Anaphora and Semantic Interpretation: A Reinterpretation of Reinhart's Approach*

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Syntactic structure constrains the possible "coreference" relations between the noun phrases in a sentence. Since the early days of generative syntax, we have learned a great deal about the nature of these structural constraints. Much of this syntactic theorizing has been possible with only a vague and informal understanding of what it really is in semantic terms that is being constrained here. Everyone agrees that it is not coreference in a literal sense, i.e., sameness of referents. But to specify in positive and semantically precise terms what it is instead has turned out to be non-trivial. Those authors that have given serious attention to the semantic import of syntactic constraints on so-called "coreference" have arrived at rather different conclusions.[1]

A particularly elegant and well-elaborated proposal in this regard is due to Tanya Reinhart (1983a; 1983b). I ts central thesis is that only one type of "coreference" relation is syntactically represented and directly constrained by principles of grammar, and this is the well-understood relation of variable binding in the sense of formal logic. Other semantic relations, in particular such as may obtain between two referring NPs, are not even represented on any syntactic level and can therefore not be directly licensed or ruled out by structural conditions. They are regulated instead by an extragrammatical principle which says, very roughly, that coreference is unavailable whenever the same meaning can be conveyed by means of variable binding. We will get to the details shortly.

The purpose of this article is two-fold: First, I will develop a formulation of Reinhart's proposal that is in certain respects somewhat more explicit than her own. Second, I will argue for a revision which, though it does

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Aside from its obvious debt to the work of Tanya Reinhart, the paper draws heavily on insights that I obtained from the writings of James Higginbotham. Angelika Kratzer's explication of Reinhart's theory in her 1990 lecture notes also influenced my thoughts. James Higginbotham, Hans Kamp, Tony Kroch, Barbara Partee, Carl Pollard, Arnim von Stechow, and Hiroaki Tada offered important comments on earlier presentations of this material, and Tanya Reinhart has been extremely generous with oral as well as written feedback for several years.

[1]The following works are helpful in clarifying the problems and contain a representative sample of proposed solutions: Evans 1980; Higginbotham 1980 (note 1); Heim 1988 (ch. III, 2.3); Soames 1990; Fiengo & May 1994 (ch. 1).

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leave practically all of Reinhart's substantive insights intact, leads to a theory which no longer fits the summary I just gave. In particular, the revised theory implies that bound variable anaphora does not enjoy a special status, but coreference anaphora is syntactically represented in exactly the same way.

The reader is warned, first, that it is not the purpose of this article to survey or evaluate the competitors to Reinhart's approach which are already found in the literature. Aside from some scattered allusions, they will be disregarded. Of course, if there already is a successful alternative to Reinhart's approach on the market, then this makes the present enterprise more or less irrelevant. I do not believe that there is, but it would take a separate paper (or several) to explain just why not. Second, I will also disregard the numerous criticisms that other authors have already put forward against Reinhart.[2] Some of them, I believe, have been successfully countered or happen not to apply against my particular formulation of her ideas. Others remain unrefuted, and most of those will threaten the revised theory I endorse no less than Reinhart's original version. For instance, I inherit what are likely to be the wrong descriptive generalizations about Weak Crossover[3] and about ellipsis[4]. If I am lucky, appropriate remedies for these and other shortcomings will not undermine my main points, but for all I know they might. Apart from these objections, which I am simply not competent to deal with, I neglect others for mere reasons of space. In particular, I omit all discussion of Binding Condition C, even though I defend claims that are not consistent with Reinhart's position on this matter.[5]

1. Reinhart's theory

Reinhart's theory of the syntax and semantics of anaphoric relations is best known from her book *Anaphora and Semantic Interpretation* (Reinhart 1983a). My exposition mostly follows the more recent summary in Grodzinsky & Reinhart 1993 (henceforth G&R). I take the liberty of making some small technical changes to suit my personal tastes and habits, but these should not distort any of the substantive ideas.

Let us begin with the central assumptions about the derivation and well-formedness of S-structure (SS). We have free, optional indexing. Any NP may, but need not, be assigned an index (a numerical subscript), and different

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[2]See especially Lasnik 1989 (ch. 9) and references cited there.

[3]For counterexamples and alternative proposals, see especially Higginbotham 1980 and Stowell 1987.

[4]Reinhart and the present work basically follow Sag 1980, which is problematic in light of a number of more recent studies (see especially Dalrymple, Schieber, Perreira 1991, Kitagawa 1991, and Fiengo & May 1994.)

[5]I am persuaded that Condition C is required in the syntax in order to predict the distribution of bound variable construals for epithets, as shown, e.g., by Haïk 1984 (204f.), Lasnik 1989 (ch. 9), and Higginbotham 1994. This point is independent of the argument that I have with Reinhart in this article. Once Condition C is reintroduced alongside A and B, most of what I say about Condition B below will probably carry over mutatis mutandis to C.

NPs in a sentence may receive the same or different indices. For instance, we can assign (1) any of the following indexings (among others[6]), though (as we will see below) some of these lead to derivations that are later filtered out as ill-formed or uninterpretable.

(1) Every boy called his mother.

a. every boy_1 called his_1 mother

b. every boy_1 called his_2 mother

c. every boy called his_1 mother

d. every boy_1 called his mother

e. every boy called his mother

One important filter consists of the Binding Theory conditions A and B, which apply at SS:

(2) Binding Conditions:

A. An anaphor is A-bound in its GC.
B. A pronominal is not A-bound in its GC.

(2) presupposes a lexical categorization into anaphors (in particular reflexive pronouns) and pronominals (non-reflexive personal pronouns). It also presupposes suitable characterizations of "Governing Category" (GC), for which the reader is referred to the syntactic literature. Moreover, it relies on the following definitions, which in turn appeal to standard definitions of "A-position" and "c-command" (most of the time, it will not matter which particular version).

(3) a. α binds β iff α c-commands and is coindexed with β.

b. α A-binds β iff α binds β and α is in an A-position.

None of (1a-e) happen to be filtered out by the Binding Conditions, but the reader is surely familiar with examples that would be.

From SS, a transformational derivation leads to Logical Form (LF). The main operation of interest in this derivation is so-called Quantifier Raising (QR). Contrary to what its name suggests, it applies optionally and freely to all types of NPs. (But again, derivations in which QR has failed to apply will often be ruled out by yielding uninterpretable outputs.) Specifically, QR is assumed to apply in the following fashion: It replaces an indexed NP α_i by a coindexed trace, adjoins α (without the index!) to a dominating node, and prefixes the sister constituent of α with a lambda operator indexed i. Schematically:

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[6]For instance, I neglected the additional option of indexing the NP *his mother*.

(4) QR:
$[_S \ldots \alpha_i \ldots] \Rightarrow [_S \alpha \lambda_i [_S \ldots t_i \ldots]]$

For example, the result of applying QR to *every boy* $_1$ in (1a) is (1f).

(1) f. every boy λ_1[t_1 called his$_1$ mother]

Our formulation implies that an NP needs to have an index in order to be able to undergo QR; this means, e.g., that *every boy* cannot be QRed in (1c) or (1e). This in itself presumably doesn't jeopardize the derivations, because quantifiers in subject position are straightforwardly interpretable in situ, there being no semantic type mismatch.

LFs are then submitted to the following definition of "variable" and the associated filter.

(5) a. An index is a variable only if it is
(i) on a λ, or
(ii) on a trace and bound by a λ, or
(iii) on a pronominal or anaphor and A-bound.

b. All indices must qualify as variables.

(5) cuts down on the number of possible derivations quite considerably. For one thing, it implies that all (overt) NPs apart from anaphors and pronominals, in particular all quantifiers and proper names, must wind up without an index. This means they must either start out unindexed at SS, or else undergo QR and thereby transfer their index to the λ. (Which makes QR effectively obligatory for *every boy* $_1$ in (1a,b,d).) From a semantic point of view, it makes sense not to allow indices on quantifiers and names: on standard assumptions, the meanings of such NPs are completely determined by the lexical entries for the words in them and compositional rules; an index has no conceivable semantic contribution to make and would thus have to be ignored anyway if it were present.

(5) also implies that LFs cannot contain any free variables ("free" in the sense of standard logic book definitions). For instance, the result of QRing only *every boy* $_1$ in (1b) is not a legitimate LF, because the index 2 is not sanctioned by any clause of (5). (The only chance of rescuing this derivation would be by QRing *his* $_2$ as well.)

(1) g. * every boy λ_1[t_1 called his$_2$ mother]

(5) moreover incorporates a version of the Weak Crossover prohibition, by disallowing locally A-bar-bound pronouns. So the derivation (1a)/(1f) is well-formed, because the pronoun *his* $_1$ winds up A-bound by the QR-trace t_1, but its counterpart with subject and object reversed would not be:

(6) a. SS: his$_1$ mother called every boy$_1$

b. LF: * every boy λ_1[his$_1$ mother called t_1]

The index on *his* in (6b) fails to count as a variable, because its only binder is the λ rather than an A-position.

Finally, LFs are semantically interpreted. I can be informal about this here, because how it works is mostly obvious. λ's, of course, are functional abstractors. Variables in the sense defined in (5) are treated like variables in logic (with occurrences of the same numerical index counting as occurrences of the same variable, and occurrences of distinct numerical indices as occurrences of distinct variables). A constituent that bears an index simply inherits the interpretation of its index. For this reason, it is harmless and natural to refer to the whole indexed NP as a "variable", though strictly speaking, the variable is just the index.

Pronouns without indices are deictic and the utterance context has to provide referents for them. Apart from sortal restrictions due to the pronoun's gender, number, and person features, this reference assignment is a result of interacting pragmatic factors, including salience and overall plausibility. Moreover, it is constrained by the following principle, which constitutes the most distinctive ingredient of Reinhart's approach.

(7) Coreference Rule:

> α cannot corefer with β if an indistinguishable interpretation can be generated by (indexing and moving β and)[7] replacing α with a variable A-bound by the trace of β.

The next section is entirely devoted to illustrations of (7), which will also serve to clarify some of the concepts it employs, notably "interpretation" and "indistinguishability".

2. Reinhart's Coreference Rule applied to examples

This section parallels the discussion of the Coreference Rule in G&R, section 2.3. In particular, my example groups (ii) - (v) are all taken from their list, with one systematic alteration: Since I am not dealing with Condition C effects at all in this paper, I have replaced all apparent Condition C violations by similar examples that look as though they violate Condition B.

2.1. Group (i): basic cases

Let's look at three primitive examples containing the proper name *John* and a masculine singular pronoun.

(8) John saw him.

(9) John saw his mother.

(10) His mother saw John.

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[7]The parenthesized part of the instructions can be skipped if β was already QRed in the original structure.

In each case, we are interested in the possible relations between the interpretations of the name and the pronoun. This breaks down into two questions: First, can the two stand in a variable binding relation? Second, can they corefer? The predictions turn out to be the following: (8) allows neither binding nor coreference; (9) allows binding but not coreference; and (10) allows coreference but not binding. Here is how they are arrived at:

When we ask whether the *him* in (8) could be a variable bound by *John*, we can't, of course, mean this quite literally; proper names are not variable binders, after all. What we really mean is whether the pronoun could be a variable bound by the λ that arose from QRing the name. So the question of whether binding is possible in (8) turns on the well-formedness of the following derivation.

(8) a. SS: * John$_1$ saw him$_1$

b. LF: John λ_1[t$_1$ saw him$_1$]

Though all indices in the LF (8b) qualify as variables and there is no obstacle to interpretability, this derivation is already filtered out at SS by Binding Condition B.

Could the two NPs corefer? For this we would need an LF as in (8c) (trivially derived from an identical SS in which no NP was indexed) and an utterance context that furnishes the reference assignments indicated by the pointers underneath.

(8) c. LF:John saw him
↓ ↓
j j

I will make use of this notation to specify utterance contexts throughout the paper: Each referring NP in the LF is connected by an arrow to its contextually supplied referent. The lower-case letters stand for individuals out there in the world, with each letter representing a unique individual and each individual represented by a unique letter.

There would be nothing wrong with the interpretation indicated in (8c), if it weren't for the Coreference Rule. This rule instructs us to look for an alternative LF that results by certain specified alterations from that in (8c) and to make sure that it wouldn't yield an indistinguishable interpretation. A potential such alternative happens to be the LF we already saw in (8b), set in this context:

(8) d. LF:John λ_1[t$_1$ saw him$_1$]
↓
j

This differs minimally from (8c) in just the way that (7) instructs us: Of our two NPs in (8c) that were candidates for a coreferring pair, the first (*John*) has been indexed and QRed and the second (*his*) has been replaced by a variable (*his$_1$*) that is A-bound by the trace of the former. It is an interpretable LF, notwithstanding the fact that it (because it would have to derive from a

Condition B violation at SS) is not part of a well-formed derivation for any English sentence.[8]

Now we must determine whether there is any difference in the interpretations of (8c) and (8d). Suppose for now this is to be done by comparing the propositions expressed by each LF in its indicated context _. It turns out that these are the same: (8c) is true in any world where j saw j, and so is (8d). So (8d) represents an indistinguishable interpretation from (8c), and therefore the Coreference Rule says that (8c) is not a permissible interpretation for (8). In short, the option of coreference in (8) is preempted by the existence of (8d).

Let's turn to (9).

(9) John saw his mother.

Here, binding is evidently predicted possible, the following derivation being well-formed on both levels.

(9) a. SS: $John_1$ saw his_1 mother

b. LF: John $\lambda_1[t_1$ saw his_1 mother]

But coreference is not. A coreferential interpretation would look like this:

(9) c. LF: John saw his mother
↓ ↓
j j

But under the Coreference Rule, this is preempted by (9d) (= (9b) plus a context).

(9) d. LF: John $\lambda_1[t_1$ saw his_1 mother]
↓
j

Both of these express the proposition that j saw j's mother.

(As G&R acknowledge in footnote 13, it might be preferable to predict this example to be ambiguous between a bound and a coreferential reading. They suggest that this could be accomplished by a revision of (7) that confines its application to those examples which involve prima facie violations of Condition B, in a sense they make precise. I will adopt a similar proposal below, but set the issue aside for the time being.)

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[8]I have chosen to read (7) in such a way that the potential alternative structures to be considered in applying this principle need not be part of complete grammatical derivations. Alternatively, one might impose this further requirement, in which case the *him* in (8c) would have to be replaced by a *himself*$_1$ in (8d). Most renditions of Reinhart's proposal seem to assume the latter. It doesn't seem to make any difference for the cases considered here, but see footnote 12 of G&R (and apparently Reinhart (1991a), which I haven't seen).

In (10), we have the reverse prediction.

(10) His mother saw John.

Binding is out, because (as we already saw with (6b)), the requisite structure contains an index on *his 1* that fails to qualify as a variable.

(10) a. * John λ_1[his$_1$ mother saw t_1]

But coreference is, for this very reason, allowed. (10b) depicts the relevant interpretation.

(10) b. LF:his mother saw John
↓ ↓
j j

This is not preempted by any other structure. Why not? Because the closest we can come to constructing a potential competitor according to the specifications of (7) is to index and QR *John* and coindex *his* with its trace, but then we have precisely (10a), where *his 1* is not a variable.

These three examples should have clarified some mechanical aspects of the Coreference Rule. They also gave us the opportunity for a first stab at elucidating the notion of indistinguishable interpretations, but we will soon see that there is more to this notion than we have so far uncovered.

2.2. Group (ii): examples with *only*

(11) illustrates another type of example which has the superficial appearance of a Condition B violation and which Reinhart cites in support of the Coreference Rule. (I won't talk about analogous cases with other focussing particles such as *even*.)

(11) (Everybody hates Lucifer.) Only he himself pities him.

Why is (11a), with coreference, an available interpretation and not preempted by the binding-alternative (11b)?

(11) a. only he himself λ_1[t_1 pities him]
↓ ↓
l l

b. only he himself λ_1[t_1 pities him$_1$]
↓
l

Well, that's obvious. We don't need to cast around for subtle differences here. These two LFs have manifestly different truth conditions. (11a) says that nobody besides Lucifer pities Lucifer , whereas (11b) claims that there are no other self-pitiers.

Actually, a closer look at (11b) reveals a potential problem with this application of (7). Notice that what corresponds to the α and β of (7) here are the NPs *him* and *he himself* respectively. It is these two, after all, whose coreference is to be licensed. When we construct the potential competing structure according to the specifications of (7), we are supposed to coindex α with the trace of β. But the trace t_1 with which we coindexed him_1 in (11b) is not really the trace of *he himself*, but rather the trace of *only he himself*. That is a different NP, and not a referring one, hence not a possible choice for β in the first place.

In short, if this is indeed the way in which G & R intend the Coreference Rule to apply to this example, then they must somehow be assuming that for the purposes of (7), t_1 in (11b) counts as a trace of *he himself*. That seems a little bit hokey, but there is something to be said for it. I will return to the matter in section 5.3.3 below.

2.3. Group (iii): identity under debate

Coreference is systematically possible in Condition B configurations when we are dealing either with explicit identity statements or with other utterances in discourse contexts where the identity of the referents is unknown or at issue. A representative example is the second to last sentence in (12).

(12) A: Is this speaker Zelda?

B: How can you doubt it? She praises her to the sky. No competing candidate would do that.

Nothing is wrong with this if the woman in question indeed is Zelda and the pronouns thus corefer. Nothing is even wrong if the speaker knew this all along and makes no secret of it. Reinhart's Coreference Rule is meant to throw light on this well-known phenomenon.

Needless to say, variable binding is ruled out in the familiar way by Condition B at SS. Coreference amounts to the following interpretation:

(12) a. she praises her to the sky
↓ ↓
z z

We must show that (12a) is not preempted under the Coreference Rule by any other structure. A potential competitor with the right linguistic shape would be (12b).

(12) b. she λ_1[t_1 praises her$_1$ to the sky]
↓
z

If this doesn't qualify to preempt (12a), it can only be because its interpretation is distinct. Is it?

Not if we just compare the propositions expressed. They are one and the same, viz. that z praises z to the sky. So if we continue to interpret the Coreference Rule in the way we did in the previous sections, it founders on this example. Alternatively, we must look for a more suitable notion of indistinguishable interpretation that will make it work right. The latter is, of course, what Reinhart intends.

It is commonplace in the philosophical literature (especially on identity statements) to distinguish the proposition expressed by an utterance from its cognitive value.[9] When the utterance contains referring terms[10], the proposition expressed depends only on their referents, but the cognitive value depends also on the way these referents are presented. In the context of our example (12), for instance, the person z presents herself to the interlocutors in two different guises: First, they have a current visual impression of her, standing on the platform over there and speaking. Second, they carry in their memory an entry with various pieces of information about her, including that she is called "Zelda".

Now when it comes to processing our sentence *she praises her* in (12), what intuitively goes on seems to be this: Each of the two pronouns connects to its referent z via one of these two guises. *She*, because of a perceived anaphoric link to the subject *this speaker* of the preceding sentence, associates with the visual impression; and *her*, through its link to the postcopular NP *Zelda*, activates the memory entry. Therefore, the cognitive value of the sentence *she praises her to the sky* for the hearer in this context is the proposition that whoever causes the visual impression in question praises whomever the pertinent memory entry represents. This is rather a different proposition from the one the sentence expresses, viz. that z praises z.

More importantly for our present purposes, it is also different from the cognitive value of the potential competitor in (12b). How so? Because (12b) contains only one referring NP (*she*) and this will pick out its referent z via one of the two guises salient in this context. Presumably this is the same one as for the *she* in (12a), namely the visual impression. The cognitive value of the LF in (12b) thereby comes to be the proposition that whoever causes this visual impression praises herself—clearly a different proposition (with different truthconditions) from the cognitive value of (12a) as described above.

The level of cognitive values thus seems to be more appropriate than that of propositions expressed when it comes to distinguishing interpretations in the sense of Reinhart's Coreference Rule. In this respect, our little diagrams representing interpretations have been misleading or at least incomplete. An utterance context for referring pronouns doesn't just supply these pronouns with referents. Rather, it supplies them with guises, and these in turn happen to be guises of something, namely the referents. The diagrams should thus contain an

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[9]While some distinction along these lines is commonplace, many details and, of course, the terminology vary from author to author. (The term "cognitive value", for instance, comes form the introductory passage of Frege 1892, as translated by Max Black in Black & Geach 1952.) For a thorough introduction and overview, see Haas-Spohn 1995.

[10]More accurately: *directly referential* terms in the sense of Kaplan 1989.

additional intermediate layer for the guises. (I use capital letters 'F', 'G', ... for guises, with each letter standing for a unique guise and vice versa.) (12c) replaces (12a), and (12d) replaces (12b).

(12) c. she praises her to the sky
↓ ↓
F G
↓ ↓
z z

d. she λ_1[t_1 praises her$_1$ to the sky]
↓
F
↓
z

Semantically speaking, a guise is an individual concept, i.e. a function from worlds to individuals. For instance, the visual impression alluded to above (represented by 'F' in (12c,d)) can be viewed as assigning to each possible world w the individual that it is an impression of in w. In the actual world of the utterance, this is z, but in other worlds it may be someone else. The cognitive value of (12c) is the proposition that is true in any w where F(w) praises G(w) to the sky; that of (12d) is the proposition that is true in any w where F(w) praises F(w) to the sky.

I will not formalize this any further, and in subsequent sections, I will even fall back into the simplifying pretense that utterance contexts match pronouns simply with referents. But before it's safe to do so, we should make sure that the stories we told about (8) - (10) in the last section haven't collapsed in the light of our refined notion of indistinguishable interpretation.

For instance, we took coreference between *John* and *him* to be ruled out in (8) because (8d) preempted (8c). It did so, we said, because it expressed the same proposition. But now we have seen that sameness of proposition expressed is not a sufficient condition for indistinguishable interpretations. So our argument re (8) is no longer conclusive. We should have established that (8d) has the <u>same cognitive value</u> as (8c). Can this stronger argument be made? Well, it can, if we bring out and exploit a tacit assumption about the example, namely that it was meant to be judged either out of context, or in some sort of run-of-the-mill context, say a conversation about John in his absence. In that kind of ordinary setting, there wouldn't be multiple salient guises of j, but just one (presumably the memory entry under his name), and the context would assign that one to both the name and the pronoun in (8c). And in that case, the cognitive values of (8c) and (8d) coincide, as desired. (Even if j happened to be presented in two ways—say, he was visible in the distance during the conversation about him—, this wouldn't suffice for the pronoun to automatically link to him via a different guise than the name. For that to happen, the context moreover has to contain appropriate clues that this is the intended disambiguation.)

In short, we must qualify our earlier conclusion about (8): It doesn't really follow from the grammar and the Coreference Rule alone that (8c) is

unavailable; it only follows under additional assumptions about the context, which imply that there is only one salient guise of j. But come to think of it, this qualification is a good thing. It is a fact, after all, that even (8) could be used with *John* and *him* coreferring if it were placed in an appropriately contrived context.

There is much more to be said about the pragmatic conditions under which contexts make two distinct guises of the same referent readily enough available[11], but let's move on.

2.4. Group (iv): when structured meaning matters

Evans (1980) emphasized a type of example that G&R likewise bring up in illustration of the Coreference Rule. It will point us to yet another aspect of the notion of indistinguishable interpretations. (The examples are again not exactly Evans's or G&R's, but adaptations thereof to Condition B configurations.) Consider the last clause of (13).

(13) (You know what Mary, Sue and John have in common? Mary admires John, Sue admires him, and) John admires him too.

Despite the Condition B environment, one sort of gets away with *him* referring to John here. Apparently there is something about this particular preceding discourse that makes it possible. What exactly is it and how does the Coreference Rule predict it to matter?

The coreferential interpretation in question is (13a), and for some reason it is not preempted by (13b).

(13) a. ... and John admires him
$\downarrow$ $\downarrow$
j j

b. ... and John λ_1[t_1 admires him_1]
$\downarrow$
j

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[11] In Heim 1988:315 - 320, I proposed one concrete restriction: No context ever assigns *distinct but presupposedly coreferential* guises to any pair of NP-occurrences. (Definition: Guises F and G are *presupposed to corefer* in context c iff F(w) = G(w) for every world w that conforms to the shared presuppositions of the discourse participants in c.) This means that reference to the same object via two distinct guises is possible only as long as the speaker still treats it as an open question whether indeed the same object is behind these two guises. Once this is taken for granted (more accurately: presupposed in the sense of Stalnaker 1979), only one guise is available. (This may be the result of "collapsing" two previously available guises; in technical terms, the result of collapsing F and G is F restricted to the set of worlds on which it coincides with G.) I still think this proposal is defensible, though there are non-trivial issues to sort out (see, e.g. Landman 1986:104 - 105 for critical discussion). For the purposes of the present article, however, I need not commit myself.

Why not? The propositions expressed are again identical, and there also don't seem to be two different guises of j in this context that would lead to different cognitive values. What then is the difference? It is, I think, the fact that two different properties are predicated of j in (13a) and (13b): the property P of admiring j in (13a), and the property Q of admiring oneself in (13b). In other words, (13a) and (13b) express different structured propositions [12], <j,P> and <j,Q>, even though they express the same unstructured proposition P(j) = Q(j) = that j admires j.

Fair enough, but why does this suddenly matter? We could have observed the same thing about all our earlier examples: there, too, the structured propositions differed, even where we concluded that the interpretations were indistinguishable. Evidently, differences in structured meaning do not always matter. There has to be a special reason when they do. The special reason in this case emerges when we analyze the preceding sentences: The speaker starts out with a promise to tell what Mary, Sue, and John have in common. So we expect him to mention a property that each of the three has. One particularly direct and rhethorically effective way of doing this is to utter three predications in which the same property is predicated of each of the three people in a row. Now the first two predications, concerning Mary and Sue, were as follows:

(13) c. Mary admires John, Sue admires him, ...
↓ ↓ ↓ ↓
m j s j

Each of these predicates of its subject the property P of admiring j. Now if we continue by (13a), we get a third predication of that same property. (13b), on the other hand, would break the pattern and predicate a different property of j than of the previous two people. It would still, of course, give us indirect information about what the three have in common: we could determine the shared property by a simple bit of deduction. But (13b) is more explicit, and this, I submit, makes it beat out its competitor here and avoid being preempted.
A similar story applies to (14). This utterance, we are to imagine spoken by a logic tutor.

(14) Look, if everyone hates Oscar, then it surely follows that Oscar (himself) hates him.

The intended interpretation is (14a).[13]

(14) a. if everyone hates Oscar, ... Oscar hates him
↓ ↓ ↓
o o o

Why isn't it preempted by (14b)?

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[12]Structured propositions (and other types of structured meanings) have been put to various uses in semantics; see Cresswell & Stechow 1982 for a recent example.

[13]Since subject quantifiers are interpretable in situ, I didn't bother to index and QR *everyone*, but of course it wouldn't have hurt to do so.

(14) b. if everyone hates Oscar, ... Oscar λ_1[t_1 hates him$_1$]

↓ ↓
o o

Well, what the logic tutor is apparently trying to get across to the student is how to apply the law of Universal Instantiation. (14a), as it happens, is a pure illustration of that law: the predicates following *everyone* in the antecedent and *Oscar* in the consequent denote the same property, that of hating Oscar. (14b), by contrast, has the property of hating Oscar in the premise, but a different one, that of hating oneself, in the conclusion. Of course, it is likewise a valid inference. But its validity relies on more than just Universal Instantiation; it collapses two inference steps (U.I. and λ-conversion). And that isn't optimal didactic practice in this context.

So once again, a difference in structured meaning alone matters enough to allow the interpretations (14a) and (14b) to count as distinct. But here as in the previous example, this is due to very special circumstances: Logic teachers have a professional duty to care not just about what proposition a sentence conveys, but about how that proposition is built up from parts. For most ordinary conversational purposes, however, the net message is all that counts, and so we were right to disregard mere differences in structured meaning with our earlier examples, and to disregard them again with most of the ones below.

2.5. Group (v): Lakoff's example[14]

Finally, why does one get away with utterances like (15), due to Lakoff (1972: 639)?

(15) I dreamt that I was Brigitte Bardot and I kissed me.

The two underlined pronouns, being both first person, supposedly can't help but corefer:

(15) a. ... and I kissed me
↓ ↓
g g

('g' for George Lakoff, the speaker of (15).) But this interpretation ought to be preempted by (15b).

(15) b. ... and I λ_1[t_1 kissed me$_1$]
↓
g

[14]This section is substantially changed from the previous version of this paper, partly in response to questions raised by Higginbotham (p.c.) and Reinhart 1991b. Thanks to Arnim von Stechow for reminding me of Stechow 1982. (McKay 1991 also looks relevant, but I only received it when I was almost finished.)

Unless, again, we can argue that the latter has a distinct interpretation. That this should be the case is made plausible by the observation that a minimally different sentence, whose grammar forces the variable binding we see in (15b), would actually describe a different dream:

(16) I dreamt that I was Brigitte Bardot and I kissed myself.

(16) describes a dream about self-kissing, (15) doesn't.[15]

Suggestive though this is, it is not so easy to show concretely how the interpretations of (15a) and (15b) differ. The propositions expressed under the reference assignments depicted in (15a,b) are certainly the same. The structured meanings are different, but it is not evident why this should matter in this context; at least there is no reason of the kind we found with (13) and (14) above. Are the cognitive values distinct, then? For all we know so far, this could only be if George Lakoff, as he utters (15), is somehow presented to his audience in two separate guises, and that doesn't seem to be the case here either. So where could the difference possibly lie?

To overcome this puzzle, we have to be a bit more precise on how such examples are semantically interpreted. A suitable analysis of pronouns in attitude reports, including an explicit application to (15), is found in Stechow 1982. Adapting his analysis (with some inessential alterations), let's begin by positing a more articulate LF representation for attitude complements than we took for granted in (15a,b). Following Quine 1956, *believe*, *dream*, and other attitude verbs are logically 3-place predicates: the basic notion is for a subject to believe (dream) something of something . The third argument (the " res"-argument) does not correspond to a surface constituent, but it is present at LF and may be filled there by material moved out of the complement clause.[16] For instance, a simplified version of (15) (omitting the complement's first conjunct) may have the following LFs, among others. (The corresponding SSs that these should derive from in Reinhart's framework—all well-formed by the Binding Conditions—appear in parentheses underneath.)

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[15]Actually, the data are not quite so simple. The choice of the reflexive seems to be compatible with both readings; at least this is my intuition about similar German sentences:

(i) Hans soll sich mal vorstellen, der Lehrer zu sein und sich/?ihn als Schüler zu haben.

'Hans should imagine being the teacher and having himself/him as a student.'

The variant with the pronominal *ihn* is unambiguous as predicted by the analysis I will sketch, though a little marginal (see below on what the marginality might be due to.) The reflexive *sich*, however, also allows the pragmatically preferred reading, according to which Hans imagines teaching Hans (rather than self-teaching). I have no account for this reading. The analysis sketched in the text predicts only the self-teaching interpretation here. Further research is required.

[16]Unfortunately, the syntactic distribution of *de re* construals doesn't exhibit the properties of movement. An "in situ" approach of the type that has proved successful for association with focus would therefore be more appealing. The techniques for this are in principle well worked out (see e.g. Rooth 1985) - except (to my knowledge) for the interaction with variable-binding, which happens to be crucial in the present application.

(15) c. I dreamt λ_1[t_1 kissed me] [I]

(SS: I dreamt I_1 kissed me)

d. I dreamt λ_1[I t_1-ed me] [kiss]

(SS: I dreamt I kiss$_1$ed me)

e. I dreamt $\lambda_{1,2}$[t_1 kissed t_2] [I, me]

(SS: I dreamt I_1 kissed me_2)

f. I dreamt [I kissed me] [ ]

(SS: I dreamt I kissed me)

The "res-movement" that creates these LFs is like QR insofar as it involves λ-abstraction, but in some other respects operates quite differently: First, it isn't Chomsky-adjunction, but substitution into a kind of argument position. Second, it may affect phrases other than NPs (as in (d)). Third, it can apply multiply (as in (e)). (If pure de dicto readings are to be covered as a special case, the res-slot may also be left empty, as in (f).)

The semantic interpretation of the verb and its two internal arguments is as follows: The left argument, denotes (as the λ-notation implies) a property of n-tuples (n≥0, depending on the number of indices on the λ). The res-argument denotes an n-tuple made up of the denotations of the phrases in it. The interpretation of the verb is relative to a special contextual parameter, an n-tuple of acquaintance relations in the sense of Lewis (1979). More precisely:

(17) An LF of the form [α β γ [δ_1,...,δ_n]], where β is an attitude verb and n≥0, requires an utterance context c which furnishes, for each i = 1, ..., n, an acquaintance relation D^c_i.

To complete the analysis, take *dream* to mean 'believe in one's sleep'. In a given context c, *dream* then denotes the following function $f_{dream,\,c}$:

(18) $f_{dream,\,c}(P)(\langle a_1,...,a_n\rangle)(b) = 1$ iff

(i) b uniquely bears D^c_1, ..., D^c_n to $\langle a_1,...,a_n\rangle$, and

(ii) b is asleep and self-ascribes the property of uniquely bearing D^c_1, ..., D^c_n to some n-tuple of individuals satisfying P.

Now back to our example (15). Stechow proposes that (15) under the intended reading has the LF-representation in (15c).[17] The utterance context under

[17]It might actually be more accurate to assume (15e), with *both* pronouns res-moved. This would come to exactly the same reading if the second acquaintance relation supplied by the context happened to be that relation which each individual bears to George Lakoff,

consideration (as before) assigns g as the referent to all three pronoun-occurrences, and (by (17)) moreover supplies an acquaintance relation D. Here is another picture to summarize these aspects of LF and context. (The pointer under the verb indicates the contextually supplied acquaintance relation.)

(15) g. I dreamt λ_1 [t_1 kissed me] [I]
↓ ↓ ↓ ↓
g D g g

What is D? It is simply identity; this, at any rate, seems to be the choice that yields the intuitively salient meaning. What the utterance asserts, then, is that g self-ascribes in his sleep the property of kissing g. (The choice of identity for D amounts to a so-called de se reading for the embedded subject; as Stechow notes, this is usually the preferred reading for pronouns coreferential with the higher subject.[18])

Now, I think, we can finally see how G & R intend the Coreference Rule to apply to this example. The *me* in (15g) is a referring pronoun that corefers with the other two 1st-person pronouns in the sentence, in particular with the embedded *I* that originates from a c-commanding position in its GC. Why is this allowed?[19] It would not be, (7) predicts, if (15g) meant exactly the same thing as the following competitor with a bound variable:

(15) h. I dreamt λ_1[t_1 kissed me_1] [I]
↓ ↓ ↓
g D g

In (15h), *me* has been replaced by a variable (*me_1*) A-bound by *t_1*, the trace of *I*, just as (7) demands. (The only difference compared to previous applications of (7) is that the trace in question is a res-movement-trace, rather than a QR-trace). (15h) has demonstrably different truthconditions from (15g): Given the same value for D (identity), (15h) claims that g in his sleep self-ascribed the property

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i.e. to that world-mate who is the actual Lakoff's counterpart by match-of-origins. It is doubtful, however, that Lakoff knows enough about his origins to dream such a thing; see Lewis 1984 for discussion. An advantage of (15e) over Stechow's choice (15c) would be that the second pronoun could then be interpreted w.r.t. a similar, but probably more realistic, acquaintance relation, say, the relation that x bears to y iff y is a world-mate of x's who has the history and permanent characteristics that the actual George Lakoff *knows* himself to have. But I will disregard this complication.

[18]For more discussion of *de se* readings and their status as special cases of *de re* readings, see Lewis 1979, Chierchia 1991, Higginbotham 1989, and Reinhart 1991b.

[19]Stechow also asks himself why (15) is not a Condition B violation, but his answer is not quite sufficient for our present purposes. According to him, (15g) is okay because the GC for *me* here is *t_1 kissed me*, which does not contain a coreferential c-commanding NP (in fact, it contains no other referrring NP at all). But if this were good enough, why couldn't we rescue every Condition B violation simply by QRing the offending antecedent (e.g. as in *John λ_1[t_1 saw him]*)? At any rate, it is not good enough for Reinhart, whose theory we are assuming here. Under her assumptions, only looking at (15g) *itself* is not enough to license it; we must also consider potential competing structures.

of self-kissing (the meaning earlier observed in sentence (16)). Hence (15h) does not preempt (15g) and so (15g) is licensed.

3. Reference isn't special

Up to now I have merely tried to explain Reinhart's analysis. If I have gone beyond plain repetition from G & R and her earlier publications, it was only to flesh out details in the semantic analysis of certain examples, but not to add anything that wasn't there yet, at least between the lines. In this section, I will begin to disagree.

Let us look again at our fourth group of examples, the ones where structured meaning mattered ((13) and (14)). Reinhart's account of them captures an important intuition: These examples are licensed because of a contextually important aspect of their meaning that would get lost if they were replaced by their bound-variable counterparts. As such they call for a rule of the kind of Reinhart's Coreference Rule, which essentially involves a comparison between the meanings of two competing structures.

I still have a quibble, however: Is the phenomenon illustrated by (13) and (14) really peculiar to referring NPs? Is it only referential pronouns that we are sometimes allowed to use in unusual ways when a conversational purpose justifies it? Come to think of it, such a limitation wouldn't be particularly plausible to expect in an essentially pragmatic principle of this sort. And indeed, once we start looking for the relevant examples, it isn't well supported empirically either.

Recall, for instance, our logic tutor and his excuse for the coreferential use of *Oscar* and *him* in (14). Once we let him get away with (14), are we really going to put our foot down when he goes on as in (19)?

(19) ... And, of course, this doesn't just hold for Oscar, but for any arbitrary man: If everyone hates a man, then that man himself hates him.

My point, of course, is that the last sentence in (19) is a donkey-sentence and the two underlined NPs are donkey-anaphors, hence not referring terms. Under one analysis of donkey-sentences, they are plainly bound variables, i.e., the LF should be something like (19b), with a silent adverb of quantification equivalent to a restricted universal quantifier (here abbreviated as "∀").[20,21]

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[20]Under an alternative (E-Type) approach to donkey-sentences, the donkey anaphors are not plain bound variables, but descriptions of some kind, and the silent universal quantification is not directly over men, but over cases. (See Neale 1990, Heim 1990, and others for recent discussion.) Still, the donkey-anaphors are not referring terms under that alternative either, because they would contain a bound case-variable, and so my main point goes through all the same.

[21]It is not entirely obvious at this point how this LF is to be derived and licensed. One revision to the present system that is surely required, once we bring in donkey-sentences, is that indefinites on the one hand and demonstratives (and other complex definites) on the other be allowed to count as variables, along with pronouns and anaphors. The definition of variables also needs extending for donkey anaphors that are ordinary pronouns, because these need not be A-bound. A suitable pair of added clauses might be:

(19) a. SS: * if everyone hates [a man]$_1$,

[that man himself]$_1$ hates him$_1$

b. LF: $\forall_1$ [if [a man]$_1$ [everyone hates t_1]]

[[that man himself]$_1$ hates him$_1$]

But this cannot be generated under Reinhart's assumptions: the derivation would be blocked by Condition B at SS. There is no provision for licensing ill-formed derivations like this, and the Coreference Rule is simply not pertinent here at all. I take it that this is not satisfactory: (19) should be predicted to have pretty much the same status as (14), with the choice of *him* over *himself* allowed for the very same reason. Admittedly, (19) is (even) more contrived than (14) and highly questionable from a pedagogical point of view. But it seems to me that its added complexity is sufficient to account for what degradation we perceive here. There isn't a qualitative contrast that would justify the special status of referring pronouns that Reinhart's Coreference Rule in its present form grants them.

And while you are in the appropriately contrived mind-set, consider a bound variable variant of our other "structured meaning" example, (13):

(20) Somebody said that what he had in common with his siblings was that his sister admired him, his brother admired him, and he (himself) admired him.

Again, it may not be the most natural English sentence, but the judgment isn't such as to warrant a fundamental disparity between referential and bound variable pronouns. My conclusion, therefore, is that Reinhart's Coreference Rule captures the right intuition of what makes utterances like (13) and (14) possible, but it should be made a little more general so that it covers (19) and (20) as well.

Analogous points could be made about some of the other groups of examples, but are more easily obscured there by murky technical details. Recall, for instance, the *only*-example, whose intended interpretation is repeated here:

(11) a. only he himself λ_1[t_1 pities him]

↓ ↓

1 1

This, too, has bound-variable counterparts with much the same intuitive status. For instance, (21) allows the reading in (21a).

(iv) or on an indefinite in the restriction of a QAdv and A-bar-bound by it,

(v) or on a definite in the nuclear scope of a QAdv and A-bar-bound by it.

(21) Every devil knows that only he himself pities him.

a. $\forall x[\text{devil}(x) \rightarrow \text{know}(x, \text{that } \forall y[y \neq x \rightarrow \sim\text{pity}(y,x)])]$

In Reinhart's system, this reading must have a derivation such as (21b,c).

(21) b. SS: every devil$_1$ knows that

[only [he himself]$_1$]$_2$ pities him$_1$

c. LF: every devil λ_1[t_1 knows that

[only [he himself]$_1$ λ_2[t_2 pities him$_1$]]]

Perhaps this is okay because no well-formedness constraint at either level rules it out (in particular, the SS doesn't violate Condition B, because the adjoined *only* blocks A-binding of *him$_1$* by *[he himself]$_1$*). It is then not directly problematic for Reinhart's theory. But isn't it a little strange if the explanation for the acceptability of reading (21a) in (21) is so completely unlike the explanation that was given for the acceptability of reading (11a) in (11)? The latter involved comparison with potential preemptors under the Coreference Rule, whereas the former relies entirely on considerations of syntactic well-formedness. We may suspect that a generalization is being missed here. It would require some work to turn this suspicion into a real objection, but since I won't let it carry the burden of my argument, I can afford to stop short of this here.

The Lakoff-example likewise has bound-variable cousins, for instance (22).

(22) Not only I dreamt that I was Brigitte Bardot and I kissed me.

The relevant reading here is the one where (spoken by g) it says that there was some x≠g such that x self-ascribed the property of <u>kissing x</u> (not to be confused with the property of self-kissing). This seems no less acceptable than the reading we have discussed for (15). But again, the explanation in Reinhart's framework for why (22) allows such a reading cannot be anything like the account given above for (15). Presumably, (22) has this reading because it allows a derivation terminating in the following LF.

(22) a. not only I λ_1[t_1 dreamt that ... λ_2[t_2 kissed me$_1$] [I_1]]

It is not so clear at this point how such an LF is derived: what exactly is the SS and why doesn't it violate Condition B? One way or another, these details must be sorted out if the reading in question is to be generated. I will offer a concrete suggestion below, but my present point doesn't depend on it. It is simply that, whatever the details of an account of (22) in Reinhart's framework may turn out to be, the Coreference Rule will not play any role in it. It couldn't, because there is no <u>coreference</u> to be licensed (only a certain pattern of <u>variable binding</u>). So once again, what to the naive observer appears to be just a more complicated

instance of the same phenomenon receives a qualitatively different explanation -- not, as it stands, a legitimate objection, but grounds for more suspicion.

The moral of this discussion seems to be that we should look for a more general version of Reinhart's Coreference Rule, one that will cover bound variable examples like (19) along with their simpler cousins involving referential NPs, like (14). What we would like to replace (7) with is something like the following:

(23) Coreference-or-Cobinding Rule:

> α cannot corefer or be cobound with β if an indistinguishable interpretation can be generated by (indexing and moving β and) replacing α with a variable A-bound by the trace of β.

This formulation presupposes a distinction between α and β being cobound on the one hand and α being bound by (=cobound with the QR-trace of) β on the other. (If "cobound" and "bound by" just meant the same thing, (23) would not make sense, because then the cobound interpretation would be necessarily indistinguishable from the one we are instructed to compare it to.) The distinction is clear enough. For instance, *[that man himself]$_1$* and *him$_1$* are cobound in our LF (19b) above, because each is bound by $\forall_1$. If the latter were to be bound by the former, the structure would have to look different, namely like this:

(19) c. $\forall_1$ [if [a man]$_1$ [everyone hates t_1]]

[[that man himself]$_1$ λ_2[t_2 hates him$_2$]]

The consequent clauses of (19c) and (19b) are logically equivalent, but they differ in structured meaning, in just the way we have found to matter to the logic tutor. So it is plausible that reading (19b) is available for (19) because of this difference between it and (19c). (23), which predicts this, is on the right track.

The main point of this article is that (7) should be generalized to something like (23), and having made that point, couldn't I stop here? I could if it weren't for the following remaining loose ends and problems. First, I haven't been able to be very precise yet about the treatment of the other types of examples introduced in this section, i.e., (21) and (22). Second, (23) contains an explicitly disjunctive formulation which it would be nicer to avoid. Third, even with the generalized principle (23) in place of the former (7), the theory still partitions the phenomena in a strange way: In coreference cases like (14), (23) serves to license a certain interpretation for a grammatical derivation, but in cobinding cases like (19) it acts to redeem an ungrammatical one. The actual status of the examples does not warrant such a distinction; it would be better if they were all grammatical, or all ungrammatical. Or, even better yet, if they were all somewhere in between, which is what I will actually say below. I will return to these points in section 5. The next section is devoted to an independent criticism of Reinhart's system. The reason why I insert it at this juncture is that it leads to some technical refinements that will be useful below.

4. From coindexing to linking and codetermination

4.1. Bound variable pronouns that undergo QR

A technical difficulty arises when we ask what exactly happens when a bound variable pronoun undergoes QR. Now I must first convince you that this situation ever arises in the first place. To be sure, we have made QR completely optional and unrestricted, so it would require a special stipulation to prevent it from applying to bound variable pronouns. But do we really ever need to exercise this option? The answer is 'yes': If we accept Reinhart's analysis of ellipsis, there will be readings of English sentences that we can only generate by QRing a bound variable pronoun.

This is not the place to launch into a detailed discussion of ellipsis. I will just give a very brief exposition of Reinhart's approach and, for simplicity, will concentrate entirely on Bare Argument ellipsis, setting aside any of the additional complications that arise with the more common and colloquial VP ellipsis. Consider a simple ellipsis structure:

(24) I called John, and the teacher too.

(24) is ambiguous: the second conjunct can mean that the teacher called John, or that I called the teacher. In the first reading, the "correspondent" of the "remnant" *the teacher* is the subject *I*, in the second reading, the object *John* is the correspondent.[22] The basic idea, going back at least to Sag 1980, is that an LF for the elliptical conjunct is derived by (a) QRing the correspondent in the antecedent sentence, and (b) inserting a copy of the resulting λ–abstract next to the remnant. Depending on the intended reading, this procedure yields (24a) or (24b) for (24). (The copied material is in italics.)

(24) a. I λ_1[t_1 called John], and the teacher λ_1*[t_1 called John]* too

b. John λ_1[I called t_1], and the teacher λ_1*[I called t_1]* too

The semantic interpretation of these LFs is transparent.

In the two readings of example (24), the correspondents were a referential pronoun and a proper name. But it is easy to construct similar examples where the correspondent is a bound variable pronoun. A case in point is the reading of (25) where it means that every boy said that I called both him (the boy) and the teacher.

(25) Every boy said that I called him, and the teacher too.

To derive the appropriate LF, we must QR the correspondent, which in this case is the bound variable pronoun *him*. How exactly does this derivation proceed?

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[22]The terminology of "correspondents" and "remnants" comes from the discussion of Gapping in Pesetsky 1982.

First, what's the SS we start out from? Presumably, it has *him* coindexed with *every boy*.

(25) a. SS: every boy$_1$ said that [I called him$_1$, and the teacher too]

(The bracket just serves to indicate that the conjunction is in the lower clause.) On the way to LF, both *every boy$_1$* and *him$_1$* must QR, the former to bind the pronoun, and the latter to create a constituent for ellipsis copying. So far, we have assumed that QR applies in such a way as to shift the index on the moved phrase over to the newly created λ next to it, so that the moved phrase itself winds up unindexed. And this made sense in view of the fact that indices on quantifying phrases like *every boy* (as well as indices on proper names and on deictic pronouns) could make no semantic contribution anyway. However, if we blindly applied QR to *him$_1$* in exactly this same fashion, we get something undesirable, namely (25b).

(25) b. every boy λ_1[t$_1$ said that

[**him λ_1**[I called t$_1$], and the teacher *λ_1[I called t$_1$]* too]]

The *him* has lost its index to the λ next to it and therefore is no longer bound by (the λ next to) *every boy*. So (25b) cannot represent the intended reading.

It is not hard to think of ways to avoid this problem. The most obvious and elegant option that comes to mind is to make the disappearance of the index under QR simply optional: we are free to either retain the index of the QRed phrase on both itself and the λ, or else—as before—to retain it only on the λ. In most cases, we will effectively be forced to the second choice, because we would otherwise end up with indexed NPs that don't qualify as variables under (5). But nothing prevents us from retaining two copies of the index in the special case where we are QRing a bound variable pronoun, and thus we can derive an appropriate LF from the SS (25a), namely (25c).

(25) c. every boy λ_1[t$_1$ said that

[**him$_1$ λ_1**[I called t$_1$], and the teacher *λ_1[I called t$_1$]* too]]

This expresses the intended meaning, and so we seem to have solved our problem.

But wait, there is a complication: Consider the following slightly more complex example:

(26) Every boy said that [he called his mother and the teacher too].

This has many different readings, most of which are to be ignored here. We are only interested in readings where (a) the correspondent of the *the teacher* is the embedded subject *he*, and (b) both *he* and *his* are anaphorically related to *every boy*. Still, there are two distinct readings that fit these specifications. The difference comes out in the following two paraphrases for the elliptical conjunct:

(26) a. ... and the teacher called his own (the teacher's) mother.

b. ... and the teacher called his (the boy's) mother.

(26a) is a sloppy reading and (26b) a strict one. What SS and LF representations are associated with each of these two readings?

Under our present assumptions, there is only one SS and LF available to represent either reading: Because both *he* and *his* are to be bound variable pronouns and anaphorically related to *every boy*, we can't but assign the following indexing at SS:

(26) c. every boy$_1$ said that he$_1$ called his$_1$ mother and the teacher too

From there on, we have no real choices (not counting derivations that terminate in uninterpretable LFs or leave the *he* unbound). Two applications of QR and ellipsis copying yield (26d).

(26) d. every boy λ_1[t$_1$ said that

[he$_1$ λ_1[t$_1$ called his$_1$ mother]

and the teacher λ_1*[t$_1$ called his$_1$ mother]* too]]

(26d) represents the sloppy meaning (26a). But for the other reading, the strict one in (26b), we are left without any possible derivation.

4.2. Inner and outer indices

To remedy this limitation, I propose that we allow pronouns to be doubly indexed at SS already. They can have an inner index that encodes what they are bound by, and an additional outer index to encode what they in turn bind. (This will be made more precise right below.) The inner and outer index need not be the same.

Such dual indexing may look like a new-fangled notational contrivance, but the distinctions it is meant to express are anything but new. Two particularly important precedents are found in the PTQ fragment (Montague 1974) and in the Linking framework of Higginbotham 1983. Both of these provide two different analyses for a sentence like (27) (a simplified version of (26), without the elliptical conjunct).

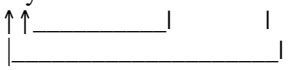
(27) Every boy said that he called his mother.

In PTQ, one option (call it (a)) is to build up a sentence with three occurrences of the same free pronoun: *he$_1$ said that he$_1$ called his$_1$ mother*, then use S14 with the operation $F_{10,1}$ to quantify in *every boy*. In this derivation, both surface pronouns are bound (=lose their subscripts) simultaneously in the last step. Another option (b) would be to generate *he$_2$ called his$_2$ mother*, then quantify *he$_1$* into this to yield *he$_1$ called his mother*, then build up further to *he$_1$ said that he$_1$ called his mother*, and finally quantify in *every boy* with $F_{10,1}$. This time,

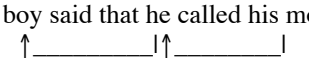
the *his* was bound earlier in the derivation, whereas the *he* had a subscript until the last step.[23] Of course, the meanings are equivalent, as one translation reduces to the other by λ-conversion.

In Higginbotham's framework, (27) is generated with two different linked structures:

(27) a. every boy said that he called his mother



b. every boy said that he called his mother



These correspond respectively to the (a) and (b) derivations in PTQ. Given the semantics for linked structures in Higginbotham 1987:125–127, 130–131, they are again logically equivalent.

My double-indexing scheme mimics the two PTQ-derivations (a) and (b) as follows:

(27) c. SS: [every boy]$_1$ said that [he$_1$] called [his$_1$] mother

LF: every boy λ_1 [t$_1$ said that he$_1$ called his$_1$ mother]

d. SS: [every boy]$_1$ said that [he$_1$]$_2$ called [his$_2$] mother

LF: every boy λ_1 [t$_1$ said that he$_1$ λ_2 [t$_2$ called his$_2$ mother]]

The LFs here and their intended semantics should be self-explanatory, but the new SSs and SS-to-LF-changes call for some comments. Notice the distinction between $[\alpha_i]$ (inner index only), $[\alpha]_i$ (outer index only), and $[\alpha_j]_i$ (doubly indexed). Regarding the operation of QR, I return to our original view that it always works the same way. The trace retains the outer index of the moved phrase, but the moved phrase itself transfers it to the λ and thereby loses it. Bound variable pronouns are no exception. If an NP doesn't have an outer index at SS, it just can't QR. On the other hand, if it does have one, it must QR, or else

[23]Of course, these are just two out of infinitely many derivations. For one thing, there are infinitely many isomorphic derivations to each (a) and (b) where 1 and 2 are replaced by different numbers. More interestingly, there are infinitely many additional derivations not isomorphic to (a) or (b) which also yield the same meaning. Not all of these can also be distinguished by means of my double indices. For instance, in PTQ we might build *he$_1$ said that he$_1$ called his$_1$ mother*, then quantify in *he$_2$* with $F_{10,1}$, and then quantify in *every boy* with $F_{10,2}$. This derivation is not replicable in my system -- unless I were to allow *triple* indices at SS, but I am not aware of any empirical motivation for this. There are, however, some more types of PTQ-derivations besides (a) and (b) that do correspond to distinct double-indices-representations; one of them will in fact become relevant right below, see (26e) and (26g). (This footnote was prompted by questions raised by Barbara Partee (p.c.). I am aware, of course, that I have not even begun to seriously explore the expressive capacities of the proposed notation and its relation to alternatives in the literature.)

its outer index will fail to qualify on the following revised definition of "variable" and the LF will be flitered out. (Note the change in clause (iii).)

(28) Definition of "variable", revised:

An index is a variable only if it is
(i) on a λ, or
(ii) on a trace and bound by a λ, or
(iii) the inner index of a pronominal or anaphor and A-bound.

It follows that a bound variable pronoun that is to QR needs two indices: an outer one in order to QR and an inner one in order to be bound.

Let's return to our problem with the strict-sloppy ambiguity in example (26). Instead of the previous single option in (26c), we now have two choices for representing (26) at SS, even when both pronouns are to be bound and the subject is the correspondent:

(26) e. [every boy]$_1$ said that [he$_1$]$_2$ called [his$_1$] mother and the teacher too

f. [every boy]$_1$ said that [he$_1$]$_2$ called [his$_2$] mother and the teacher too

(26f) is, of course, just like (27d) above; (26e) is like (27c) as regards the indexing of *his*, but has an additional outer index on *he* (which we need to enable it to QR, a prerequisite for ellipsis copying).[24] Each of these derives a unique LF:

(26) g. every boy λ_1[t$_1$ said that

[he$_1$ λ_2[t$_2$ called his$_1$ mother]

and the teacher λ_2[*t$_2$ called his$_1$ mother]* too]]

h. every boy λ_1[t$_1$ said that

[he$_1$ λ_2[t$_2$ called his$_2$ mother]

and the teacher λ_2[*t$_2$ called his$_2$ mother]* too]]

And these correctly express the strict and sloppy readings respectively.

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[24]Ignoring the elliptical conjunct, a PTQ derivation that corresponds to the indexing choices in (26e) would proceed by building up *he$_2$ called his$_1$ mother*, quantifying in *he$_1$* by F$_{10,2}$ to yield *he$_1$ called his$_1$ mother*, building up to *he$_1$ said that he$_1$ called his$_1$ mother*, and finally quantifying in *every boy* by F$_{10,1}$. After the second step, this is like derivation (a), and as in (a), both surface pronouns are bound simultaneously in the last step.

4.3. The strong version of Condition B

We have now solved our initial technical problem about bound variable pronouns undergoing QR, but we have yet to explore the repercussions of our solution, especially for the operation of the Binding Conditions. With NPs allowed to bear two distinct indices at once, there no longer is a unique obvious notion of "coindexing," and thus of the Binding Conditions which rely on it.[25] A variety of different coindexing-concepts are in principle definable, including the following two:

(29) Definition:

a. β is linked to α iff α's outer index = β's inner index.
b. α and β are colinked iff α's inner index = β's inner index.

The terminology is deliberately reminiscient of Higginbotham's linked structures. It'll make sense to you if you glance at (27a,b) while applying the definitions to (27c,d). In fact, linking as defined in (29a) has exactly the properties of Higginbotham's linking relation; for instance, unlike coindexing it is neither symmetric nor transitive.

Consider now Condition A. In the version used so far, it requires that an anaphor be "coindexed with" a c-commanding A-position in its GC. How should we reinterpret it in the present setting? Higginbotham proposes to replace "coindexed with" by "linked to":

(30) Condition A, new version:

An anaphor is linked to a c-commanding A-position in its GC.

(30) predicts that an SS such as (31a) is ill-formed.

(31) a. * $[\text{he}_1]_2$ cut [himself$_1$]

The reflexive, though in some sense "coindexed" with the subject, is not linked to it in the sense of definition (29a). What (30) requires instead is the kind of indexing shown in (31b).

(31b) $[\text{he}_1]_2$ cut [himself$_2$]

The semantic import of this prediction is that a reflexive must really be bound within its GC, not just have a cobound antecedent there. To see this, look at the LFs that (31a,b) give rise to:

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[25]The reference to "A-binding", and hence to "coindexing", in LF-conditions like (28) remains unproblematic, since all indices are single by the time we reach a well-formed and interpretable LF.

(31) c. from *(31a): $he_1\ \lambda_2[t_2$ cut himself$_1]$

d. from (31b): $he_1\ \lambda_2[t_2$ cut himself$_2]$

The reflexive is free in (31c) and bound in (31d). Neither of these, of course, is a well-formed LF on its own on our current assumptions, because of the free index on *he$_1$* . But they might be part of larger well-formed LFs such as (32a,b).

(32) a. every boy $\lambda_1[t_1$ said that $he_1\ \lambda_2[t_2$ cut himself$_1]]$

b. every boy $\lambda_1[t_1$ said that $he_1\ \lambda_2[t_2$ cut himself$_2]]$

These two happen to be logically equivalent, so we cannot observe right here whether the prediction that (32a) comes from an ungrammatical SS is borne out. But if we add an elliptical conjunct, the difference becomes manifest: (30) predicts, correctly, I assume[26], that (33)—unlike (26)—allows only a sloppy reading.

(33) [every boy]$_1$ said that [he$_1$]$_2$ cut [himself$_{*1/2}$] and the teacher too.

Now let's turn to Condition B. This used to require that a pronominal not be "coindexed with" any c-commanding A-position in its GC. Should we again replace "coindexed with" by "linked to"? If we have learned the lessons of Partee & Bach (1984)[27] or Higginbotham (1983; 1985), we know better than that. Consider the following potential derivation for sentence (34):

(34) every boy said that he called him

a. SS: [every boy]$_1$ said that [he$_1$]$_2$ called [him$_1$]

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[26]More precisely: if (33) allows a strict reading as well, it does so no more easily than (i).

(i) John cut himself, and the teacher too.

Whatever relaxation of Reinhart's assumptions (here left untouched) about reflexives and ellipsis will accommodate a strict reading in (i) should do so for (33). I don't mean to dismiss the issue of strict readings with reflexives or diminish its potential significance for the goals of this paper, but one thing that seems fairly clear is that we don't want a theory that draws the dividing line between (33) and (i).

[27]I am indebted to Barbara Partee for reminding me of this important reference. It may be the earliest attempt to formulate Binding Conditions A and B within a framework which (due to its kinship with PTQ, in this case) captures semantic distinctions that turn on the difference between "cobound" and "bound by", such as the strict/sloppy ambiguity in (26). Just as in Higginbotham's framework, the need to strengthen Condition B arises as an immediate consequence of the system's ability to represent this semantic distinction. Partee & Bach present the issue somewhat differently than I have done here: Their treatment of ellipsis (which focusses on VP Ellipsis rather than Bare Argument Ellipsis) does not rely on quantifying-in of pronouns. But the Derived VP Rule that they employ instead has a similar effect of multiplying the possible derivations for sentences with two pronouns (like (34)). A detailed comparison between their proposals and those of Higginbotham or the present article must await another occasion.

b, LF: every boy λ_1[t_1 said that he$_1$ λ_2[t_2 called him$_1$]]

(34b) is logically equivalent to *every boy λ_1[t_1 said that he$_1$ called him$_1$]*, a reading that sentence (34) clearly lacks and that English can only express with the reflexive: 'every boy said that he called <u>himself</u>'. So this derivation should be ruled out. If Condition B merely prohibits <u>linking</u>, it will not block (34a): *[him$_1$]* is not, after all, linked to *[he$_1$]$_2$* (nor is there anything else we know of wrong with the derivation). *[he$_1$]$_2$* and *[him$_1$]* are, however, <u>colinked</u> (as defined in (29b)). So if we make Condition B sensitive to both linking and colinking, we would seem to solve our problem. This suggests the following formulation:

(35) Condition B, preliminary new version:

> A pronominal is neither linked to nor colinked with any c-commanding A-position in its GC.

A noteworthy implication of such a conception of Condition B is that many indexing patterns cannot be realized with any lexical item at all. For instance, *[he$_1$] called [α_1]* is ill-formed however we spell out α, in particular for α = *him* as well as α = *himself*.

(35) is adequate to deal with (34), but it is known to be still too weak for similar examples with somewhat more complex indexing patterns, for instance (36).[28]

(36) * [every boy]$_1$ said [he$_1$]$_2$ knew [he$_1$] called [him$_2$]

The LF that (36) gives rise to has the meaning of 'every boy said he knew he called <u>himself</u>', so this better not be a well-formed SS. Treading again in Higginbotham's footsteps[29], I therefore define an even more inclusive relation of which linking and colinking are two, but not the only, special cases.

(37) Definition[30]:

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[28]This too was already seen clearly by Partee and Bach (1984). See especially their section 6.3, pp. 124 - 25, where they comment on the sentence *Every man talked to himself by himself about a book that he gave to him* and the need for a condition that is sensitive to *global* properties of the derivation.

[29]See especially the motivation for the "transitivity condition" in Higginbotham 1983: 406 and the refined conditions that replace it in 1985: 570 - 575 and 1991: 8 - 11. The following is an attempt to replicate his proposal that two elements in a Condition B configuration "cannot be determined by the structure in which they occur to share a value" (1985: 575).

[30]This is an equivalence relation. In the present system, it happens to be coextensive with the reflexive, symmetrical, and transitive closure of the linked-to-relation. It will differ, however, after we reintroduce free variables in section 5.2 below. Two NPs with

α and β are codetermined iff
(i) $\alpha = \beta$, or
(ii) either one of α or β is linked to the other, or
(iii) α and β are colinked, or
(iv) for some γ, α and γ are codetermined and so are γ and β.

(38) Condition B, final new version:

A pronominal is not codetermined with any c-commanding A-position in its GC.

I leave it to the reader to check this against (36) and other even fancier cases suggested by the literature. For the remainder of this article, it is sufficient to remember that codetermination includes linking and colinking.

To sum up section 4, I started out with the question of how QR applies to bound variable pronouns and ended up with an endorsement of Higginbotham's Linking Theory, in particular of its non-parallel conceptions of Binding Conditions A and B. The overall indexing system appears more complex now, but it may be seen as a conservative extension of Reinhart's ideas. Notice in particular that, throughout my revisions, I have adhered to her assumption that there is a perfect correspondence between syntactic binding in the sense of Condition A and semantic binding (variable binding at LF). The newly introduced double indices serve, in effect, to express distinctions at SS that otherwise could only be brought out at LF. And the motivation for expressing them there is (as throughout Reinhart's work) the fact that syntactic Binding Conditions, which apply at SS, are sensitive to those distinctions.

5. Revised proposal

5.1. The Exceptional Coindexing Rule

We are now ready to return to the central issue of this study, namely the status of the Coreference Rule. In the section 3 titled "reference isn't special", I suggested that whatever will survive of this rule should pertain not just to coreference possibilities but also to the possibility of cobinding two bound variable NPs. Consider again the derivation I gave above for the donkey sentence version of the logic tutor's utterance and which violated (the original version of) Condition B:

(19) a. SS: * if everyone hates [a man]$_1$,

[that man himself]$_1$ hates him$_1$

b. LF: $\forall_1$ [if [a man]$_1$ [everyone hates t_1]]

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matching free inner indices will then count as colinked by (29b), and hence as codetermined by (37iii), and this is intended.

[[that man himself]$_1$ hates him$_1$]

From our current perspective, the question arises whether the index on *that man himself* is supposed to be an inner or an outer index. Given that it encodes what this bound variable demonstrative is bound by, it makes sense to consider it an inner index, as in (19d,e).[31]

(19) d. SS: * if everyone hates [a man$_1$],

[that man himself$_1$] hates [him$_1$]

e. LF: $\forall_1$ [if a man$_1$ [everyone hates t$_1$]]

[that man himself$_1$ hates him$_1$]

This derivation, at any rate, seems appropriate to the intended reading. Notice how (19e) illustrates Universal Instantiation: under any given assignment, the predicates following *everyone* in the antecedent and *that man himself* in the consequent denote the same property.

Our worry above was that (19a) was excluded by Condition B. (19d) is still excluded by the new version of Condition B: *[that man himself$_1$]* and *[him$_1$]* are colinked. If we say nothing further, we are no better off than before. Suppose, however, we exploit the refined indexing system to draw a distinction between different types of Condition B violations: linking violations and mere codetermination violations. In the former, a pronominal is linked to a c-commanding A-position in its GC; in the latter, it is codetermined with one, but not linked to any. Notice that *[him$_1$]* in (19d) is codetermined with *[that man himself$_1$]*, but not linked to it, so this is a mere codetermination violation. I speculate that this is significant. The general hypothesis is as follows: Linking violations of Condition B are disallowed under any circumstances. Mere codetermination violations are normally disallowed as well, and perhaps are never 100% perfect, but they can be much improved under suitable discourse conditions. Specifically, what makes (19) viable could be a principle like the following.

(39) Exceptional Coindexing Rule:

A pronominal α is (marginally) allowed (at SS) to be codetermined with a c-commanding A-position β in its GC when the interpretation thus obtained needs to be distinguished from the one that would result if (β

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[31]The pertinent clauses in the definition of variables (cf. footnote 21) are accordingly reinterpreted as follows:

(iv) or the inner index of an indefinite in the restriction of a QAdv and A-bar-bound by it,

(v) or the inner index of a definite in the nuclear scope of a QAdv and A-bar-bound by it.

were given an outer index and moved and) α were replaced by a variable A-bound by the trace of β.

This is obviously a very close relative of Reinhart's Coreference Rule. Not only does it express her basic insight that we may sometimes say things we otherwise couldn't because that's the best way to get our communicative point across; it also retains almost all the concrete wording of (7). But one thing is different: (39) is about indices, not about referents.

(39) applies to sanction (19d,e), on the grounds that the meaning of the competing structure in (19f) would not have served the logic tutor's special communicative purpose:

(19) f. $\forall_1$ [if a man$_1$ [everyone hates t_1]]

[that man himself$_1$ λ_2[t_2 hates him$_2$]]

Though logically equivalent, the structured meaning of (19f) fails to illustrate pure Universal Instantiation.

Now it would be rather dissatisfying to have both the Coreference Rule (7) and the Exceptional Coindexing Rule (39) side by side in our system. They clearly concern different instances of the same phenomenon and we would like to collapse them somehow. But how is this possible? Under the present assumptions about syntactic representation which we took from Reinhart, there is a fundamental difference between (7) and (39): (39) deals with licensing certain indexing patterns, but (7) doesn't deal with any aspect of syntactic representation at all, but directly with interpretive choices. The reason for this is, of course, Reinhart's view that coreference relations, as opposed to variable binding relations, have no syntactic representation. If we want to unify (7) and (39), it seems advisable to give up this radical bifurcation. In particular, if we want to subsume the cases now dealt with by (7) under the scope of (39), we are driven back to the more conventional view of coindexing as a representational device that does double duty for coreference and variable binding. This is the line that I will pursue here, and it requires a couple of revisions in the basic syntactic and semantic system.

5.2. Free variables readmitted

If referring NPs are to bear indices and indices are semantically variables, then referring NPs correspond to <u>free</u> variables. Free variables were systematically excluded in Reinhart's system, so our first task is to permit free variables under the well-formedness conditions for LFs. The current definition of "variable" leaves no room for them, so we have to extend it.

(40) Definition of "variable", revised again:

An index is a variable only if it is
(i) on a λ, or
(ii) on a trace and bound by a λ, or

(iii) the inner index of a pronominal or anaphor and A-bound, or
(iv) the inner index of a definite NP and free.

Second, we must provide these free variables with some kind of semantic interpretation. Let's at first restrict our attention to the special case where we are dealing with free pronouns. These are, of course, the deictic pronouns (formerly unindexed) and they get their reference assigned by the context. Since we want to ensure that coindexed free pronouns are ipso facto coreferential, we should now think of the context as supplying a referent per index (rather than, as before, per pronoun occurrence). And mindful of our discussion of cognitive value in section 2.3, we assume that it is not really a referent that the context supplies, but a guise. So we add the following principle:

(41) Reference Assignment (1st version):

An LF ϕ is interpretable in an utterance context c only if for each index i free in ϕ, c furnishes a guise F^c_i.

In the compositional semantic interpretation of the utterance, these contextually supplied guises provide values for the free variables. When we are calculating the proposition expressed by an LF ϕ in a given context c, we assign to each free α_i the individual $F^c_i(w_c)$ that F^c_i picks out in the utterance world w_c. (To obtain the cognitive value, we first have to calculate the propositional concept that maps each world w in the context set of c to the proposition ϕ would express if uttered in w, then diagonalize this; see Stalnaker 1979.)

As it stands, (41) ensures that coindexed free pronouns corefer. In fact, it ensures something even stronger, namely that they pick out the same referent under the same guise. How about two free pronouns with different indices? Could they still receive the same referent? Could they be assigned even the same guise? Nothing so far prevents it, and as far as mere coreference goes, that's just fine. But sameness of guises is something we have to disallow, for reasons that will quickly become clear. So we need an amendment:

(42) Reference Assignment (2nd version):

An LF ϕ is interpretable in an utterance context c only if c furnishes a distinct guise F^c_i for each index i free in ϕ.

With this much of the new system in place, the coverage of our Exceptional Coindexing Rule is no longer limited to bound variable examples like (19), but includes analogous cases with two coreferential pronouns, such as the following variant of (14).

(43) Look, if everyone hates Oscar, then it surely follows that he himself hates him.

Suppose the intended interpretation of this has the following derivation:

(43) a. SS: if everyone hates Oscar, ... [he himself$_2$] hates [him$_2$]

b. LF: if everyone hates Oscar, ... he himself$_2$ hates him$_2$

The utterance context c for (43b) is of course meant to be such that $F^c_2(w_c)$ = Oscar. (Never mind what the complete appropriate guise of Oscar is.) So the consequent clause of (43b) in context c expresses the structured proposition that consists of Oscar and the property of hating Oscar. Now (43a) is a Condition B violation because *[he himself$_2$]* is in the GC of and codeterrmined with *[him$_2$]*. But (39) allows it anyway because this is a context where structured meaning matters, and the alternative (43c) would express a different structured proposition in c, namely the one consisting of Oscar and the property of self-hating.

(43) c. ... he himself$_2$ λ_3[t$_3$ hates him$_3$]

So far, so good. Our account of this example is not complete, however, without a demonstration that (43a,b) is essentially the <u>only</u> derivation under which it gets the intended meaning (apart from trivial alphabetic variants, of course). In particular, we have to watch out for the following two potential rivals, in which *he himself* has either received no index at all, or a different one from *him*.

(43) d. SS: if everyone hates Oscar, ... [he himself] hates [him$_2$]

e. LF: if everyone hates Oscar, ... he himself hates him$_2$

(43) f. SS: if everyone hates Oscar, ... [he himself$_4$] hates [him$_2$]

g. LF: if everyone hates Oscar, ... he himself$_4$ hates him$_2$

Neither of these are even prima face Condition B violations, so any interpretations they represent should be fine quite regardless of the special discourse conditions that are required for clearance by the Exceptional Coindexing Rule. They better not be alternate representations of our intended interpretation, then, because that way we would lose our empirical prediction about (43). In other words, we would lose Reinhart's insight that this particular interpretation of this English sentence stands and falls with the presence of a context in which there is some special reason for structured meaning to matter.

As regards (43d,e), I will simply stipulate it away by a provision that pronouns bear an (inner) index as a lexical property (see right below). (43f,g), on the other hand, must certainly be allowed as a well-formed derivation for <u>some</u> reading of (43), for example one where *he himself* refers to Fred. But can it be set in a context c where it so happens that $F^c_4(w_c) = F^c_2(w_c)$ = Oscar? Well yes, it could <u>so happen</u>—for instance if we have been talking about a certain "Fred", *he himself$_4$* connects anaphorically to an occurrence of that name *Fred*, and then Fred and Oscar turn out to be the same person. But in this case, $F^c_4 \neq F^c_2$ (even though they concide on w_c), and that's a different interpretation from the one we have been contemplating all along (and one that <u>should</u> be predicted okay without special excuses about the importance of structured

meaning!). What our Reference Assignment principle doesn't allow is for *he himself*$_4$ and *him*$_2$ in (43g) to pick out Oscar through the same guise. (This was the purpose of the amendment in the 2nd version.) And this, I take it, suffices to disqualify (43f,g) as an alternative representation of the interpretation we associated with (43a,b). The logic tutorial setting that we have been imagining just doesn't provide two separate guises of Oscar (much less appropriate clues to determine which pronoun goes with which guise).

So much for (43). But of course we also need to cover the original (14), with the proper name *Oscar (himself)* rather than a pronoun in the subject position. In order to do this, we must allow the name to bear an (inner) index and that index must represent the name's reference. What's more, we must not just allow, but force, names to bear indices. This is for the same reason that we wanted to exclude (43d,e) above: If we let a name be interpretable without the benefit of an index, we couldn't read off coreference relations between that name and some other NP from the syntactic representation. That way, we could always "sneak by" Condition B and the Exceptional Coindexing Rule by suppressing potentially offending indices and still get equivalent readings. And then we would still need a separate Coreference Rule of Reinhart's kind to block those.

So we must go all the way and make sure that there is no reference without an index. Specifically, I stipulate that all pronouns, proper names, and other definites bear an inner index as part of their lexical entry and thus come automatically indexed when they are inserted in any syntactic structure. (The assignment of outer indices may be left free and optional as before.)

Free indices still are assigned referents by the utterance context, but the NP's lexical content must now be made to constrain this assignment. Actually, to some extent this happens even with pronouns, which normally have gender, number, and person features that limit their choice of referent. Proper names are just a more extreme case of this phenomenon: *he* fits any male person or animal, *John* is specialized to those named "John". Since that's a common name, there is still considerable disambiguating work left to be done by the usual pragmatic factors; but the formulation below is also meant to cover the limiting case of a name unique enough to render the context's role trivial.

(44) Reference Assignment (3rd version):

> An LF ϕ is interpretable in an utterance context c only if c furnishes a distinct guise F^c_i for each index i free in ϕ
>
> such that it is presupposed in c that F^c_i picks out an individual which fits the features and lexical content of any NP indexed i occurring in ϕ.

(44) is a bit vague, but that could be worked out.[32]

There is now no significant difference between (43) and the original (14). On our current assumptions, the latter's SS and LF are as follows:

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[32]For some pertinent discussion, especially regarding definite descriptions, see Heim 1988.

(14) c. SS: if everyone hates [Oscar$_2$], ... [Oscar$_2$] hates [him$_2$]

d. LF: if everyone hates Oscar$_2$, ... Oscar$_2$ hates him$_2$

The context must match the free index 2 with some guise that is known to be of something named "Oscar" and a male human or animal. (If the second requirement, stemming from the features of the pronoun, is redundant, given that "Oscar" is a familiar name for males, so much the better.) Presumably, this guise is the memory entry under the name "Oscar".[33] The Exceptional Coindexing Rule applies to license this interpretation just as we showed above for (43a,b), and (for the reasons we went over there) we needn't worry about alternate derivations in which *Oscar* and *him* weren't coindexed.

5.3. Other examples in the revised analysis

In arguing that the Exceptional Coindexing Rule takes over the work of Reinhart's Coreference Rule, I have looked at only one type of example so far, the kind where structured meaning matters. What about the other types initially adduced in illustration of the Coreference Rule? Let's run through the list one more time. We will see that the revised account parallels G & R's original one for the *only* and Lakoff examples. On the other hand, due to the fact that (39) doesn't apply unless there is a Condition B violation in the first place, the basic cases and debates about identity are now licensed independently of (39), simply because they have fully grammatical representations.

5.3.1. Basic cases

Here is our initial trio again:

(8) John saw him.

(9) John saw his mother.

(10) His mother saw John.

We can be brief on (8): A bound variable interpretation is out as before, as it would be a linking violation of Condition B. A corefential interpretation, with the common referent picked out under the same guise, would have to be represented by matching inner indices on *John* and *him* and thus would be a mere codetermination violation of B. It is therefore also out, except in special contexts where structured meaning matters. Finally, coreference via distinct guises is okay, but requires the sort of context where distinct guises are readily available.

With (9), Condition B does not apply since *John* is beyond the GC of *his*. Both linking and colinking are therefore permitted. The former represents the bound variable reading, the latter the coreferential one. Here we see the benefit of restricting (39) to prima facie ill-formed structures (as opposed to

[33] In the logic tutorial setting, there may be no reference to any particular real-life Oscar. But let's abstract away from this bit of make-believe.

haveing it apply everywhere, as did (7) and (23)). As G & R point out in their footnote 13, there is reason to believe that (10) is inherently ambiguous. Otherwise one would have to say that it allows a coreferential interpretation in continuations like *John saw his mother, and so did Bill* only because this yields a manifestly distinct interpretation for the continuation. But this is problematic for two reasons. First, as noted in Lasnik 1989:166, it doesn't straightforwardly cover the case where the elliptical continuation is uttered by a different speaker. Second, there is independent reason to doubt that the Coreference Rule "looks ahead" that far in the discourse: if it did, *John saw him, and Bill did too*, should likewise permit coreference between *John* and *him*. G & R show that these problems disappear if the Coreference Rule is restricted to prima facie Condition B violations, and I have taken up a version of that idea in my (39).[34]

In (10), variable binding continues to be out for the same reason as before: Locally A-bar-bound pronouns still fall through the cracks of the definition of "variable". But nothing whatsoever interferes with coreference, which would be represented by matching inner indices on *his* and *John*. (Again, I mean coreference via a common guise.)

5.3.2. Identity debates

Let's turn to example (12).

(12) A: Is this speaker Zelda?

B: How can you doubt it? She praises her to the sky. No competing candidate would do that.

In a way, I have already said everything I have to say about this one. Without being mentioned explicitly at that point, this type of example was my guide in setting up the Reference Assignment principle in such a way that it imposes a one-to-one match of indices and guises (and not of indices and actual referents). So whether or not party B turns out to be right and the speaker is Zelda, the syntactic representation of the pertinent reading of this example will have distinct inner indices on *she* and *her*, and so, once again, Condition B doesn't even get a shot at it.

Here the present analysis actually takes a different view than G & R, even in the version of their footnote 13, which restricts (7) to prima facie Condition B violations. (12) does qualify as such a prima facie violation in their sense, but it isn't a violation of any kind in the present system. This is welcome insofar as this type of case has none of the marginal flavor of the other types (as G & R also concede in their footnote 10).

5.3.3. *only* examples

Here is the example about Lucifer once more:

(11) (Everybody hates Lucifer.) Only he himself pities him.

[34]G & R actually don't commit themselves to this particular solution, they just spell it out as one possibility among others.

Recall that there was a murky point in G & R's original account of this example, a kind of equivocation between "the trace of *only he himself*" and "the trace of *he himself*". Let us see what shape this takes in the present system. The derivation of (11) on the intended reading ought to be (11c,d).

(11) c. SS: [only [he himself$_1$]]$_2$ pities [him$_1$]

d. LF: only [he himself$_1$] λ_2 [t$_2$ pities him$_1$]

As indicated, 1 in (11c) is an inner index on the smaller NP, and 2 an outer index on the larger NP. If this is indeed the situation, then (11c) is not in violation of Condition B, not even a codetermination violation: the larger NP is in a c-commanding A-position w.r.t. *[him$_1$]* but doesn't share any index with it, and the smaller one is colinked with *[him$_1$]* but not in a c-commanding A-position.

If we are only concerned with allowing this interpretation of (11), we can live with this result. But the intuitive status of this type of example is like that of others we have classified as weak Condition B violations in need of sanctioning by the Exceptional Coindexing Rule. So a better prediction would be that the subject and object in the SS of (11) do count as codetermined, and that therefore (39) has to step in to license (11d) on the grounds that its truth-conditions differ from those of (11e):

(11) e. only [he himself$_1$] λ_2 [t$_2$ pities him$_2$]

At this point, our options are not unlike G & R's: For instance, we can just stipulate that adjunction structures of this sort count as one NP rather than two. (This implies, among other things, that such structures never have room for more than a total of two indices; they couldn't have up to four, as we'd expect in a genuine instance of two nested NPs.) The indices 1 and 2 on *he himself* and *only he himself* then just are the inner and outer index of this one NP, which thereby qualifies as colinked with the object. As it stands, this is just as hokey as the equivocation implicit in G & R's original story. But perhaps it can be improved upon when future research gives us a deeper understanding of both the syntax and the semantics of double indexing.[35]

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[35]In a related type of example that is likely to be relevant in this connection, *only* does not form a constituent with the focus it associates with:

(i) I could only see that [he himself]$_F$ pities him.

As shown by Rooth (1985: 72 - 72, 76 - 79), an index on a focussed phrase may be inside or outside the focus-marker, with non-equivalent semantic results. In the present setting, we face the question whether the phrase including the F and the one that excludes it should be treated as two separate, nested NPs (each with potentially an inner and an outer index), or whether there is just one NP, whose inner index is interpreted below the F and whose outer index above it. The latter choice is preferable in light of the fact that the relevant coreferential readings for such sentences have the same intuitive status as analogous cases in which *only* and its focus form a constituent. -- The discussion of anaphora with focussed antecedents in Higginbotham 1989 also points in this direction.

In other words, our analysis of (11) remains essentially Reinhart's—except that it now extends automatically to (21), which receives the derivation below:

(21) d. SS: [every devil]$_1$ knows that

[only [he himself$_1$]]$_2$ pities [him$_1$]

e. LF: every devil λ_1[t$_1$ knows that

[only [he himself$_1$] λ_2[t$_2$ pities him$_1$]]]

The fine-structure of the *only*-NP in (21d) is whatever it is in (11c), and thus (11) and (21) are alike from the standpoint of both Condition B and the Exceptional Coindexing Rule. The potential preempting alternative to (21e), which however has different truth-conditions, is (21f).

(21) f. every devil λ_1[t$_1$ knows that

[only [he himself$_1$] λ_2[t$_2$ pities him$_2$]]]

5.3.4. Lakoff's example

G & R's account of (15) likewise carries over in full and now generalizes to (22). The derivations speak for themselves.

(15) i. SS: [I$_2$] dreamt [I$_2$]$_1$ kissed [me$_2$]

j. LF: I$_2$ dreamt λ_1 [t$_1$ kissed me$_2$] [I$_2$]

k. potential preemptor: I$_2$ dreamt λ_1 [t$_1$ kissed me$_1$] [I$_2$]

(22) b. SS: [not only [I$_3$]]$_2$ dreamt [I$_2$]$_1$ kissed [me$_2$]

c. LF: not only [I$_3$] λ_2 [t$_2$ dreamt λ_1 [t$_1$ kissed me$_2$] [I$_2$]]

d. potential preemptor:

not only [I$_3$] λ_2 [t$_2$ dreamt λ_1 [t$_1$ kissed me$_1$] [I$_2$]]

6. Concluding remark

I have pointed out plenty of loose ends along the way. Let me just note one more respect in which the present account might need revision. My proposal, as it stands, actually has two separate parts. One claim is that there are two different types of Condition B violation, and that one of these types, the mere

codetermination violations, can be rescued under suitable discourse conditions. The second claim specifies more concretely what these discourse conditions are; in close agreement with Reinhart, it implies that an interpretive difference between the LF to be licensed and its binding-alternative is a sufficient licensing factor.

Now it could conceivably turn out that the first claim is right, but the second is wrong. Specifically, there may be additional discourse factors, besides or even instead of the one that Reinhart identified. For instance, Evans (1980) and others have conjectured that prima facie Condition B violations improve when the previous discourse provides an antecedent that both potentially offending NPs can be anaphorically linked to. G & R correctly observe that this is not a sufficient condition for such violations to become acceptable. But a possibility that has not been explicitly considered so far is that it might be a necessary factor in addition to the requirement stated in (7) or (39). There is something to be said for this possibility. All the relevant examples I have used in this article actually happen to have this property; see, in particular, (11), (14), (15), and their variants, all of which contained a suitable common antecedent for the two NPs in the Condition B configuration. As Hans Kamp (p.c.) pointed out to me, this appears to be crucial. For instance, if we have not been talking about Lucifer before, an utterance of *Only Lucifer pities him* (or of *Only he pities him*, using the first pronoun with a demonstrative reference to Lucifer) is quite bad under a coreferential reading. So the condition identified by Reinhart and carried over into my Exceptional Coindexing Rule is not by itself sufficient, and a common antecedent seems to be required on top of it. This needs further exploration.

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