstructed position with respect to a expression $[\beta_i [\ldots t_i \ldots]]$. Depending on general principles where $[\ldots \alpha_i \ldots]$ is interpreted, Condition C effects either do not arise, or do arise, or sometimes arise. What we found is that Condition C effects sometimes arise. This is consonant with LF interpretation; hence the tasks would be to determine under which conditions we find reconstruction (and hence Condition C violations), and under which conditions we don't.

Under Surface Interpretation, we should generally not expect Condition C violations in this configuration, as it is the meaning $[\![[\ldots \alpha_i \ldots]]\!]$ that ends up being interpreted in the position of the trace, t_i. As Condition C violation effects sometimes seem to arise, this appears to be a problem for Surface Interpretation.

However, in the next section I will argue that the cases that look like Condition C violations actually can be explained in another way, a way which can characterize the class of these cases well. It will turn out that the apparent Condition C violations do not distinguish between LF Interpretation and Surface Interpretation, after all, and cannot be used as an argument against LF interpretation. The result will be interesting for LF interpretation accounts as well, as it helps to characterize the exceptions to what this account takes to be Condition C violations.

4. A Competition Account for Apparent Condition C effects

4.1 A preference for syntactic binding

The alternative explanation for apparent Condition C effects under reconstruction contexts follows a suggestion in footnote 13, attributed to Gennaro Chierchia and Yael Sharvit, in Fox (1999), as well as proposals by Sharvit (1999), Cechetto (2001) and Sternefeld (2001), with various extensions. It makes use of the competition account for Condition C effects going back to Reinhart (1983).

Let us consider the following minimal pair:

(100) a. $^{??}$ *What kind of stories about Diana₁'s brother is she₁ likely to invent _ ?*
      b. *What kind of stories about her₁ brother is Diana₁ likely to invent _ ?*

Under Surface Interpretation, the intended coreference in (100)(b) can be expressed as a case of a syntactically bound pronoun, as in (101): *her* creates a functional reading for the *wh*-phrase, the *wh*-phrase is interpreted by lambda-conversion in the position of the trace

T$_2$, and the binding operator B ensures that the meaning of *Diana* ends up coreferent with the meaning of *her*. The derivation is exactly as proposed for (52).

(101) [*what kind of stories about her brother*] [2 [*is Diana* [B [*likely to invent* T$_2$]]]]

Now, if (100)(a) were grammatical, this coreference could not be expressed by a syntactically bound pronoun. The reason is that the referential expression *Diana* does not generate a functional reading, hence the B operator could not be applied:

(102) [*what kind of stories about Diana's brother*] [2 [*is she* [*B [*likely to invent* T$_2$]]]]

But syntactic binding is not the only option available. Coreference can also be expressed by discourse binding, as in antecedent – anaphor relations across sentences in discourse, or in donkey sentences, cf. (11) and (12). This is a distinct kind of binding that follows different rules, as outlined in Discourse Representation Theory (e.g., Kamp & Reyle 1994) and Centering Theory (e.g., Walker, Joshi & Prince 1998). In discourse binding, the antecedent need not c-command the anaphoric expression, but it typically precedes it. So, discourse binding should be possible for structures like (100)(a). In particular, under the plausible assumption that a sentence like (100)(a) is uttered in a context in which Diana is already given, and even salient, *Diana* should be able to refer to the person Diana, and *she* should be able to pick up the discourse referent that is already given. Nevertheless, even in such contexts (100)(a) appears to be degraded, and (100)(b) is at least more acceptable, though not quite as acceptable as (c) in which *Diana* is picked up by a pronoun.

(103) A: *I have a friend, Diana, who comes up with weird stories about her brother.*
　　 B: a. $^{??}$*What kind of stories about Diana's brother is she likely to invent?*
　　　　 b. $^{?}$*What kind of stories about her brother is Diana likely to invent?*
　　　　 c: ✓ *What kind of stories about her brother is she likely to invent?*

I would like to propose that the reason for the degraded status of (100)(a) is not due to a Condition C violation, but rather to a competition with sentence (100)(b). The reason is that (100)(b) expresses coreference in a more grammaticalized way, by syntactic binding, than (100)(a). The general pragmatic rule underlying this reasoning can be stated as follows:

(104) If there is a constituent [… α … β …] in which α and β should refer to the same entity, then it is better to express this coreference by syntactic binding than by discourse binding.

This means that if syntactic binding can be used to express coreference, then it should be used. As a consequence, if it is avoided, then a reading in which α and β do not corefer results, by implicature; this is the reading that (100)(a) actually gets, with *she* referring to a different person than Diana. Of course, (100)(b) has a discourse-bound reading as well if there is a salient discourse referent not anchored to Diana that can be picked up by *her*.

The proposal to explain the lack of the indicated co-referring reading of (100)(a) is in line with other competition theories of anaphoric choice, as proposed in Reinhart (1983). Reinhart distinguishes bound anaphora, which might be reflexive/reciprocal or pronomi-

nal, and non-bound, or referential expressions, which might be non-pronominal or pronominal expressions (but not reflexive/reciprocal). She states:

(105) When syntactically permitted, bound anaphora, whether of [reflexive/reciprocal] pronouns or non-[reflexive/reciprocal] pronouns, is the most explicit way available in the language to express coreference, as it involves referential dependency. So, when coreference is desired, this should be the preferred way to express it. (Reinhart 1983, p. 76).

Cf. Grodzinsky & Reinhart (1993) for refinements of this argument, and Safir (2004) for a particular implementation, the FTIP principle, which states that if an antecedent c-commands a pronoun, the "most dependent" form of the pronoun must be used. With Reinhart, we could explain why (100)(a) is of reduced grammaticality because (after reconstruction, by syntactic or semantic means), coreference could not be expressed because the pronoun cannot be syntactically bound by *Diana*, and there is an alternative way, (b), by which coreference can be expressed. While the possibility for this type of explanation has been disregarded by Safir (2004) in his own competition theory, it was suggested in work such as Sharvit (1999), Cechetto (2001) and Sternefeld (2001).

The picture developed here is slightly more complex than in Reinhart's original account. In that account, two conditions were considered: expressions that indicate coreference, and expressions that don't. Here, there are three conditions: expressions that indicate coreference by syntactic binding, expressions that indicate coreference by discourse binding, and expressions that do neither. But Reinhart's argumentation can apply to the present case as well when we assume that syntactic binding is the most explicit way to express coreference, followed by discourse bound pronouns. The reason for this ranking is that the conditions for syntactic binding are defined most narrowly, involving a syntactic configuration between binder and bindee, whereas the conditions for discourse binding are defined more broadly, including binding across sentences; in theories like Elbourne (2005), discourse pronouns would not express binding at all, but coreference by covert descriptions.

Sportiche (2013) explicitly argues against a competition account as proposed in the previous section. One of his arguments is that there should be a reason why the winning candidate is the winning candidate, and he fails to see one. This argument can be answered by pointing out that we have a subset relationship between the application domains of two devices, syntactic binding and discourse binding; wherever the first can apply, the second can apply as well, but not vice versa. This is a typical situation where pragmatic rules would force language users to choose the more restrictive device, if applicable. For example, a definite DP should be used if its conditions – in particular, uniqueness of reference – is satisfied, which results with indefinite DPs as having a non-uniqueness implicature.

4.2 When syntactic binding is not optimal

Reinhart (1983) has stated a number of cases in which the pragmatic preference (105) is superseded by other factors, and she considers it a remarkable strength of her theory over standard Binding Theory that she can explain configurations where the preference in

(105) seems not to hold and relations obtain that are ruled out by standard binding theory (relations as the ones discussed by Evans 1980). For example, in statements like *He is John*, the speaker wants to express an identity that is not established yet. So, coreference between *he* and *John* is "desired" in this case, but it is not presupposed, but asserted in the very sentence. Syntactic binding does not assert coreference, but presupposes it, and hence cannot be relied on in this case.

We have seen in section 3 that there are a number of exceptions to apparent Condition C violations under reconstruction, and we will have to explain why in these cases syntactic binding is not the best option, and discourse binding succeeds. For example, we will have to explain why example (86) , here repeated, allows for a discourse-bound reading that is not surpassed by the syntactically bound reading.

(106) *How many stories about Diana$_1$'s brother is she$_1$ likely to recall?*

It should be pointed out that discourse binding does not necessarily mean that *Diana* introduces a discourse referent that is then picked up by *she*. Rather, we should assume that there is already a salient discourse referent for Diana that is picked up first by the name, and then by the pronoun. This is the typical context for such sentence. To see this, observe that if we change the name to an indefinite that introduces a new discourse referent, the resulting sentence is bad:

(107) **What kind of stories about the brother of* [*a friend of yours*]$_1$
       is she$_1$ likely to recall?

Only indefinites that are very clearly interpreted as specific allow for such sentences:

(108) *What kind of stories about a certain friend of yours does he prefer to forget?*

Notice that global givenness did not help much to improve cases like (103)(a), and we will have to explain why verbs of creation are different.

Another point to consider here is that in order for apparent Condition C effects to arise, the available competitor is indeed better than the alternative that it blocks. It is instructive to consider an example by Lebeaux (1990) involving intermediate traces that is refined by Fox (1999) to argue for syntactic reconstruction (with indicated judgements).

(109) a. [*Which (of his) paper(s) that he$_1$ gave to Ms. Brown$_2$*]
         did every male student$_1$ hope t *that she$_2$ will read* t′?
      b. *[*Which (of his) papers that he$_1$ gave to Ms. Brown$_2$*]
         did she$_2$ hope *t *that every male student$_1$ will revise* t′ ?

Fox assumes two potential trace positions, one as the trace of cyclic wh-movement in SpecCP of the embedded clause, one as object of *read*. Reconstruction must be such that the pronoun *he* ends up being bound by the quantifier *every student*. In (109)(a), reconstruction (or spell-out for interpretation) in t is possible, in which case the name *Ms. Brown* c-commands the pronoun. In (b), reconstruction must be at the lower trace t′, as otherwise the pronoun *he* could not be bound by *every male student*, in which case a Condition C violation ensues. This is the story for syntactic reconstruction.

From the viewpoint of semantic reconstruction, we can again assume that syntactic binding between *Ms. Brown* and *she* is preferred, where possible. Let us, for the purpose of checking the alternatives, exchange the occurrences of the name and the pronoun:

(110) a. [*Which (of his) paper(s) that he$_1$ gave to her$_2$*] *did every male student$_1$ hope* t
      that Ms. Brown will read t′?

    b. [*Which (of his) paper(s) that he$_1$ gave to her$_2$*] *did Ms. Brown hope* t
      that every male student$_1$ will revise t′?

If we assume, with Fox, that for semantic reasons the moved phrase is associated with both traces, t and t′, then the alternative (110)(a) does not lead to an improvement over (109)(a): The moved *wh*-expression would have to be reconstructed in the position of the first trace, and in the position of the first trace, *her* would still not be in a position to be syntactically bound by *Ms. Brown*. Hence the coreference between *her* and *Ms. Brown* can only be expressed by discourse binding, to a discourse referent for Ms. Brown that is already given in the global context. As syntactic binding is not a competitor in this case, both alternatives, (109)(a) and (110)(a), are fine – but under discourse binding. The situation is different for (109)(b). Here, the alternative (110)(b) allows for syntactic binding of *her* by *Ms. Brown* in both trace positions, and in particular for the low trace position t′ that is forced as the quantifier *every student* has to bind *he*. Hence, the availability of an alternative involving syntactic binding blocks (109)(b).

We will now have a closer look where the general preference for syntactic binding does not obtain, and discourse binding draws level with it, or even overtakes it. This will be done in two sections: In section 4.3 we will consider structural features that make syntactic binding problematic, and in 4.4 we will turn to information-structural features, in particular, to topichood as a factor in the competition.

4.3   Structural exemption from preference to syntactic binding

The position of the binder. Sportiche (2013) has argued against the competition account by pointing out that there are configurations in which both competing forms are possible. For this situation he presents an example that is of intrinsic interest even though it does not involve reconstruction, (111) in contrast to (112):

(111) a. *John$_1$'s mother told Bill about him$_1$.*

    b. *His$_1$ mother told Bill about John$_1$.*

(112) a. *John$_1$ told Sue about his$_1$ mother.*

    b. **He$_1$ told Sue about John$_1$'s mother.*

A plausible explanation of this difference is as follows: From the position of the specifier of a DP as in (111), syntactic binding is possible, as we have seen with quantifier antecedents as in (23)(a), but it requires a scope extension that is computationally costly. Hence the advantage of syntactic binding over discourse binding is not as evident anymore so that it would be able to block (111)(b) (even though this is presumably still less acceptable, in an appropriate context where *John* is given, than (a)). – An alternative explanation is that binding from the possessive is not syntactic binding at all, but discourse binding; hence there is no competition to begin with, as discussed in the context of (23).

A similar point can be made with examples involving reconstruction like the following, in which the potential binder in an apparent Condition C reconstruction configuration is in a SpecCP position:

(113) a. *the stories about Diana's brother that her uncle is likely to invent*
     b. *the stories about her brother that Diana's uncle is likely to invent*

Here, example (113)(a) appears to be grammatical, even though syntactic binding from a SpecCP position is possible. The reason is that syntactic binding, as expressed in (b), is costly from this position, and hence does not outcompete discourse binding, as in (a).

It might be questioned whether the implementation of syntactic binding in section 2.4 could deal with cases like (113)(b) at all. Consider here cases like the following:

(114) a. *Diana's uncle likes her.*
     b. *Every girl's uncle likes her.*

In a first step, quantifiers like *every girl's uncle* are generated by a meaning where the genitive attached to the quantifier, *every girl*, introduces an argument for a functional meaning that is then filled by the meaning of *uncle*, resulting in a complex quantifier *every girl's uncle*:

(115) a. $[\![every\ girl]\!] = \lambda P \forall x[girl(x) \rightarrow P(x)]$
     b. $[\![\text{'}s]\!] = \lambda Q \lambda f \lambda P[Q(\lambda x[P(f(x))])]$
     c. $[\![every\ girl\text{'}s]\!] = \lambda f \lambda P \forall x[girl(x) \rightarrow P(f(x))]$
     d. $[\![every\ girl\text{'}s\ uncle]\!] = \lambda P \forall x[girl(x) \rightarrow P(uncle(x))]$
     e. $[\![every\ girl\text{'}s\ uncle\ is\ happy]\!] = \forall x[girl(x) \rightarrow happy(uncle(x))]$

It is not straightforward to see how syntactic binding of a pronoun *her* in the VP meaning P can be implemented. This is a good argument that binding in (114) is by discourse binding, and in particular, that the *her* in the quantifier case is an instance of donkey anaphora. In this case, both versions of (113) would involve donkey anaphora, and (113)(b) would not be a competitor to (113)(a).

Interpretations that can accommodate syntactic binding exist, but they need new variants of quantifier meanings. One technique that is reminiscent of the second quantifier meaning in (43)(b) is sketched in (116); here the quantifier ends up with a meaning (d) that expects a relational expression like (a), yielding the right interpretation.

(116) a. $[\![likes\ her]\!] = \lambda u{:}female\ \lambda x[x\ likes\ u]$
     b. $[\![\text{'}s]\!] = \lambda Q \lambda f \lambda R[Q(\lambda x[R(x)(f(x))])]$
     c. $[\![every\ girl\text{'}s]\!] = \lambda f \lambda R \forall x[girl(x) \rightarrow R(x)(f(x))]$
     d. $[\![every\ girl\text{'}s\ uncle]\!] = \lambda R \forall x[girl(x) \rightarrow R(x)(uncle(x))]$
     e. $[\![every\ girl\text{'}s\ uncle\ likes\ her]\!] = \forall x[girl(x) \rightarrow uncle(x)\ likes\ x]$

Again, one can assume that this derivation of a form that allows for syntactic binding is overly complex, and once again (113)(b) is would not be a strong competitor to (113)(a).

The position of the bindee. We should expect that in a situation in which the potential bindee, the pronoun, is in a less-than-optimal position, this form loses competitiveness

against discourse binding. This is what happens with examples (86) vs. (87), and perhaps more obviously with the following examples:

(117) a. *??the stories about Diana that she is likely to invent*
     b. t*he stories about herself that Diana is likely to invent*

(118) a. *the stories about the castle of Diana's husband that she is likely to invent*
     b. *the stories about the castle of her husband that Diana is likely to invent*

Here, (117)(a) is considerably worse than (118)(a). This can be explained by the fact that the competitor of (117)(a), namely (117)(b), allows for a natural syntactic binding relation, whereas this is not the case for the competitor of (118)(a), namely (118)(b). The reason is that in the latter case, the syntactically bound pronoun is relatively deeply embedded, which means in the implementation of syntactically bound pronouns developed in section 2.4 that the argument of the functional variable representing the pronoun would have to be projected a number of steps in the semantic competition.

The argument/adjunct asymmetry. A related argument may help to explain the well-known argument/adjunct asymmetry, the observation that referring expressions that occur in adjuncts within the moved phrase do not as easily lead to apparent Condition C violations, as in the received judgements for (119).

(119) a. *??[Which claim that Mary had offended John$_1$] did he$_1$ repeat _ ?*
     b. *[Which claim that had offended John$_1$] did he$_1$ repeat _ ?*

Under the current line of argumentation, we should assume that the variant of with pronoun in the *which*-clause (120)(a) outcompetes (119)(a), whereas (120)(b) does not outcompete (119)(b):

(120) a. *Which claim that Mary had offended him$_1$ did John$_1$ repeat _ ?*
     b. *Which claim that had offended him$_1$ did John$_1$ repeat _ ?*

We would arrive at this result if it can be shown that syntactic binding is more costly into adjuncts, as in (121)(a), than into arguments, as in (b) (here shown under syntactic reconstruction):

(121) a. *John$_1$ repeated [which claim [$_{Adjunct}$ that Mary had offended him$_1$]]*
     b. *John$_1$ repeated [which claim [$_{Argument}$ that hat offended him$_1$]]*

Now, argument/adjunct asymmetries are well-known for syntactic movement, and so it would not be unexpected that syntactic binding, which involves the projection of a functional dependency, is more costly when it originates from an adjunct, as adjuncts are less tightly syntactically integrated.

Another contrast may be found with picture nouns and reflexive anaphors, which presumably are syntactically bound. Under this condition, (122)(a) should be better than (b).

(122) a. *John recalled the rumor that Mary had mutilated a picture of himself.*
     b. *John recalled the rumor that caused Mary to mutilate a picture of himself.*

At the end of the next section I will discuss another line of argument that helps to explain the difference between adjuncts and arguments.

4.4 Topicality as exemption from preference to syntactic binding

We now turn from a type of exemption from syntactic binding related to syntactic structure to a more important one that relates to information structure. The basic idea is that the need to refer to a given entity, i.e. a topic, constitutes an important reason that undermines the general preference for syntactic binding, (104). For example, in the context of (123), sentence (100)(a), here given as (123)(a), is remarkably good, and presumably not worse than (100)(b), here given as (123)(b).

(123) A: *Do you remember Diana? She has this interesting brother. People make up*
       weird stories about him. Even she herself participates in that sometimes.
     B: a. *What kind of stories about Diana's brother is she likely to invent?*
         b. *What kind of stories about her brother is Diana likely to invent?*

I assume that in contexts like the one given, the need to express coreference by syntactic binding is not pressing, as the discourse referent for Diana is present and highly salient. Thus, *she* can refer to the discourse referent given in the global context, and does not rely on a discourse referent introduced by *Diana* in the sentence it occurs.

However, saliency of Diana is not sufficient to tip the balance, as (103)(a) shows. In (123), the weird stories about Diana's brother are made particularly salient as well, which appears to be crucial for the grammaticality of (123)(B:a). Hence, the whole constituent *stories about Diana's / her brother*, must be related to a discourse topic.

If *stories about Diana's / her brother* is used to refer to a discourse topic, then there is a good reason to avoid syntactic binding, and to prefer the version *stories about Diana's brother*. Under syntactic binding, the pronoun *her* would lead to a functional meaning, (124)(a), which does not match the discourse referent anchored to the meaning $\lambda y[\text{stories}(y) \wedge \text{about}(\iota z[\text{brother}(Diana)(y)]$. It is true that after supplying the value Diana for the argument u, the resulting predicate would refer to the concept that this discourse referent stands for. But the expression would not pick up that discourse referent directly. In contrast, (124)(b) would pick up that discourse referent. Hence, if we assume that there is a preference for re-using meanings that are provided by salient discourse referents, the non-functional concept as in (124)(b) has an interpretative advantage.

(124) a. ⟦*stories about her₁ brother*⟧ = λu:female $\lambda y[y$ is story about $\iota z[z$ is brother of u]]
     b. ⟦*stories about Diana's brother*⟧ = $\lambda y[y$ is a story about $\iota z[x$ is brother of Diana]]

I should mention here that topicality may also be responsible for certain known exceptions to Condition C called "instantiation contexts" by Safir (2004) (Ken Safir, pers. communication). In the context of (125)(A), John is highly salient, hence *John* can outcompete a bound pronoun in (B).

(125) A: *There are no people who like John.*
     B: *Well, John is someone who likes John.*

Evidence for the role of salient discourse referents, or topicality, can also be gained by looking at sentences in which no reference to a topical entity is intended. In this situation, apparent Condition C violations under reconstruction should become more prominent.

And this is what we find in (126), a case with a predicate like *recall* that is known not to lead to Condition C violations under reconstruction:

(126) *the / $^{??}$any stories about Diana$_1$'s brother that she is likely to reinvent / recall*

A number of the observed exceptions to apparent Condition C effects under reconstruction can be explained by the topicality effect, to which I will now turn.

Verbs of Creation. – We start with Heycock's observation that the verb meaning plays a role; in particular, apparent Condition C violations occur more reliably with verbs of creation, cf. section 3.4. With verbs of creation, the referent of the moved phrase, e.g. *stories about Diana's brother*, does not exist independently. This makes it less easy to come up with contexts in which this concept is contextually given, and hence it leads more easily to the judgement of such sentences as bad. However, as we have seen with example (123), there are contexts in which even concepts that are objects of verbs of creation are contextually given, and in such contexts the grammaticality of sentences with apparent Condition C violations increase.

Topic marking. Salzmann (2005), working on German, observed that stressing improves acceptability in cases of apparent Condition C violations under Reconstruction, as in the following example:

(127) *die Nachforschungen über **Peter**, die er mir lieber verschwiegen hätte*
    'the investigations about Peter that he would rather have concealed from me'

On closer examination, it seems that it is not stressing the antecedent that is at stake. Rather, it is stressing the final constituent of the head noun, which indicates a prosodic boundary:

(128) *die Nachforschungen über Peter$_1$ in **Wien**), die er$_1$ mir lieber verschwiegen hätte*
    'the investigations about P. in Vienna that he would rather have concealed from me'

I assume that the prosodic boundary marked by stress indicates the information-structural notion of topic. According to the argument developed above, this should improve sentences with preceding referential expressions, as this allows for a bound reading. This is shown in the following examples, where in addition to stress, other means like the contrastive topic particle *jedoch* or topic marking by *was betrifft* or *was angeht* ("as for") make it clear that the head of the relative clause is a topic.

(129) *die Geschichten über Diana$_1$'s Bruder <u>jedoch</u>, die sie$_1$ wahrscheinlich erfinden wird, darf man nicht für ernst nehmen*
    'the stories about Diana's brother PARTICLE, which she will probably invent, one should not take serious'

(130) a. *<u>was</u> die Geschichten über Diana$_1$'s Bruder <u>betrifft</u>, die sie$_1$ wahrscheinlich erfinden wird*
    'as for the stories about Diana$_1$'s brother that she$_1$ is likely to invent'

   b. *<u>was</u> das Foto von Bill$_1$ <u>angeht</u>, das er$_1$ gerne aufnehmen würde*
    'concerning the picture of Bill$_1$ that he$_1$ would like to take'

Focus marking. Sophie Repp (pers. comm.) pointed out that focus in the relative clause improves acceptability as well, as in the following example:

(131) a. *the picture of Bill* [*that he took / plans to take in* **Vienna**]$_F$
　　 b. *the picture of Bill* [*that he took / plans to take him***self**]$_F$

We can explain this as follows: Focus, as usual, indicates the presence of alternatives that are relevant for the interpretation of expressions. In the current case, focus in the restrictive relative clause indicates that there are several sets of entities that fall under the head noun that are present in the context, here, *picture of Bill* (e.g., those that he took in Vienna and those that he took in Venice). One of these sets is selected, here those that he took in Vienna. Consequently, the concept referred to by the head noun, here, *picture of Bill*, is presupposed to be given in the global context. In such a context, the bound pronoun version, *the picture of him that the took in Vienna*, does not outcompete the form *the picture of Bill that the took in Vienna*, as the latter can refer to the given concept, *picture of Bill.*.

Specificity of the head. Bianchi (2004) has identified as a factor that decreases apparent Condition C violation effect the specificity of the head of relative clauses. The more specific the head, the milder Condition C violation effect become; they are lacking with appositive relative clauses.

(132) *L'imagine di Gianni che* pro *cerca de transmettere*
　　 'the immage of John that he tries to project'

(133) *ho comprato una scultura di Defendi que* pro *dicono que* pro *che abbia realizzato*
　　 'I bought a sculpture by Defendi that they say he had carved*'*

(134) *ha telefonata a i due student, que ogni medico visitera domani*
　　 'I phoned up the two students, which all doctors will visit tomorrow'

Specificity in this sense directly relates to topicality of the head, which creates the configuration in which the two expressions do not compete with each other.

Factive complement clauses. Several exceptions that Safir (1999) mentions involve factive complement clauses, as the following ones:

(135) a. *That Ed$_1$ was under surveillance he$_1$ never realized.*
　　 b. *That John$_1$ had seen the movie he$_1$ never admitted.*

Factive clauses are presupposed in the context. That is, their presuppositions can be derived from the common ground, and hence have to be given. For this reason, it might be important to identify the factive proposition in the context, which is easier if this proposition is not functionally dependent on some antecedent, that is, does not contain a syntactically bound pronoun. This is the reason why forms like (135) survive, in addition to those in which binding is expressed syntactically:

(136) a. *That he$_1$ was under surveillance Ed$_1$ never realized.*
　　 b. *That he$_1$ had seen the movie John$_1$ never admitted.*

Existing vs. hypothetical entities. Another one of Safir's examples can be explained by the fact that under a plausible interpretation, the set of entities referred to should be given, and hence are better identified by a non-functional concept.

(137) *Which biography of Picasso$_1$ do you think he$_1$ wants to read?*

For (137) it is likely that the meaning of *biography of Picasso* is contextually salient, that is, that the speaker refers to a given set of biographies. This is even more obvious with the variant (138), in which reference to a given set is made clear by the definite description in the *which*-phrase.

(138) *Which of the biographies of Picasso$_1$ do you think he$_1$ would have liked to read?*

If *biography* means 'type of biography', that is, if the speaker does not refer to a given set of biographies, then (137) becomes considerably less grammatical, and the variety with a syntactically bound pronoun is preferred:

(139) a. *$^{??}$Which type of biography of Picasso$_1$ do you think he$_1$ would have liked to read?*
    b. *Which (type of) biography of himself do you think Picasso$_1$ would have liked to read?*

The answer to (139)(b) could be, e.g. *A biography that stresses his Spanish roots, but such a biography does not exist yet.*

Ken Safir (pers. comm.) suggested that the topicality argument only applies in case the r-expression precedes the pronoun, but not in cases like (140), which appears to disallow for a reading in which *he* refers to Picasso.

(140) *Do you think he would have liked to read one of the biographies of Picasso?*

I am not convinced that a coreferent reading is excluded. In a context like (141), which makes both *Picasso* and *biographies of Picasso* salient, (140) appears to be fine.

(141) *As of today, there are twenty biographies of Picasso on the market, fifteen biographies of Cezanne, twelve of Gauguin. Imagine Picasso were still alive, ...*

Topical vs. non-topical quantifiers. Yet another example of Safir (1999) involves the quantifier *most*. This is a topical quantifier, expressing a quantification over a salient set, and so we should expect violations of apparent Conditon C effects in reconstruction contexts. When we change *most* to a non-topical quantifier like unstressed *some*, we arrive at a clear contrast:

(142) a. *Most articles about Picasso, I am sure he hated.*
    b. *$^{??}$Some articles about Picasso, I am sure he hated.*

We should also expect differences in the following contrast, which pitches the topical quantifier *each* against the not necessarily topical *nearly every*. But the difference, if existing, appears to be slight.

(143) a. *Each article about Picasso that he authorized increased the prices of his paitings.*
    b. *$^?$Nearly every article about Picasso that he authorized increased the prices of his paintings.*

Which vs. what. These *wh*-words differ insofar as *which* asks for a particular instantiation out of a set that is typically given, whereas *what* asks for an entity with a certain property, typically of an open-ended list. This makes *which*-constituents more easily to be

constructed as topical, which in turn should lead to to differences in acceptability in cases like the following:

(144) a. *Which stories about Diana's brother did she invent before the age of seven?*
    b. *??What stories about Diana's brother did she invent before the age of seven?*

Uniqueness. Heycock (1995, fn. 13) discusses the following contrast, with her grammaticality judgements:

(145) a. *?Which picture of John$_1$ does he$_1$ like _ best?*
    b. *??Which picture of John$_1$ does he$_1$ like _?*

Again, topicality is at stake here. In order to answer which picture satisfies a certain description in the **best** way, the range of pictures under consideration must to be given, due to the requirements of the superlative. This makes it plausible that the speaker refers to it with an expression that is not functionally dependent. On the other hand, with *like*, it is easier to assume a more open class that is not topical.

Topicality of antecedent expression. The following example is difficult to interpret even though it comes with at least two features that would make it easy: the predicate *like best* and the *wh*-expression *which*.

(146) *??Which picture of a man does he like best?*

The problem is the indefinite expression *a man*, which presupposes that the discourse referent for *a man* is not given. This makes it impossible that the concept of pictures of that man is topical (cf. the discussion of (107)). However, it seems that sentences like (146) improve if *a man* is read generically:

(147) A: *Which picture of a man does he like best?*
    B: *His wedding picture, of course.*

This is predicted, as *picture of a man* can be read as referring to a stereotypical class of pictures, and *a man* as referring to the exemplars of a given kind.

Givenness of functions. Above, I have argued that examples like (109)(b) are bad because there is a viable competitor that involves syntactic binding. Here, I would like to argue that the need to refer to topical concepts might improve such sentences as well. In such a context, the following example appears fine:

(148) *I know that each student has to write a phonology paper, a syntax paper, and a semantics paper in Ms. Brown's class. Now, [which of his papers that he gave Ms. Brown] did she hope that every student would revise?*

The reason is that the first sentence makes salient a set of papers for each (male) student that can be defined functionally, as the student's phonology, syntax and semantics paper. This is sufficient to offset the general tendency for syntactic binding between *Ms. Brown* and *she*.

The nature of the binder. It turns out that the choice of the binding expression in the main clause influences the strength of the apparent Condition C effects as well. These effects are particularly strong when the expression that c-commands the referential expres-

sion is a pronoun; sometimes Condition C is formulated in these terms (e.g., Sportiche 2013: "A pronoun cannot c-command a coreferential name"). Indeed, sentence (149) appears better with the epithet *that devil* than with *she*.

(149) *What kind of stories about Diana$_1$'s brother will she$_{*1}$ / that devil$_1$ invent _ ?*

The reason for this difference may be that epithets resist syntactic binding, cf. (21), and hence example (149) does not have a clearly better competitor with the same linguistic material (the same enumeration of expressions). Furthermore, as epithets are discourse bound and must refer to salient antecedents, a context is invoked in which Diana is given, and hence the first occurrence of *Diana* can already refer to that discourse referent.

In German, we can make a similar observation with d-pronouns, which also resist syntactic binding. And indeed, violations appear much weaker in this case.

(150) *die Geschichten über Dianas$_1$ Bruder welche sie$_{*1}$ / die(se)$_1$ wieder erfinden wird*
    'the stories about Diana's brother that she / d-pron invent again'

This difference can be explained as follows. As we have seen in (22), d-pronouns resist syntactic binding; they are typically discourse bound. This means that a salient discourse referent must be already established that the d-pronoun can pick up. Hence, d-pronouns suggest a context in which the referent, here *Diana*, is discourse salient. This makes the syntactically bound alternative (151) less likely to count as competitor

(151) *die Geschichten über ihren Bruder, welche Diana wieder erfinden wird*
    'the stories about her brother that Diana is likely to invent again'

The same contrast can be repeated in a pro-drop language like Italian with non-overt subjects and overt subject pronouns, which lack a Condition C effect (D. Delfitto, pers. comm.):

(152) *Nella casa di John,* pro$_{*1}$ / *lui$_1$ a invitato ogni professore*
    'In the house of John, pro / he invited every professor'

Arguments vs. Adjuncts, again. In section 4.3 I have argued that adjuncts may constitute an exception for the general preference for syntactic binding, as there are reasons to assume that syntactic binding is more costly into adjuncts, and hence allows for discourse binding to emerge as a co-optimal form. I would like to take up the argument/adjunct asymmetry again. Consider the following example:

(153) a. $^{??}$*The claims that Mary had offended John$_1$ that he$_1$ remembered*
     b. *The claims that had offended John$_1$ that he$_1$ remembered*

Adjuncts typically serve to identify one entity or a set of entities out of a larger class. In order for this to work, the larger class of entities has to be given. Also, the property that is used to single out a particular entity or a smaller set of entities should be known. This makes it likely that (153)(b) evokes a context in which claims that had offended John are given. Now the general reasoning pattern of this section applies: To identify this class, it is better to use a non-functional meaning, that is, to avoid syntactically bound pronouns, against the general tendency that prefers such pronouns whenever possible. The prime

function of arguments is different; arguments are typically not used to restrict a class of given entities. For example, (154)(a) appears to be more natural than (b).

(154) a. *We were informed of claims that Mary had offended John.*
  b. *We were informed of claims that had offended John.*

As a consequence, (153)(a) invokes less natural a context in which claims that Mary had offended John are topical, and therefore the general preference for syntactically bound pronouns leads to suboptimality of this expression with respect to its rival using syntactic binding, *The claims that Mary had offended him that John remembered.*

5. Concluding remarks

The question addressed in this article concerned the general architecture of the syntax/semantics interface, by Surface Interpretation or by Logical Form. Contexts which involve syntactic reconstruction (under the LF approach) are treated differently under these general perspectives, and lead to different predictions. In particular, while the two approaches make the same prediction for the syntactic binding of pronouns of reconstructed constituents, they differ when it comes to the reconstruction of r-expressions. The LF approach predicts that in this case reconstruction can result in so-called Condition C violations, while the LF approach seems not predict that (cf. Fox 1999).

In this paper I developed an argument against this line of reasoning. Taking up initial suggestions by Reinhart (1983), and following a reasoning pattern similar to Sharvit (1999), Cechetto (2001) and Sternefeld (2001), I argued that there is a general preference for syntactic binding, which can explain why apparent Condition C violations under reconstruction occur even within the Surface Interpretation perspective: The structure that allows for the expression of syntactic binding is preferred, and hence degrades the structure that does not use this device.

In a second step, I looked at the many exceptions to apparent Condition C violations under reconstruction, and explained them by counteracting principles. First, the frequently discussed argument/adjunct asymmetry could plausibly be explained by the greater costs for syntactic binding into adjuncts, which makes syntactic binding a less viable competitor to discourse binding. Second, and more importantly, I argued that the need to refer to a given, topical concept can counterbalance the general preference for syntactic binding: This reference is better accomplished with non-functional meanings, that is, with expressions that avoid syntactic binding.

The two classes of "exceptions" to apparent Condition C violations in reconstruction contexts can also be used to explain these exceptions within the Logical Form perspective. However, the general methodological point is that a potentially fatal problem for Surface Interpretation turned out to be not a problem after all.

As far as I can see, there are two main desiderata that this article leaves open. First, the subtle judgements concerning Condition C violations under reconstruction would have to be tested in a more rigid way than by introspection. It is unlikely that linguistic corpora will be very helpful here; rather, experimental evidence would have to be collected by

manipulating the binder – bindee relation, and especially the context of sentences. Second, I have proposed an intricate competition model in which subtle factors can shift the balance in this way or that way. To make this line of reasoning predictive, a model that allows for the evaluation of competing forms, for example an optimality-theoretic model with ranked constraints, would have to be constructed.

There is also a larger issue here concerning the two accounts of Surface Interpretation and Logical Form. Under a Surface Interpretation, Condition C cannot be properly formulated on the level of semantic interpretation, even for cases that do not involve reconstruction. Consider the following example, which involves a Condition C violation:

(155) ⟦[*Diana* [*likes Diana's brother*]]⟧
     = ⟦*Diana*⟧(⟦[*likes Diana's brother*]⟧)

There is nothing in the meaning ⟦*likes Diana's brother*⟧, = $\lambda x[\text{likes}(\iota z[\text{brother}(\text{Diana})(z)])(x)]$, that would reveal that its description contains an r-expression; the constant Diana cannot be retrieved from this meaning. Hence Condition C cannot be checked on this level. How, then, can it be compared with the bound variable reading, where the predicate has the meaning $\lambda x[\text{likes}(\iota z[\text{brother}(x)(z)])(x)]$?

(156) ⟦[*Diana* [B [*likes her brother*]]]⟧
     = ⟦*Diana*⟧(⟦[B [*likes her brother*]]⟧)

The difference is in the computation of this meaning: While in the computation of (155), a second reference to ⟦*Diana*⟧ is necessary when computing the meaning of ⟦*likes Diana's brother*⟧, no such repeated interpretation of constants is involved in the computation of (156). Assume that reference to entities by regular interpretation is costly, whereas syntactic binding is cheap; as a consequence, (156) would be preferred over (155) if reference to the same person Diana is intended. Notice that under this argument, Condition C in the usual formulation is not required anymore (where the elimination of Condition C has been proposed by a number of authors, including Safir 2004). Adding discourse binding leads to a certain refinement of this argument: We can assume that reference to entities by regular interpretation is costly, reference to meanings expressed by salient discourse referent is cheaper, and syntactically bound variables are cheaper yet.

The main point of this article has been to weaken an argument against Surface Interpretation. With the suggestion of eliminating Condition C altogether, there appears an argument for Surface Interpretation, and against LF interpretation: If we do not need Condition C, then a framework in which it is not even possible to express Condition C should be preferred.

References

Walker, Marilyn A., Aravind K. Joshi & Ellen F. Prince (eds). 1998. *Centering theory in discourse.* Oxford: Clarendon Press.

Baker, Chris & Pauline Jacobson (eds). 2007. *Direct Compositionality*. Oxford: Oxford University Press.

Barker, Chris. 2012. Quantificational binding does not require c-command. *Linguistic Inquiry* 43: 614-633.

Cechetto, Carlo. 2001. Syntactic or semantic reconstruction? Evidence from pseudoclefts and clitic left dislocation. In: Ceccheto, Carlo, Gennaro Chierchia & Maria Teresa Guasti, (eds), *Semantic Interfaces*. Stanford: CSLI publications.

Chomsky, Noam. 1993. A minimalist program for linguistic theory. In: Hale, Kenneth & Samuel Keyser, (eds), *The view from Building 20. Essays in linguistics in honor of Sylvain Bromberger*. Cambridge MA: MIT Press, 1-52.

Chomsky, Noam. 1995. *The minimalist program.* Cambridge, Mass.: MIT Press.

Corver, Norbert & Jairo Nunes (eds). 2007. *The copy theory of movement*. John Bejamins.

Dubinsky, Stanley & Robert Hamilton. 1998. Epithets as antilogophoric pronouns. *Linguistic Inquiry* 29: 685-693.

Elbourne, Paul. 2005. *Situations and individuals*. Cambridge, Mass.: MIT Press.

Engdahl E. 1986. *Constituent questions. The syntax and semantics of questions with special reference to Swedish.* Dordrecht: Reidel.

Evans, Gareth. 1980. Pronouns. *Linguistic Inquiry* 11: 337-362.

Fiengo, Robert & Robert May. 1994. *Indices and identity.* Cambridge, Mass.: MIT Press.

Fox Danny. 1999. Reconstruction, binding theory and the interpretation of chains. *Linguistic Inquiry* 30: 157-196.

Grodzinsky, Yosef & Tanya Reinhart. 1993. The innateness of binding and coreference. *Linguistic Inquiry* 24: 69-101.

Hestvik, Arild. 1995. Reflexives and ellipsis. *Natural Language Semantics* 3: 211-237.

Heycock Caroline. 1995. Asymmetries in reconstruction. *Linguistic Inquiry* 26: 547-570.

Huang, Yan. 1991. A neo-Gricean pragmatic theory of anaphora. *Journal of Linguistics* 27: 301-335.

Hulsey Sarah & Uli Sauerland. 2006. Sorting out relative clauses. *Natural Language Semantics* 14: 111-137.

Jacobs Joachim. 1999. Informational autonomy. In: Bosch Peter & Rob van der Sandt, (eds), *Focus. Linguistic, cognitive and computational perspectives*. Cambridge: Cambridge University Press, 56-81.

Jacobson Pauline. 1994. Binding connectivity in copular sentences. *Proceedings of Semantics and Linguistic Theory IV*. Ithaca, N.Y.: Cornell University, 161-178.

Jacobson, Pauline. 1999. Towards a variable-free semantics. *Linguistics and Philosophy* 22: 117-184.

Jacobson, Pauline. 2004. Direct compositionality: Is there any reason why not? Ms., Brown University.

Kadmon, Nirit. 1987. *On unique and non-unique reference and asymmetric quantification*. Doctoral dissertation, University of Massachusetts at Amherst.

Kamp, Hans & Uwe Reyle. 1993. From discourse to logic. *Introduction to model theoretic semantics of natural language, formal logic, and Discourse Representation Theory*. Dordrecht: Kluwer.

Kayne, Richard. 1994. *The antisymmetry of syntax*. Cambridge, Mass.: MIT Press.

Krifka Manfred. 2009. Counting configurations. *Sinn und Bedeutung*. Universität Stuttgart,

Kuno, Susumu. 2006. *Empathy and direct discourse perspectives*. In: Horn, Laurence R. & Gregory Ward, (eds), The handbook of pragmatics. Malden: Blackwell Publishing, 315-343.

Lebeaux David. 1990. Relative clauses, licensing and the nature of derivation. *NELS*. Amherst, MA: GLSA, University of Massachusetts at Amherst, 318-332.

Levinson Stephen C. 1987. Pragmatics and the grammar of anaphora: a partial pragmatic reduction of Binding and Control phenomena. *Journal of Linguistics* 23: 379-434.

Munn Alan. 1994. A minimalist account of reconstruction asymmetries. *NELS*. 397-410.

Patel-Grosz, Pritty & Patrick Grosz. 2010. On the typology of donkeys: Two types of anaphora resolution. *Proceedings of Sinn und Bedeutung* 14. 339-355.

Piñon Christopher. 2007. Verbs of creation. In: Dölling J., T. Heyde-Zybatow & Schäfer, (eds), *Event structures in linguistic form and interpretation*. Berlin: de Gruyter,

Pollard, Carl & Ivan Sag. 1992. Anaphors in English and the scope of Binding Theory. *Linguistic Inquiry* 23: 261-303.

Reinhart Tanya. 1986. Center and periphery in the grammar of anaphora. In: Lust Barbara, (ed), *Studies in the acquisition of anaphora*. Dordrecht: Reidel.

Reinhart, Tanya. 1983. Coreference and bound anaphora: a restatement of the anaphora question. *Linguistics and Philosophy* 6: 47-88.

Safir, Ken. 1999. Vehicle change and reconstruction in A'-chains. *Linguistic Inquiry* 30: 587-620.

Safir, Ken. 2004. *The syntax of anaphora*. Oxford: Oxford University Press.

Salzmann Martin. 2006. Reconstruction for Principle C in German relatives. In favor of the Matching Analysis. *Proceedings of SAMS2, Utrecht Institute of Linguistics Working Papers*. 65-79.

Sauerland Uli. 2003. Unpronounced heads in relative clauses. In: Schwabe Kerstin & Susanne Winkler, (eds), *The interface: deriving and interpreteing omitted structure*. Amsterdam: John Benjamins, 205-226.

Sauerland, Uli. 2000. Obligatory reconstruction and the meaning of traces. *Arbeitspapiere des SFB 340* 153. Tübingen.

Sells, Peter. 1987. Binding resumptive pronouns. *Linguistics and Philosophy* 10: 261-298.

Sharvit Yael. 1999. Connectivity in specificational sentences. *Natural Language Semantics* 7: 299-339.

Sportiche, Dominique. 2006. Reconstruction, binding and scope. In: Everaet, Martin, (ed), *The Blackwell companion to syntax*, Vol. IV. Blackwell, 35-93.

Sportiche, Dominique. 2013. Binding theory -- Structure sensitivity of referential dependencies. *Lingua* 130: 187-208.

Sternefeld, Wolfgang. 2001. Semantic vs. syntactic reconstruction. In: Kamp, Hans, Antje Rossdeutscher & Christian Rohrer, (eds), *Linguistic form and its computation*. Stanford: CSLI Publications, 145-182.

Strigin, Anatoli. 1994. Topicalization, scrambling and argument scope in German: integrating semantic and syntactic information. *Journal of Semantics* 11: 311-363.

Vergnaud, Jean-Roger. 1974. *French relative clauses*. Doctoral dissertation, Massachusetts Institute of Technology.

von Stechow Arnim. 1990. Layered traces. Conference on Logic and Language. Revfülöp, Hungary.

von Stechow Arnim. 2001. Temporally opaque arguments in verbs of creation. In: Cechetto C., G. Chierchia & M.T. Guasti, (eds), Stanford: CSLI Publications, 278-391.