Draft, August 2007

COREFERENCE AND SELF-ASCRIPTION[1]

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ABSTRACT

Although the classical binding theory stipulates complementary distribution of pronouns and reflexives, there are famous cases of non-complementarity: for example, a pronoun may have a local antecedent in certain contexts, obviating Condition B, as in *John and Mary have a lot in common: he loves her and she$_i$ loves her$_i$* (Evans, 1970). Reinhart's standard account contends that Condition B obviation through "coreference" is possible only if the sentence at issue has an interpretation that is "distinguishable" from its bound alternative.

The paper presents new empirical and conceptual problems to the coreference rule, and proceeds to pursue a new perspective: A pronoun and a local antecedent may have common reference iff the result makes for a non-self-ascriptive reading of the pronoun. Previously unnoticed empirical evidence that supports this view comes from several sources:

I. There is a meaning difference between sentences that allow a pronoun to be locally coreferential, and their bound alternatives: coreferential pronouns, but no other anaphoric expression, allow non-self-ascriptive readings (resulting, I argue, in *de re* readings, on a par with those in belief contexts). This meaning difference enables Local Coreference (*a k a* Condition B obviation).

II. The distribution of coreferential pronouns is narrower than previously supposed – in standard contexts, only a restricted class of (mostly intensional) predicates allows coreference. E.g., a coreference reading can be squeezed out of *John and Mary have a lot in common: he adores her and she$_i$ adores her$_i$*; but in *John and Mary do the same thing on Tuesdays: he tells her stories and she$_i$ tells her$_{\#i}$ stories*, coreference in the second conjunct is much more difficult to obtain. This restriction appears to stem from the unavailability of non-self-ascriptive readings of pronouns when the predicate is non-intensional (like *tell*).

I show how a revised coreference rule, in which Condition B obviation is triggered by a non-self-ascriptive (or *de re*) pronoun, handles all these new facts. I then proceed to discuss additional phenomena:

III. A quantified subject of an ECM verb and the pronominal subject of this verb's complement can have common reference, with the pronoun assuming a collective (as distinct from distributive) interpretation, contrary to Chomsky's (1986) observations.

These facts lead to a revised coreference rule: Condition B obviation is possible iff the resulting meaning is different from the bound reading.

[1] Supported by Canada Research Chairs and by a standard grant from SSHRC. Danny Fox was extremely generous with his time and thoughts, and commented extensively on several earlier drafts. I am also most grateful for the indispensable help and advice Dan Drai and Bernhard Schwarz gave me. Additional thanks go to Na'ama Friedmann, Andrea Gualmini, Omer Preminger and Yael Sharvit, and to the audiences at the Tel Aviv University and Ben-Gurion University Linguistics Colloquia, whose comments and suggestions were most useful.

0. From rule-i to *de re* Co-determination

The classical binding theory stipulates complementarity between pronouns and reflexives. Yet there are famous cases of non-complementarity. For example, a pronoun may corefer with a local antecedent in certain contexts, obviating Condition B, as in *John and Mary have a lot in common: he loves her and she$_i$ loves her$_i$* (Evans, 1970), or *I dreamt I was Brigitte Bardot and I$_i$ kissed me$_i$* (Lakoff, 1972). A standard account of such phenomena, proposed by Reinhart (1983) and Grodzinsky & Reinhart (1993), contends that Condition B obviation through coreference is possible only if the sentence at issue has an interpretation that is "distinguishable" from its bound alternative. Other accounts of coreference vary in precise formulation as we shall see, but they all retain the idea that coreference is obtained through a comparison between alternative interpretations (Heim, 1993/1998; Fox, 2000; Büring, 2005).

I present reasons to revisit the coreference rule (*a k a* rule-i). The basic observation here is that self-ascription and coreference are closely related. In particular, self-ascriptive readings of anaphors – available (at times even forced) in bound anaphors – are blocked in coreference. This observation paves the way to a new account: what makes apparent violations of condition B possible is the non-self-ascriptive reading of the pronoun (which, I will try to argue, is a *de re* reading). Taking Reinhart's approach as my point of departure, I present the relevant facts, and then move on to consider a new version of the coreference rule: a pronoun can corefer with a local antecedent if it has a *de re* reading. Finally, I present a more generalized alternative, according to which a pronoun may corefer with a local antecedent only if its meaning is distinct from that of its bound alternative (Distinct Meaning Co-determination, DMC).

The paper begins with the standard approach to coreference, as manifest in rule-i (Section 1). This rule assumes a distinction between coreferential and bound-variable pronouns, and that all pronouns that have local antecedents are coreferential, and permits a pronoun to corefer with a local antecedent on condition that it have a "distinguishable" interpretation that is somehow different from the bound alternative in the relevant context. Section 2 presents problems for this approach to coreference. Central among these are the vagueness of the term "distinguishable interpretation", and the fact (brought up by Heim) that condition B violations are possible even when the antecedent of the pronoun is a bound variable, which goes against the spirit of rule-i. I then move on to Heim's solution for this problem, and her

revised rule (Section 3). Following Higginbotham, she builds a dual linking system, in which local coreference is an indirect relation between two NPs, manifest when both are linked to the same antecedent. Similar to rule-i, a relation between these NPs (now called co-determination) is possible when context allows a "distinguishable interpretation" to arise.

Observations on the structure of Heim's Exceptional Co-determination Rule lead to a search for new phenomena: in her system a (previously coreferential) co-determined pronoun is connected to a local "antecedent" only indirectly. Hence, there may be reasons to look for semantic consequences of this indirect connection. The search bears fruit, leading to the conclusion that locally coreferring pronouns (that apparently violate condition B) are non-self-ascriptive (Section 4). I argue that the distinction between self-ascriptive and non-self-ascriptive readings in the context of coreference is on a par with the *de se/de re* distinction, usually invoked in belief contexts. I then reformulate the coreference rule as a *de re* Co-determination rule.

Next, I move on to consider related phenomena. Section 5 demonstrates that rule-i's overgeneration problem (i.e., the unacceptability of coreference in sentences like *John and Mary do the same thing on Tuesdays: he tells her stories and she$_i$ tells her$_{\#i}$ stories*) is solved by the *de re* Co-determination rule. Section 6 brings up a puzzle that regards the unexpected absence of collective interpretation of pronouns, which Chomsky (1986) presents as an empirical argument against rule-i. Chomsky's facts are reconsidered in light of the foregoing discussion. It turns out that when the relevant sentences are placed in proper discourse context, they do allow for collective readings of the pronouns – a fact not considered by Chomsky. This new set of facts leads to a generalization of the *de re* Co-determination rule (section 7). Finally, Section 8 briefly considers the consequences of the new view on coreference to the debate on the acquisition of binding and coreference.

1. The current picture and how we came to have it

A Binding theory in which locality is the divide between pronouns and reflexives (e.g., Chomsky, 1981) is immediately confronted with several types of counterexamples, which indicate that these two types of anaphoric expressions are not in complementary distribution. Prominent among these are cases where a pronoun is locally linked to an antecedent. One famous type consists of cases in which a certain context induces Condition B violations, as the pronoun is linked to a local antecedent:

(1) Local Coreference – "apparent" violations of Condition B:

a. John and Mary have a lot in common. He loves her and *she* loves *her*. (Evans, 1980)
b. I dreamt I was Brigitte Bardot and *I* kissed *me*. (Lakoff, 1972)
c. Who is this woman? She must be Zelda. *She* praises *her* to the skies. Only Zelda would do that. (Evans, 1980)
d. If everyone hates John then it follows that even *he (himself)* hates *him*. (Heim, 1993/1998)
e. Sometimes I'm so bad, even *I* don't like *me*. (Bill Laimbeer, *Detroit Pistons*, due to Steve Pinker)

A well-known account (Reinhart, 1983; Grodzinsky & Reinhart, 1993) proposes that such violations are possible for a semantic reason, namely if the relation between the pronoun and its antecedent in (1) results in a special interpretation. On this view, this relation is distinct from binding, and hence exempt from the Binding Theory.

Reinhart builds on an idea of Bach and Partee (1980), who propose to handle pronominal ambiguities in VP-ellipsis by distinct grammatical modules. They observe that "It is really only in situation (2a) (in some sentences)… that it seems appropriate to talk about coreference. In every other case...coindexing of a pronoun with some other expression is a shorthand way of saying that the pronoun in question is being interpreted as a bound-variable."

(2) Binding vs. coreference (Bach & Partee, 1980):

a. *John* said *he* was OK
b. No *woman* doubts *she* is OK
c. . . .the *woman* who said *she* found the answer

The distinction between coreference and variable binding, then, is the backdrop against which the current picture was formed. It extends the Bach-Partee distinction between bound and coreferential pronouns to other phenomena. For example, to the strict/sloppy identity ambiguity in VP-ellipsis (2a) and in sentences with *only* (2b), where a single indexing system that handles referential dependencies produces multiple readings:

(3) Strict/sloppy ambiguities:

a. VP-ellipsis: John$_i$ walked his$_i$ dog and Bill$_j$ did [~~walk his$_{i,j}$ dog~~] too
(Ross, 1967; Keenan, 1971)
i. Sloppy meaning: …Bill walked Bill's dog
ii. Strict meaning: …Bill walked John's dog
b. Cases with *only:* Only John voted for his mother
i. "Sloppy" meaning entails that she may have gotten more than 1 vote
ii. "Strict" meaning entails that she got exactly 1 vote

Thus strict identity coreference in VP-ellipsis (3a-*ii*) and with *only* (3b-*ii*) is grouped with Local Coreference (1) as well as with cases of pronominal coreference without a violation (4a), where a pronoun can corefer with a non-c-commanding antecedent, but cannot be bound by it (4b):[2]

(4) Coreference without a violation:
   a. The man [next to $Mary_i$] touched her_i
   b. *The man [next to [every actress]$_i$] touched her_i

Local Coreference, however, cannot hold between a pronoun and just any antecedent NP. As (5a) demonstrates, it is impossible in the absence of a licensing context:

(5) a. $Mary_i$ likes her_{*i}
   b. $Mary_i$ likes $herself_i$

The need, then, is to distinguish coreference from variable binding on the one hand, and on the other hand regulate it so that cases like (5a) are ruled out. Thus a special rule is proposed, relying on the observation that where an anaphor can be bound (5b), pronominal coreference is blocked. The rule is supposed to express the intuition that pronominal coreference is possible when it accomplishes something that binding cannot do – that pronouns may be coreferential only on condition that they do something special:

(6) Rule-i (Grodzinsky & Reinhart, 1993):
   NP A cannot corefer with NP B if replacing A with C, C a variable A-bound by B, yields an indistinguishable interpretation.

This leads to a cluster of facts that are said to follow from the same principle:

(7) Reinhart's Coreference Cluster:
   a. Pronominal binding is only variable binding; any other relation between a pronoun and an antecedent is coreference.
   b. Coreference clusters 3 types of cases:
      i. Local Coreference in Condition B violations (1).
      ii. Strict-identity readings (3a-ii), (3b-ii).
      iii. Coreference without violation – pronouns co-referring with non c-commanding antecedents (4a).

Rule-i accounts for these cases as follows: Condition B violations (1) are possible in discourse contexts that add some special angle to the assertion – perhaps a modicum of irony

[2] Grodzinsky & Reinhart (1993) collapsed Condition B and Condition C violations. In this paper, I ignore issues pertaining to Condition C, focusing only on pronouns.

or some such thing – which leads to an interpretation that is distinguishable from its bound counterpart, and thus Local Coreference is licensed. Next, the truth conditions of sentences with strict pronouns (3a-ii), (3b-ii) are different from their sloppy counterparts, hence interpreted distinctly. Finally, coreference without violation in (4a) is licit because it results in an interpretation that is distinct from the ungrammatical (4b) which is presumably uninterpretable. For these three types of cases, rule-i seems to work.

2. Potential problems for the coreference rule

Although the rule accounts for the facts it is designed to cover, empirical problems and conceptual questions do arise. Some of these are listed below:

2.1. Reference

The coreference rule is stated as a relation between pronouns and *referential* antecedents. Yet Condition B violations are sometimes possible in sentences where this is not so. Heim (1993/1998), in her critique of rule-i, presents donkey anaphora bound by an indefinite, and points out that Rule-i is incapable of handling such sentences:

(8) If everyone hates a man$_i$, then it follows that [that man himself]$_i$ hates him$_i$

Examples such as (8) may call into question the relevance of reference to the analysis of Local Coreference.

2.2. Overgeneration

The net that the rule casts may be too wide. In particular, it is not designed to distinguish among predicate types. Yet upon examination, coreference appears to be possible only with a restricted class of mental predicates as those above, and blocked with others. Here is a handful of examples:

(9) a. *I know what Mary and John do every Tuesday. She gives/sends him money and he$_i$ gives/sends him$_i$ money.
b. *Is this clown Zelda? Of course she$_1$ is. She$_i$ just sent/mailed her$_i$ a letter. Only Zelda would do such a thing.
c. *No one gave/sent John a gift. Only he$_i$ gave/sent him$_i$ a gift

These contrasts are unexpected, and call for an explanation.

2.3. Vagueness

Central to rule-i is the notion "distinguishable interpretation", and yet the nature of this notion is not clear. The most natural construal of this notion seems to be "distinct truth conditions." However, to require this from the trigger for coreference would lead to incorrect

results. In particular, this construal leads to the expectation that (10) and (11) would exhibit the same acceptability contrast: both bound alternatives (10a)-(11a) are acceptable, and thus by rule-i, the replacement of the bound anaphor with a (presumably coreferential) pronoun should have the same effects in both. And yet, there is a clear acceptability difference between (10b) and (11b):

(10) a. John and Mary have a lot in common. He loves her and she_i loves $herself_i$.
b. John and Mary have a lot in common. He loves her and she_i loves her_i.

(11) a. She_i loves $herself_i$.
b. *She_i loves her_i

We can sense that the acceptable (10b) – the paradigmatic Evans example for coreference – has an ironic nuance, something that perhaps has the flavor of different perspectives on the same proposition. By contrast, (11b) is flatly unacceptable, and in fact serves as a standard example for a condition B violation. There is an intuitive difference between the cases, but it does not seem expressible in terms of truth conditions. Indeed, rule-i tries to capture this distinction by alluding to "distinguishable interpretation" as the trigger for coreference. But what "distinguishable interpretation" is, and how the context in (10b) help it to surface, is difficult to tell.

Other versions of the coreference rule are not of much help in the present context. Fox's (2000, p. 115) Rule-H triggers an alternative by an allusion to "the same semantic interpretation". Similarly, Büring (2005, p. 121) requires "change of interpretation" as trigger. As we shall later see, Fox's and Büring rules focus on a set of phenomena that overlaps with the Coreference Cluster in (7), but are not identical to it: among other things, they use it to explain other phenomena (e.g., the so-called "Dahl's (1973) paradox"). Yet, an understanding of these may require tools are not useful for an understanding of the difference between (10) and (11), which is where we started. In particular, it is not clear how the trigger "sameness of semantic interpretation" can be construed in order to explain the difference between (10) and (11). The exact nature of the trigger for coreference, then, is something we should try to uncover. If we manage to get a handle on it, we might be able to elucidate the nature of the contextual conditions that license Local Coreference. In the following pages, I will try to find solutions to these problems.

3. Hints from Heim (1993/1998) regarding the nature of Local Coreference

3.1 Varieties of Local Coreference

Heim (1993/1998) offers a critique of rule-i, investigates the nature of coreference, and comes up with a proposal that will be useful in the present context. She begins with a typology of Local Coreference phenomena, and shows that they all suggest that the dependency relation at issue is indirect. Here are two examples that illustrate this point:

(12) A partial typology of Local Coreference:

a. *"Structured meaning"*:
I know what John and Mary have in common:
He_{John} ***[loves her***$_{Mary}$***]*** and *she*$_{Mary}$ ***[loves her***$_{Mary}$***]***
parallel VP, perhaps unanalyzed

b. *"Identity under debate"*: Who is this woman speaker?
She must be Zelda. *She*$_{this\ woman}$ praises *her*$_{Zelda}$ to the skies.
Only Zelda would do such a thing.
answer to an identity question

In the "structured meaning" example (12a), context sets up an expectation for a property common to John and Mary. This property is specified in the first conjunct as λx[x loves her_{Mary}]; the expectation then leads to the invocation of some form of parallelism condition, by which the VP in the second conjunct is interpreted like the first VP. This way, *she*$_{Mary}$ comes to have the property of *loving her*$_{Mary}$, and as both pronouns refer to Mary, Local Coreference is obtained.[3]

The example in (12b), though of a different type, also features indirect Local Coreference. In this case, Heim shows that although the pronoun and its antecedent corefer, they are *cognitively* distinct: reference is assigned to two "guises", which are later asserted to be one and the same. The context is a question about the identity of the speaker, and the

[3] How this parallelism would work is not clear to me. The problem I see is in examples like the following, in which each VP has a different predicate, and which are as acceptable as the other examples:

(i) …he despises her but she adores her
(ii) If everyone hates John, then we certainly can't conclude that he loves him

Note that this type of case only works when the two predicates have opposite denotations:

(iii) #…he despises her and she resents her
(iv) #If everyone hates John, then we certainly can't conclude that he resents him

I do not see how to formulate a parallelism constraint so that it can produce these results.

answer asserts that the 2 "guises" under discussion (Zelda, the woman speaker) refer to the same individual, (this woman=Zelda) with the result of Local Coreference.[4]

3.2. Local Coreference and reference

The indirect nature of Local Coreference helps Heim to show that "reference isn't special". That is, contrary to Reinhart's conception, the distinction between coreferential and bound pronouns may not be related to reference. For that, Heim describes her "Logic Tutor", who attempts to teach her students about the logical principle of Universal Instantiation, with a donkey sentence in which 2 pronouns seem to "corefer":

(13) a. ... 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*.

b. $\forall_1$ [if [a man]$_1$ [everyone hates t_1]] [[that man himself]$_1$ hates him$_1$]

The two anaphors (*that man himself*, *him*) are variables, bound by a higher silent quantifier, with a resulting LF as in (13b). "Coreference" is established as the two pronouns are bound by the same antecedent. Heim notes that an LF like (13b) cannot be grammatical in Reinhart's system, because it is blocked by Condition B, and yet, (13a) passes the acceptability test as easily as its "coreferential" counterparts in (1). Thus, not only does this example show that "coreference" is a misnomer (as it presupposes the relevance of reference); it also provides yet another demonstration that the local link is obtained indirectly (in this case, through binding by the same quantificational expression).

Upon reflection, though, Heim's Logic Tutor sentences may not be ideal for the test. As we shall see later (note 14), they construct environments that may not be as sensitive to grammaticality contrasts as one would like them to be. One possible reason for this insensitivity is that these cases require the hearer to calculate and judge 2 different things at the same time: grammatical acceptability vis-à-vis coreference, and logical well-formedness vis-à-vis Universal Instantiation. In subtle judgments such as this, the latter may interfere with the former, as we shall see. To avoid this possible confound, our focus should only be the issue of interest, namely, the feasibility of Local Coreference when the antecedent is non-referential, but without the logical inference the Heim's example requires. To this end, I reproduce below the original Evans example, in which Local Coreference is accomplished

[4] Heim also shows how *dream* contexts (I dreamt I was Brigitte Bardot and *I* kissed *me*) are again different, but I will leave off the details of these, as such discussion would complicate matters unnecessarily and divert us from the main.

via parallelism; this time, though, the antecedent of the pronoun is turned into an indefinite, so as to make the "coreferential" pronoun a variable, bound in a manner analogous to Heim's example:

(14) John and [some math professor]$_1$ have a lot in common, as he adores her$_1$ and she$_1$ adores her$_1$.

Local Coreference is still acceptable in the Parallelism Cum Indefinite (PCI) case. I will be using PCI as the standard test case for Local Coreference throughout this paper.

Heim shows that the standard indexing system may not be sufficient for an adequate account of these phenomena. Similar considerations hold of VP-ellipsis, where a pronoun may have a strict reading, but at the same time be non-referential.[5]

3.3. Dual linking – a solution

To remedy the failings of rule-i just noted, Heim replaces the binding/coreference system with a dual linking system (built in the spirit of Higginbotham's (1983) directional linking system), that does not depend on the distinction between variable binding and coreference. This system, that has independent empirical motivation[6], features inner and outer indices. An

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[5] An argument usually given in favor of rule-I is that in VP-ellipsis, when the subject of the first conjunct is quantificational, the strict meaning vanishes, as can be seen from the ambiguous (i) and the unambiguous (i):
(i) John$_i$ walked his$_i$ dog and Bill$_j$ did [~~walk his$_{i/j}$ dog~~] too
(ii) Every student$_i$ walked his$_i$ dog and Bill$_j$ did [~~walk his$_{*i/j}$ dog~~] too

Reinhart takes this fact to indicate that the strict pronoun is referential, yet as we have just seen, Heim's Logic Tutor examples demonstrate that reference is not a relevant notion for "coreference". The conclusion, then, must be that there are reasons other than reference that account for the contrast in (13).

We can now try to extend Heim's result to VP-ellipsis. For that, we must demonstrate that strict readings do not depend on referential antecedents. For that, we use the modified test (14), which we try to replicate for VP-ellipsis. Recall that this test is based on a Parellelism-driven obviation of Condition B, with a non-referential antecedent located in a higher clause, as in (14).

Rule-i predicts that coreference with an indefinite is impossible. Hence, the strict reading would disappear, because they require referential antecedent. Heim expects that a strict reading would persist, just like the simple case (14). This is borne out: the second conjunct in (iii) means that there is some math professor such that that person adores himself. The pronoun in the ellipsis site, then, corefers with *that man himself*, and as a result the pronoun has a strict reading, contrary to rule-i's prediction:
(iii) John and [some math professor]$_1$ have a lot in common. He adores her$_1$ and she$_1$ does ~~adore her$_{1/}$~~**,** too.
We return to this issue below.

[6] Heim presents multiply ambiguous VP-ellipsis sentences, for which such dual system is necessary:
(i) Every boy said [he called his mother, and the teacher __ too].

Of the many meanings this sentence has, the brackets and gap marker leave two, which a single index is unable to distinguish, as Heim shows. These meanings concern the possessive pronoun in the elided conjunct (whose subject is *the teacher*). Both pronouns in the antecedent clause are variables; hence the VP to be copied into the ellipsis clause would contain a variable that would be locally linked, with a resulting sloppy reading (…the teacher called his own mother); however, (i) also has a strict meaning

outer index $\alpha_{/o}$ is on the antecedent, and an inner index $\beta_{i/}$ is on the linked element. An NP may be at the tip of one link and at the tail of another, in which case it has both an inner and an outer index. This dual indexing enables two types of connections between elements, defined as follows:

(15) Linking and Co-linking (definition):
a. β is linked to α iff α's outer index = β's inner index.
b. β and α are colinked iff β 's inner index = α's inner index.

Heim shows how this dual system of directional indices gives the richness necessary to differentiate the facts without allusion to referential properties. Binding is subsumed by linking, and Local Coreference now becomes Co-Linking:

(16) Linking:
a. John$_{/1}$ looked at himself$_{1/}$ in the mirror.
b. John$_{/1}$ says he$_{1/2}$ thinks Sue likes him$_{2/}$.

(17) Co-linking:
John$_{/1}$ and [some math professor]$_{/2}$ have a lot in common. He$_{1/}$ adores her$_{2/}$ and she$_{2/}$ adores her$_{2/}$.

This dual indexing system forces a restated binding theory. Condition A is strengthened, to require that a reflexive must be locally linked to an antecedent in an A-position. Condition B is also strengthened, so as to locally block both linking and co-linking. Finally, a new term, co-determination, is introduced, by which two elements are co-determined if they are either linked, or co-linked, or co-determined by a third element. This definition opens the way for a revised rule-i as a contextually-motivated relaxation of co-determination. Local co-determination is blocked, unless the result is an interpretation that is "distinguishable" from the linked alternative:

(18) Exceptional Coindexing Rule:
A pronominal β is (marginally) allowed (at SS) to be co-determined with a

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(…the teacher called every boy's mother) which a single indexing system cannot capture. For that, Heim proposes a dual indexing system, whose results, very roughly, are these:

(ii) Every boy$_{/1}$ said he$_{1/}$ called his$_{1/}$ mother, and the teacher [called his$_{1/}$ mother], too. *strict*
(iii) Every boy$_{/1}$ said he$_{1/2}$ called his$_{2/}$ mother, and the teacher [called his$_{2/}$ mother], too. *sloppy*

In (ii), *his* is linked to the quantifier and copied with its (inner) index to the ellipsis site, with the resulting strict reading. In (iii), by contrast, *his* is linked to the subject pronoun (itself linked to the quantifier), and carries a respective inner index. This allows it to be linked to *the teacher*, an NP filling a position parallel to that of *he* – the antecedent of the pronoun in the first clause.

> c-commanding A-position α in its GC when the interpretation thus obtained needs to be distinguished from the one that would result if α were given an outer index and moved and) β were replaced by a variable A-bound by the trace of α.
> (Heim, 1993/1998, p. 235)

This results in permissible co-determination violations, but not linking violations – these are blocked by the binding conditions. The distinction between bound variable and coreferential pronouns no longer plays a role. How the rule works is illustrated for PCI (19a) and "identity under debate" (19b):

(19) The contextual licensing of co-determined pronouns:
   a. John$_{/1}$ and [some math professor]$_{/2}$ have a lot in common. He$_{1/}$ adores her$_{2/}$ and ***she***$_{2/}$ adores ***her***$_{2/}$.
   b. Who is this [woman speaker]$_{/1}$? She$_{1/}$ must be Zelda. ***She***$_{1/}$ praises ***her***$_{1/}$ to the skies. Only Zelda would do that.

The italicized pronouns are co-linked. Moreover, they allow co-determination, because context helps to produce an interpretation that is "distinguishable" from the linked meaning. For a comparison between the interpretations, we need to replace the co-linked pronouns with locally linked ones. This is not possible, as the resulting sentences would be ruled out by Condition B. We thus replace these pronouns with bound reflexives (20), and compare the interpretations. Indeed, the results are interpretively distinct:

(20) Linked interpretations with reflexives:
   a. John$_{/1}$ and [some math professor]$_{/2}$ have a lot in common. He$_{1/}$ adores her$_{2/}$ and ***she***$_{2/3}$ ***adores herself***$_{3/}$.
   b. Who is this [woman speaker]$_{/1}$? She$_{1/}$ must be Zelda. ***She***$_{1/2}$ ***praises herself***$_{2/}$ to the skies. Only Zelda would do that.

A PCI sentence with a reflexive (20a) sounds a bit odd, and lacks the ironic overtones and the (putatively related) "structured meaning" aspect of (19a). Context sets up an expectation for properties common to John and Mary. In (19a), this commonality is expressed by the same predicate. In (20a), however, the expectation for commonality is not met. There, John and Mary turn out to be in different emotional states (John loves someone whose identity is unknown, whereas Mary is engaged in self-loving).[7] Cases (19a) and (20a) are thus distinct,

[7] It is possible that the slight oddity of (20a) stems from the lack of complete parallelism between the conjoined clauses that contain anaphora, as the first contains a pronoun and the second, a reflexive. For that, consider (i), in which parallelism is maintained, but the ironic effect that leads to a "distinguishable interpretation", Reinhart style, is nonetheless not observed:
(i) John$_{/1}$ and [some math professor]$_{/2}$ have a lot in common. He$_{1/3}$ adores himself$_{3/}$ and ***she***$_{2/4}$ ***adores herself***$_{4/}$.

and Heim's system encodes that. The "identity under debate" cases, (19b) and (20b), are also distinct. While the answer in both cases confirms that Zelda is the woman speaker, they differ in reasoning: (19b) asserts that the reason the interlocutors know that this woman is Zelda is because they share the knowledge that Zelda is the only woman who would praise Zelda. Its linked counterpart (20b), by contrast, asserts that the reason is that Zelda is the only woman speaker to be engaged in self-praise.

Heim's rule, then, produces the desired effect for both referential and non-referential examples, and provides important insights into the nature of coreference and its relation to reference. Still, like rule-i, Heim's formulation relies on the vague notion "distinguishable interpretation" to license co-determination. As noted in §2.1., this vagueness is a problem.

3.4. Co-determination and point-of-view

In an attempt to make progress toward a solution, I would like to turn to a consequence of Heim's dual indexing system. In this system, a linked anaphor is assigned the reference of its antecedent (i.e., of the element whose outer index is the anaphor's inner one); co-linked expressions, too, end up having the same reference, but indirectly so – by virtue of being co-linked by some operator, or, in the "identity under debate" cases (19b), by their having been assigned two "guises" which pick out the same individual. A common inner index, then, represents referential identity, but no overt dependency holds between the arguments. For the latter to hold, linking (between an outer and an inner index) is necessary. Simply put, then, co-linked pronouns are connected, but neither one is referentially dependent on the other. Thus in (19), the subject and the object pronouns are referentially identical, but not dependent. One might wonder whether this odd relation has observable empirical consequences. The goal, then, is to show a semantic effect that holds of co-determined pronouns, but not of linked ones.

A reasonable way to start is by trying to identify the reason for the irony effect observed in statements with co-determined pronouns. Irony, it seems, has to do with perspective: when an *omniscient narrator* knows something that her *protagonist* does not, that may is create a discrepancy in perspective. Irony might result when we hearers detect this discrepancy in perspective, and asses it in light of context. A perspective difference between narrator and protagonist, then, opens the door to an ironic statement. In the present case, this door opens when the speaker has a perspective on the object pronoun that may differ from that of the

subject – it knows that both subject and object refer to the same individual. The subject, who has an attitude toward the object, may not be privy to this identity in reference. And this, of course, can happen only when the pronoun is co-determined, because the relation between it and the subject is referential identity-without-dependency.

On this view, the reason we find (19a) ironic is because the (omniscient) speaker, who evidently thinks that some math professor is a self-admiring narcissist, does not assert that. Rather, he implies it (using parallelism and co-determination), by imputing to the math professor the same as John's vis-à-vis the object of admiration, which happens to be she herself. By contrast, when a reflexive linked to the subject (John) replaces the pronoun in (20), no discrepancy in point-of-view is possible, and the ironic touch disappears.

Heim's co-determination, then, leads us to investigate differences in perspective not between speaker and hearer, but rather, between the speaker and the subject of the sentence he utters. It is similar to binding in that both relations establish identity between the object anaphor and the subject. Binding and co-determination differ, however, on the dependency dimension. A co-determined pronoun opens the way for a difference in cognitive state between the narrator and the protagonist: the omniscient narrator has full access to the identity relation between the subject and the object, whereas the protagonist may not be aware of that she and her object pronoun are referentially identical.[8]

This distinction can actually be demonstrated empirically, by conjoining to (19a) and (20a) a statement that asserts the subject's ignorance of the identity of the object. Such an assertion would be commensurate with a sentence in which subject and object are co-determined (21a), but would lead to a contradiction when conjoined to a sentence with a bound anaphor (21b):

(21) <u>The subject's awareness of the object's identity</u>
   a. I know what Maria and Pavarotti/a famous opera singer have in common: *she* admires *him* and he admires *him*, (although he is not aware that he is engaged in self-admiration)
   b. I know what Maria and Pavarotti/a famous opera singer have in common: *she* admires *him* and he admires *himself*, (#although he is not aware that he is engaged in self-admiration)

[8] At this point, it is tempting to speculate about Condition C violations, which in Reinhart's system fall together with violations of Condition B. It may well be that in such cases (e.g., *Nixon believes that Nixon is smart*), referential identity-without-dependency is implied in a manner analogous to that we have just noted.

Sentence (21a) is acceptable only in a scenario like this (inspired by Chiecrchia): Pavarotti and Maria are listening in admiration to an amazing Rodolfo singing *Che gelida manina* on the radio[9], without knowing the identity of the singer. The omniscient narrator, however, knows that the singer is Pavarotti himself. The sentence properly conveys that the singer admires his singer object, unaware that it is he himself. In the words of Cresswell & von Stechow (1982), Pavarotti (or for that matter, an indefinite) may not be in the right "cognitive contact" with the (co-linked) object pronoun. And while not a very likely scenario (given Pavarotti's ability to identify his own voice), it is no doubt imaginable. Importantly, such a scenario is incommensurate with the unacceptable (21b): the meaning of the analogous sentence with a (linked) reflexive is inconsistent with the singer's ignorance of the singer's identity.

These examples not only demonstrate that co-determination (but not linking) permits the said lack-of-awareness on the part of the subject; they also show how the irony effect goes away, once it is asserted rather than implied. To us, what is important here is the observation that co-determination correlates with non-self-ascription, which immediately brings to mind the *de se/de re* distinction in the context of anaphora. Indeed, this is our next stop.

4. Attitudes *de se/de re* and co-determination

4.1. *De se* and *de re*

Lewis (1979) argued for the unique status of "self-locating" belief in a theory of propositional attitudes. A series of thought experiments demonstrated that an agent may know all the properties of a class of entities, but may still not know where he is located relative to that class. Lewis's conclusion was that a theory of propositional attitudes must distinguish self-attributing belief (*de se*) from non-self-attributing belief (*de re*).

These types of belief are characterized by Cresswell & von Stechow (1982) as different sorts of "cognitive contacts" between arguments.[10] At issue are beliefs that contain "essential indexicals" (Perry, 1979), whose relation to the believer is under discussion. For an individual *a* to have contact of the right sort for *de se* belief with a *res b* in a world *w*, a

[9] See http://www.youtube.com/watch?v=5mSDCDh8xvU.

[10] More precisely: *a* ascribes a property T to *b* and 'knows what he is talking about' iff there is a suitable relation ξ such that

a. $(\forall y)(w \in \xi(a,y) \Leftrightarrow y=b)$ and

b. *a* self-ascribes φ in *w*, where φ is the property such that for any world *w* and any individual *c*: $w \in \varphi(c)$ iff $(\exists x)[(\forall y)(w \in \xi(c,y) \Leftrightarrow x=y) \& w \in T(x)]$ (Cresswell & von Stechow, 1982, note 8, p. 532).

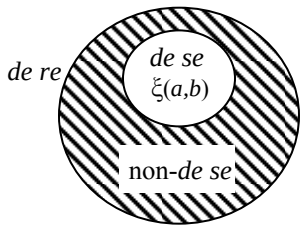
"suitable relation" ξ must hold between *a* and *b*, by virtue of which we can say that "*a* knows what he is talking about". Such knowledge – the content of ξ – can obviously vary. If *b* is a pronoun, ξ can be, for example, '*b* refers to the same entity as me'. *A*'s knowledge that he and *b* are referentially identical amounts to proper "cognitive contact," and leads to a *de se* interpretation of the pronoun. I will henceforth take ξ to be this sort of relation.

Pronouns may self-ascriptive, although they do not have to be. They may be ambiguous between *de se* and *de re*. This is evident in ambiguities like (22), demonstrated by the following contrasting scenarios (from Chierchia, 1989):

(22) Pavarotti believes that his pants are on fire
   a. The scenario for *de se*: Pavarotti sees a man in the mirror, and comes to believe that the pants of that man are on fire; he also believes that that man is he himself.
   b. The scenario for *de re*: Pavarotti sees a man in the mirror, and comes to believe that the pants of that man (who, perhaps unbeknownst to Pavarotti, happens to be he himself according to the speaker) are on fire.

The 2 meanings differ in self-ascription, as Pavarotti may or may not know that he is seeing Pavarotti in the mirror. Note that as the *de se* interpretation contains ξ(*a*,*b*), it is more specific and informative than its *de re* counterpart (22b). The former corresponds to the inner circle in the Venn diagram, and entails *de re* (outer circle). The distinction between the 2 readings is brought out when just the non-*de se* (striped) subset of *de re* (e.g., (22b)) is picked out. For simplicity and clarity, I will henceforth refer to the non-*de se* aspect of the pronoun's meaning as its *de re* meaning:

(23)



But as Chierchia shows, there are sentences with unambiguous *de se* anaphors, that allow only self-ascriptive belief. He contrasts the ambiguous (22) with unambiguous control PRO in infinitives and gerunds that only has a *de se* meaning. We may add reflexives to his list:[11]

[11] Although Chierchia claims that reflexives allow both *de re* and *de se* reading, these judgments are controversial – many speakers only accept *de se*. When the denial of self-ascription is conjoined to a sentence like (24c), the result is a contradiction. See further discussion below. See also Reinhart (1991), and Heim (1994). I will proceed with this judgment as it makes some of the illustrations more immediate. This choice, though, is immaterial to the main claims I will be making.

(24) a. Pavarotti wants PRO to be happy
b. Pavarotti tried PRO singing Rigoletto
c. Pavarotti wants himself to be happy

Chierchia's point is that self-ascription is forced in (24), as indicated by the inappropriateness of the corresponding sentences in (25). There, a sentence inconsistent with self-ascription is conjoined to each case. The contradictory nature of each statement results in unacceptability:

(25) a. #Pavarotti wants to be happy, but not for himself.
b. #Pavarotti tried that Domingo sing Rigoletto.
c. #Pavarotti wants himself to be happy, but not for himself.

The basic idea, then, is that self-ascription (which, if we follow Cresswell & von Stechow, can be expressed as $\xi(a,b)$, with ξ here being a relation of the sort '*a* sees that $[\![a]\!]=[\![b]\!]$) is entailed by the meaning of reflexives and PRO. The *de se* meaning is thereby enforced, as (25) shows. This, however, is not the case in pronouns, which usually (although not always) allow *de se*, but do not force it (22). When pronouns are non-self-ascriptive, $\xi(a,b)$ does not hold in *w*, as *a* is not in the right sort of cognitive contact with *b* (or not necessarily knowing 'what he is talking about'). We shall now see how this plays out in coreference.

4.2. Pronominal co-determination and the *de se/de re* distinction

I would like to argue for a deep parallel between the behavior of anaphora in belief contexts, and in contexts that permit co-determination of the sort we saw in earlier sections of this paper (i.e., "apparent condition B violations"). This is the argument, schematically: Local Coreference, the special relation between a pronoun and its local antecedent, inheres in referential identity without referential dependency. The absence of the latter, I hope to show, deprives the resulting proposition of the self-ascriptive property that anaphor-containing propositions normally have. The result, evident in cases like (20)-(21), is a proposition with a non-self-ascriptive anaphoric expression, namely, one with a meaning from which ξ is excluded. In intensional contexts, such pronouns are considered *de re*. Therefore, apparent condition B violations have *de re* readings, which constitute the special, "distinguishable" meanings that the coreference rule permits.

The idea, then, is that co-determination between a pronoun and a local antecedent blocks *de se*, producing a *de re* reading, which is distinct from the linked, *de se,* alternative.

The reformulated coreference rule will, at a first approximation, license Local Coreference if a *de re* meaning is obtained. This revision will help to design new experiments, which I will present in order.

I begin with a demonstration that self-ascription (or lack thereof) is a crucial ingredient in the formation of "distinguishable interpretations" that license co-determination. In (25) we saw that a proposition with a reflexive or PRO in an ECM complement has a self-ascriptive, *de se*, reading. Chierchia's logic that led to the test in (25) is similar to that in (21), which was set up independently, in an attempt to understand the irony effect in coreference through Heim's co-determination system. In (21), the goal was to detect empirical consequences of the difference between linking and co-determination. The idea I had in mind was that unlike linking, co-determination only requires referential identity between co-determined elements, whereas linking requires both referential identity and referential dependency. The test for referential dependency required the subject's self-ascription.

In the current test (25), self-ascription is sought as indicative of the *de re/de se* distinction. Both tests produce the same results, leading to the conclusion that referentially dependent anaphoric expressions force self-ascription, and that the absence of referential dependency opens the way to a *de re* interpretation of anaphora. This conclusion opens the way to a reformulated coreference rule.

Consider the example in (26a) below, analogous to (21b). The reflexive in matrix object position forces self-ascription, evident by the oddity that results when it is denied (i.e., "P is aware of the reflexivity of his experience, and is unaware of the reflexivity of his experience"). Yet, when the reflexive is replaced by a co-determined pronoun and the example is turned into a PCI sentence (26b), the denial of self-ascription does not lead to a contradiction:[12]

(26) a. Pavarotti$_{/1}$ adores himself$_{1/}$, #[but is unaware that he is engaged in self-adoration]
contradictory – self-ascriptive

b. We all know what Maria and [a famous opera singer]$_{/1}$ have in common. She adores him$_{1/}$ and he$_{1/}$ adores him$_{1/}$, although he is unaware that he is engaged in self-adoration
not contradictory – non-self-ascriptive[13]

[12] The same effect is also demonstrated with non-argumental reflexives:
i. Pavarotti$_{/1}$ hates Maria and himself$_{1/}$, #[but is unaware that he is a self-hater]
contradictory – self-ascriptive

[13] The same holds for all other cases in (1).

This contrast suggests that self-ascription is a distinction relevant to anaphora not only in belief-contexts – $\xi(a,b)$ is a relation which is present elsewhere, too. Linked anaphors are mandatorily self-ascriptive, whereas co-determined ones are not. As this is the essence of the *de se/de re* distinction, it is easy to think about these results along *de se/de re* lines:

(27) *De se/de re* and linking/co-linking:
a. A linked anaphor is a *de se* anaphor
b. A co-linked (or co-determined) anaphor is a *de re* anaphor

4.3. *De re* Co-determination

The foregoing naturally leads to our first reformulation of Heim's exceptional co-determination rule. We have seen that a co-linked pronoun is interpreted *de re*, whereas replacing the pronoun with a bound reflexive forces a *de se* interpretation. These observations shed new light on the notion "distinguishable interpretation": if co-determination is licensed by such an interpretation, but is perfectly correlated with *de re*, we can articulate the rule:

(28) *De re* Co-determination
A pronominal β is allowed to be co-determined with a local c-commanding antecedent α iff a *de re* interpretation is thus obtained.

In addition to solving Heim's Reference problem (§2.1), the *de re* co-determination rule uses a reasonably clear semantic notion, and captures the facts about *de se/de re* presented above, which seems to imply that we have made progress in understanding the semantic conditions for co-determination. In doing so, we have characterized one set of instances of reflexive/pronoun non-complementarity ("apparent condition B violations"). Context helps us expose the relevant meaning of the pronoun, and realize how interpretive differences between a co-linked pronoun and its linked counterpart are obtained through differences between the perspective of an omniscient narrator and that of a (potentially) less knowledgeable protagonist.

5. *De re* Co-determination and the overgeneration problem

5.1 Predicates that tolerate *de re* co-determination, and predicates that don't

The new rule seems to overgenerate, however. A short perusal of the literature on coreference reveals that the range of predicates that feature in example sentences is rather narrow – standard cases contain verbs with a mental component, mostly intensional, of

various types: experiencer verbs like *love* (or *be in love with*), *hate*, *adore* and *admire*, and of course, famously, *dream*. ECM verbs also allow for *de re* co-determination, as do certain verbs of saying like *praise* and *glorify* in identity-question-answering contexts. Yet, are the same contextual violations possible with just any verb? The answer is negative. As noted in §2.2, rule-i suffers from an overgeneration problem, and Local Coreference is blocked with many predicates, even though some judgments are crisper than others:

(29) Verbs with a mental component accommodate *de re* and allow Co-determination:
- a. *Psych I:* Joe and some math professor have much in common. He loves/hates her and *she* loves/hates *her*
- b. *Psych II:* …He annoys/amuses her and *she* annoys/amuses *her*
- c. *ECM:* …He expects/wants her to win and *she* expects/wants *her* to win
- d. *Raising:* J&S have similar views: he seems crazy to her and *she* seems crazy to *her*
- e. *Saying etc.:* Is this woman Zelda? Yes/no, *she* praises/curses *her* like no one else…

(30) Agentive verbs (weakly) disallow Co-determination:
- a. ??I know what Bill and some math professor do when they meet. He kicks her and *she* kicks *her*.
- b. ??Is this clown Zelda? Of course not. *She* just hit *her* on the head with a frying pan. Zelda would never do such a crazy thing
- c. ?? No one/everyone touched John. Only/even *he* touched *him*

(31) Verbs of delivery – Double objects – strongly disallow Co-determination:
- a. *I know what Bill and some math professor do every Tuesday. He gives her money and *she* gives *her* money.
- b. *Is this clown Zelda? Of course she is. *She* just gave *her* a compliment. Only Zelda would do such a thing.
- c. *No one/everyone gave John a gift. Only/even *he (himself)* gave *him* a gift

(32) Other triadic predicates disallow Co-determination:
- a. *I know what Mary and some math student do every Tuesday. She tells him stories and *he* tells *him* stories.
- b. *Is this clown Zelda? Of course she is. *She* just told *her* to go to hell. Only Zelda would do such a thing.
- c. *No one/everyone told John a story. Only/even *he* told *him* a story.

The restriction on co-determination, and the seemingly graded nature of the acceptability judgments, are surprising.[14] Upon reflection, though, a small reconsideration of our assumptions would make these facts follow from the *de re* co-determination rule.

5.2. Intensional aspects of the relevant predicates and substitution failure

Sentences that admit a *de re* reading mostly contain predicates that are, in some sense, intensional. One recognized property of intensional predicates is substitution-failure: if their object is substituted with another that refers to the same entity, the truth value of the resulting sentence might change (cf. Quine, 1956; Kaplan, 1969; for recent linguistic discussion cf. Moltmann, 1997; Larson, den Dikken & Ludlow, 1997). Other verbs do not have this property. To see the contrast, take Mary, a manager in an insurance company where Bob Parr works. She may not be aware that Bob is in fact Mr. Incredible, who assumed a new identity as part of the Federal Witness Protection Program. In a context where ⟦Bob Par⟧= ⟦Mr. Incredible⟧, consider the following:

(33) Substituting predicates:
  a. ⟦Mary touched Bob Parr⟧ = ⟦Mary touched Mr. Incredible⟧
  b. ⟦Mary told Bob Parr a story⟧ = ⟦Mary told Mr. Incredible a story⟧
  c. ⟦Mary gave Bob Parr a kiss⟧ = ⟦Mary gave Mr. Incredible a kiss⟧

(34) Non-substituting predicates:
  a. ⟦Mary adores Bob Parr⟧ ≠ ⟦Mary adores Mr. Incredible⟧
  b. ⟦Mary dreamt about Bob Parr⟧ ≠ ⟦Mary dreamt about Mr. Incredible⟧
  c. ⟦Mary praised Bob Parr⟧ ≠ ⟦Mary praised Mr. Incredible⟧
  d. ⟦Mary expects Bob Parr to win⟧ ≠ ⟦Mary expects Mr. Incredible to win⟧

As (33) demonstrates, substituting Mr. Incredible for Bob Parr does not change the truth value of a sentence in which *touch*, *give* or *tell* is a main verb. That is, whether or not Mary knows Bob Parr's secret is irrelevant in (33): she performed some physical action on an individual, but her knowledge state – whether or not she knew his real identity when she was

[14] At this point, we can see how Heim's Logic Tutor construction fails to properly distinguish between predicate types, whereas PCI does. Recall that Heim's original example demonstrated the possibility of co-determination in cases like (i):
(i) If everyone hates a man, then it follows that that man himself hates him
As I argued above, this structure may confound judgments of logical and grammatical well-formedness, making it possible for the former to override the latter. That this is so is evident in the following, which may be contrasted with (30)-(32):
(ii) If everyone hit a man, then it follows that that man himself hit him
(iii) If everyone gave a man a gift, then it follows that that man himself gave him a gift

The contrast between (29) and (30)-(32) is much stronger than that between (i) and (ii)-(iii), indicating that indeed, the confound created by the Logic Tutor example interferes with proper judgment.

at it – does not affect truth conditions, as long as the omniscient narrator "knows what he is talking about." That is, what matters is that he, not the subject, bears a suitable relation toward the object. The situation is quite different in a sentence whose predicate is *adore*, *dream*, *expect* or *praise*. There, substitution (potentially) affects truth value. In (34), Mary's state of knowledge, rather than the narrator's, is highly relevant to truth conditions, because the sentence is about her attitude toward the object, and this attitude is causally related to *her* knowledge state, not the omniscient narrator's. Mary adores Mr. Incredible because she knows of his special powers, which Bob does not possess. Thus a world in which Mary adores Mr. Incredible but not Bob Parr, is easily imaginable. Therefore, unless we guarantee that she "knows what she is talking about," we cannot ascertain that the statement pairs in (34) are equivalent. Substitution failure thus follows. The difference between these verbs and agentive ones, then, is clear: the state of knowledge of the subject is relevant in the latter, not the former.

When the object is a coreferential pronoun, the *de se/de re* distinction comes into play. As the mental state of the subject is irrelevant for sentences with agentive verbs, it plays no role in meaning. As a result, *de re* co-determination does not apply, and Local Coreference is not licensed. In sentences with mental predicates, by contrast, the mental state of the subject is highly relevant, and the possibility for *de re* co-determination opens the way to Local Coreference.[15]

De re co-determination thus provides an explanation for the overgeneration problem: agentive verbs block Local Coreference because they allow for substitution, therefore blocking the way for a difference in point of view between the narrator and subject. This property makes *de re* co-determination impossible. No other existent perspective on Local Coreference lends itself to such an account.[16]

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[15] More specifically, psychological predicates, ECM, and perhaps Raising verbs fail the substitution test. In the "identity under debate" cases that involve attitude verbs of saying like *praise* or *condone*, substitution may not be tested, but the existence of Heim's "guises" allows for difference in perspective between subject and narrator, which is what *de re* co-determination requires.

[16] The foregoing discussion assumes that Local Coreference is completely blocked in sentences that contain substituting predicates. Yet, this is not quite so: contrived contexts can be found, that make *de re* co-determination possible even in sentences with substitutable predicates (e.g., actional and triadic verbs (30)-(32)). This can happen where the narrator seeks to convey the relevance of the subject's knowledge state. That is, where protagonist and narrator are in different knowledge states, despite the fact that the predicate at issue does not normally allow for that. Here is an example: under normal circumstances, it is difficult to imagine how you tell stories to you *de re*, meaning in a manner not equivalent to telling yourself stories. This is so because

We have gone a long way: following Heim, we moved from coreference to co-linking to co-determination; we then moved on to *de re* co-determination, the way it selects intensional predicates. Is this the end of the story? Not quite, for we have only focused on one relevant set of cases. Moreover, we haven't gone over other facts from Reinhart's cluster, to see whether they follow from *de re* co-determination. As we broaden the scope of our empirical discussion in the next section, some questions will be raised as to whether *de re* co-determination is exactly the right generalization.[17]

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normally, if you tell stories and you are the audience, you are telling stories to yourself, and it is difficult to see how you wouldn't be aware of that. But if highly abnormal circumstances are concocted, in which the protagonist is described as unaware of his own identity as the object, *de re* co-determination is possible even with actional verbs:

(i) Dick and Jane each have Jane's home number on the top of their speed dials. When they came to the party, they both left their cell phones on the couch. Oddly enough, they then sat down with equal clumsiness: they both sat on their phones inadvertently, and hit the speed-dial in the same way. Thus, he phoned her and *she* phoned *her* (i.e., her home phone).

(ii) Walking into the crowded stadium, John and Mary stumbled upon the same object. It was so crowded that they didn't even realize that he kicked her and *she* kicked *her*.

Previously, it was shown that dyadic (and other actional) predicates do not allow for *de re* co-determination, and I argued that substitutability was the block. We now see that when conditions for non-substitutability are created, the door is open for *de re* readings. Still, this does not mean that context plays a crucial role in Local Coreference. Rather, context can apparently be "contrived" so as to enable the hearer to suppress $\xi(a,b)$ even when the predicate is a substituting one. Its relevance, then, is to the way predicates are interpreted, and we see that at times, the suitable relation $\xi(a,b)$ can be suppressed. Discussion of this point is beyond the scope of this paper.

[17] When extensions of our solution are considered, one might want to consider problems that touch upon non-complementarity in binding. Best known among these are cases with pronouns and reflexives inside PP complements of objects:

(i) a. John likes/hates/detests [$_{CFC}$ stories about him/himself]
b. John read/heard [$_{CFC}$ rumors about him/himself]

To account for this non-complenentarity, Chomsky's (1986) modifies the classical binding theory and defines locality for binding (Complete Functional Complex - CFC) so that they require an anaphor to be bound by the closest antecedent, and a pronoun to be locally free. But such effects are not obtained with all predicates:

(ii) a. John wrote [PRO stories about *him/himself]
b. John disseminated[PRO rumors about *him/himself]

Chomsky assumes PRO as subject of NP, and alludes to a notion of possession – or more precisely, creation, as Danny Fox suggests – (of a story, a rumor, etc.) as a syntactically encoded notion, in the form and index on a control PRO. As predicates differ with respect to creation, the contrast follows.

Suppose we keep Chomsky's focus on the PRO subject, but instead of alluding to creation as the line dividing between predicates allowing non-complementarity and predicates that don't, we turn to *de re* co-determination. While syntactically, a pronoun and a reflexive can appear in the same position, there is a meaning difference, as before – *de re* is possible with pronouns inside PP complements, but not with reflexives:

(iii) a. They$_1$ read stories about them$_1$,unaware that that they were the subject
b. #They$_1$ read stories about themselves$_1$,unaware that they were the subject

The *de se/de re* distinction seems to be at work here. Less clear is whether this contrast (and related ones) follow from *de re* co-determination.

6. An extension: Collective and distributive readings of pronouns

6.1 Chomsky's cases of pronouns in ECM complements

Chomsky (1986) presents certain ambiguities of pronouns in ECM contexts, which seem to support an argument against the coreference rule. As Grimshaw and Rosen (1990) put it, rule-i predicts that (35c) should be acceptable:

(35) a. [Many students]$_1$ expect themselves$_1$ to leave[18]
b. [Many students]$_1$ expect that they$_1$ will leave
c. *[Many students]$_1$ expect them$_1$ to leave

Chomsky, Grimshaw and Rosen's reasoning begins with a meaning difference between pronouns and reflexives in ECM contexts: a reflexive whose antecedent is quantified with *many* only allows a distributive reading, in which the pronoun ranges over individuals. Thus (35a) only means that there are many students such that each of these students expects himself or herself to leave. By contrast, as pronouns may refer to a plurality, the embedded pronoun in (35b) allows for an ambiguity: this sentence has the distributive meaning of (35a), but it also has a collective reading, meaning that there are many students such that they expect to leave collectively, however it is not necessarily the case that each of them has this expectation for himself or herself. These two meanings are distinct – there are situations in which (35b) is true whereas (35a) is false. Chomsky points out that rule-i predicts (35c) to be acceptable on a collective interpretation of the pronoun: according to this rule, if a distinguishable interpretation is available, then a pronoun replacing the reflexive should lead to a grammatical sentence on this alternative interpretation. Such an alternative exists, as indicated by the collective reading of (35b). Rule-i, which blocks local coreference only if no such interpretation is available, predicts the acceptability of (35c) on a collective reading, contrary to fact. Heim's co-determination system is not designed to handle such cases either, as it, too, relies on the same notion of "distinguishability".

6.2 Chomsky's cases considered in discourse context

Before accepting the conclusion that this argument leads to, we should examine its empirical content more carefully. From the current perspective, we might doubt the validity of the test

[18] As Heim, Lasnik & May (1991, p. 77) point out, using a reciprocal anaphor may lead to crisper judgments, due to the distributive operator on the anaphor. This is indeed so, as indicated by the following:
(i) [Two students]$_1$ expect [each other]$_1$ to win \$100 (total expectation: \$200)
(ii) [Two students]$_1$ expect that they$_1$ will win \$100 (total expectation: \$100)
(iii) *[Two students]$_1$ expect them$_1$ to win \$100

in (35c). In the previous section, context was used to highlight the *de re* reading of locally coreferring pronouns. We might want to construct parallel conditions here, and see whether a meaning has gone undetected, one that would be brought out by an appropriate context. The goal here, then is to embed (35c) in such a context, in search for a collective interpretation. Below, I create such an example step-by-step.

In principle, a revised test can use materials taken from any condition B violation, as long as they make use of a quantificational antecedent capable of giving rise to both collective and distributive readings of anaphora. I will thus build gradually toward a test with ECM verbs – the ones used by Chomsky – and begin with mental verbs in a parallelism-inducing context. Previously, we tested quantificational antecedents in PCI, but we were not interested in the distributive/collective distinction and therefore used singular pronouns. As we shift our focus to these cases, follow Chomsky's logic, and pluralize the pronouns, we expect an acceptable collective interpretation to emerge:

(36) I know what Bill and many rock singers have in common. He admires them and *they* admire *them*.

Indeed, the result is acceptable. We can conclude that acceptability is due to the availability of an alternative meaning, brought out by context, but it would be nice to construct a direct demonstration that the pronoun has a collective reading. For that, we need to find a way to distinguish a collective from a distributive interpretation. In keeping with previous practice, we add another ingredient to our soup – an assertion that denies the distributive interpretation. An available collective interpretation would lead to an acceptable result, because a negated distributive meaning does not contradict a collective one. Indeed, the result is an acceptable (37), which moreover contrasts with a parallel sentence where a reflexive forces a distributive meaning (38). An added assertion results in a contradiction:

(37) I know what Bill and many rock stars have in common. He admires them and they admire them, although individually, each of them doesn't necessarily admire herself.
collective – not contradictory

(38) I know what Bill and many rock stars have in common. He admires them and they admire themselves, #although individually, each of them doesn't necessarily admire herself.
distributive – contradictory

The sweat put in the construction of this test has been rewarding: (37) describes a situation that is easily imagined, and the contrast is established.[19] In fact, the availability of a collective reading of a pronoun can be seen through a different type of contrast. Earlier it was shown that actional verbs block Local Coreference although context is the same as for mental verbs (33). I related this contrast to the substitutability property. In the present context, however, the property of substitutability should not be relevant, because the availability of a collective meaning for the pronoun (as compared to a distributive one) should result in grammatical co-determination in a manner that is independent of predicate type. If we modify the sentence accordingly, by replacing the definite discourse antecedent with a quantified one, *many New York story tellers*, and pluralize the pronoun to allow for the distributive/collective ambiguity, things should change as in (37), regardless of the fact that we are now testing with an actional (hence substituting) predicate. Indeed, this manipulation makes a collective interpretation of the pronoun possible, and Local Coreference now becomes acceptable:

(39) a. Bill and this New York story teller engage in this common activity on hot summer nights: As they sit around an open fire hydrant on the street, he tells her stories, and *[*she* tells *her* stories].

b. Bill and many New York story tellers engage in this common activity on hot summer nights: As they all sit around, next to an open fire hydrant on the street, he tells them stories, and *they* tell *them* stories.

collective – not contradictory

To see that (39b) is indeed not contradictory on a collective interpretation, imagine a group of story-tellers seated next to a fire hydrant on a hot summer night, where each member tells stories to the group. It is fairly clear that (39b) may describe this situation. By contrast, (39a) is an odd way to describe a parallel situation in which only 2 story-tellers participate. Thus, you may question the acceptability of (39b), but I am quite sure that it contrasts with (39a), which

[19] Danny Fox points out that (37) may be acceptable not because of the collective reading, but due to the intensional verb *admire* which allows for a *de re* reading of the pronoun. This is true, yet the pronoun in (37) must also have a collective reading, as without it, we expect (39b) to be ungrammatical, since its predicate is actional, contrary to fact.

drives home the point about the relevance of the collective/distributive contrast in these cases for co-determination.[20]

Finally, we return to Chomsky's original example. Once augmented with an appropriate context, it yields a reasonably acceptable set of contrasts. In the first 2 cases (40a-b), a distributive reading is forced, as the subject of the ECM verb is co-linked with a PRO and a reflexive. Thus an assertion denying that reading results in a contradiction. By contrast, the same assertion produces a non-contradictory result in the third case (40c), with a collective, co-linked plural pronoun:

(40) a. Before the women's races, Dick and Bill and many girl competitors had similar expectations. The boys expected them to win and *they* expected PRO to win, #although no girl in particular expected herself to win.
distributive – contradictory

b. Before the women's races, Dick and Bill and many girl competitors had similar expectations. The boys expected them to win and *they* expected *them* to win, #although no girl in particular expected herself to win.
distributive – contradictory

c. Before the women's races, Dick and Bill and many girl competitors had similar expectations. The boys expected them to win and *they* expected *them* to win, although no girl in particular expected herself to win.
collective – not contradictory

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[20] A more detailed outlook on the collective/distributive contrast is revealed if we modify Heim, Lasnik & May's analysis (1991) of plurals. The sentence in (i) is 5-way ambiguous, depending on whether or not each argument has a distributor:

(i) John and Mary argue that they will win $100
a. [John and Mary]$_1$ argue that they$_1$ will win $100
b. [John and Mary]$_1$ argue that they$_1$ D$_2$ will win $100
c. [John and Mary]$_1$ D$_2$ argue that they$_1$ will win $100
d. [John and Mary]$_1$ D$_2$ argue that they$_2$ will win $100
e. [John and Mary]$_1$ D$_2$ argue that they$_1$ D$_3$ will win $100

To fit our discussion of ECM, we modify their example, replace the verb *argue* with *expect*:

(ii) Three gamblers expect that they will win $100
a. Three gamblers ***jointly*** expect that ***together*** they will win $100 (J&M expect J&M will win)
b. Three gamblers ***jointly*** expect that *each* of them will win $100 (J&M expect J to win, M to win)
c. Three gamblers *each* expect that ***together*** they will win $100 (J expects J&M to win; M expects J&M to win)
d. Three gamblers *each* expect for ***himself*** that he will win $100 (J expects J to win; M expects M to win)
e. Three gamblers *each* expect that ***together*** they will win $100 (J expects J to win, M to win; M expects J to win and M to win)

The move toward co-determination selects only certain meanings, which are best detected when compared to the true bound-variable reading (ii-d):

(iii) a. John and three gamblers have much in common. He expects them to win $100 and they expect them to win $100, ??#although each of them does not expect any of the others to win $100.
b. John and three gamblers have much in common. He expects them to win $100 and they expect themselves to win $100, although each of them does not expect any of the others to win $100

7. Generalizing *de re* co-determination

7.1. Do collective pronouns allow *de re* Co-determination?

The foregoing has added a case in which an alternative interpretation makes a sentence with a locally co-determined pronoun acceptable. But wait a minute: weren't we assuming *de re* co-determination all along? Can *de re* co-determination account for the distributive/collective cases as well? For that we would need to demonstrate that collective, but not distributive, pronouns allow *de re* readings.

Previously, we showed Local Coreference in ECM contexts by comparing Chomsky's distributive/collective contrasts to which proper context was added. To link this type of contrast to the *de se/de re* distinction, another component must be added. That is, we must add an assertion that denies *de se*, namely denies that the (quantified) subject is unaware, in order to check for the availability of a *de re* reading.

With a reflexive, only a *de se* reading is possible (41a), and the appended assertion should lead to oddity (i.e., 'they expect themselves to win but are unaware that they expect themselves to win'). Yet if an embedded subject pronoun allows a *de re* reading, the resulting sentence should be good. In (41), then, there may be a *de se/de re* contrast between a plural reflexive and a pronoun, indicating that *de re* co-determination may be possible:

(41) a. I know what Jacques and F1 drivers have in common. He expects them to win the Grand Prix and *they* expect *themselves* to win the Grand Prix, #although individually, none of these race drivers is aware that she expects herself to win the Grand Prix.

distributive – contradictory

b. I know what Jacques and many F1 drivers have in common. He expects them to win the Grand Prix and *they* expect *them* to win the Grand Prix, although individually, none of these race drivers is aware that she expects herself to win the Grand Prix.

collective – not contradictory

If the result of this test were clear, a new means to accomplish a *de re* co-determination would become available: when a plural anaphor ranges over individuals, *de se* is forced. But when it refers to a plurality (as is the case in collective pronouns), the doors is opened to a *de re* meaning, and a resulting possibility of Local Coreference. Yet it seems to me that this test is inconclusive, as the judgments in (41) are murky. This should lead us to consider alternative account. Moreover, *de re* co-determination fails to handle other cases from Reinhart's coreference cluster. This is a serious problem, which I discuss below.

7.2. Distinct Meaning Co-determination (DMC)

Our starting point was Reinhart's coreference cluster:

(42) Reinhart's Coreference cluster:
i. Local Coreference in Condition B violations.
ii. Strict-identity readings.
iii. Coreference without violation – pronouns co-referring with non c-commanding antecedents.

The meaning differences in (42b), and (42c) are not related to the *de se/de re* distinction. At issue are sentences such as those in (43)-(44), whose meanings are listed:

(43) Cases in which the coreference alternative is not entailed from the bound one:
a. John$_i$ walked his$_i$ dog and so did Mary$_2$ ~~walk his$_i$/her$_2$ dog~~
i. ⟦Mary walked Mary's dog⟧ *sloppy*
ii. ⟦Mary walked John's dog⟧ *strict*

b. Only Mary$_2$ voted for her$_2$ father
i. ⟦Mary voted for Mary's father &
no one else voted for Mary's father, but
unknown is whether anyone else voted for their own father⟧ *sloppy*
ii. ⟦Mary voted for Mary's father &
no one else voted for their own father, but
unknown is whether anyone else voted for Mary's father⟧ *strict*

(44) Local Coreference without a violation:
a. [$_{LD}$ The man [next to Mary$_i$] touched her$_i$]
b. *[$_{LD}$ The man [next to [every actress]$_i$] touched her$_i$]

Members of each pair are distinct in meaning, but the difference between them is not related to *de se/de re*. *De re* co-determination leaves these cases outside its scope. Could this rule be slicing coreference too thin in light of this exclusion? Bernhard Schwarz proposes to restate it: Now that we know that co-determination depends on a meaning difference (whether *de se/de* re or other, as above), he asks why not construe rule-i's notion "distinguishable interpretation" straightforwardly as "having distinct truth conditions"? Stated thus, the rule would cover (43)-(44) in addition to the cases previously discussed, carving the phenomena like rule-i:

(45) Distinct Meaning Co-determination (DMC):
A pronominal β is allowed to be co-determined with a local c-commanding antecedent α when the interpretation thus obtained is distinct from the one with a bound reading.

DMC is stated in the spirit of Fox's Rule-H, designed to account for Dahl's paradox. All cases now fall under a single generalization.

8. Coda: implications to the acquisition of Condition B

I conclude with a brief comment on the debate on the acquisition of Condition B (e.g., Grimshaw & Rosen, 1990; Chien & Wexler, 1990; Grodzinsky & Reinhart, 1993; Elbourne, 2005). This debate has to do with children's putatively asymmetric performance in experiments that require the detection of Condition B violations. In various experiments (mostly requiring "picture verification" or "truth-value-judgment" of multiple tokens for each sentence type, divided into Match and MisMatch conditions[21]), children's performance has been as follows:

(46)

	Match ***(% correct)***	***MisMatch*** ***(% correct)***
a. This is A. This is B. Is A touching himself?	~90	~90
b. This is A. This is B. Is A touching him?	~90	~50
c. This is A. These are the Bs. Is every A touching him?	~80	~80

This pattern – and in particular children's apparent failure (chance-level performance) on the MisMatch condition of (46b) and only there – has been taken to suggest that children know the binding conditions, and as they sometimes accept condition B violations, and do so only when the antecedent is referential, it follows that they have problems with rule-i.

There has been am lively debate on the validity of these results, as well as on their relevance to rule-i (or, for that matter, to any other version of the coreference rule). Serious discussion of these issues is beyond the scope of the present discussion, but I would like make 2 observations in the context of *de re* co-determination and DMC: a. all the predicates that have been used in experiments have been actional, namely, of the non-substituting type. Such predicates do not easily allow Local Coreference, which is obtained only under in highly contrived contexts as we have seen. Thus, it is not likely that these tests probed children's knowledge of coreference, at least not as directly as several authors (myself included) have tried to claim. It is not at all clear, then, that children's performance on

[21] The Match condition depicts a scenario that matches the sentence; the MisMatch depicts a scenario that requires a violation of the relevant binding condition: the MM picture for (46a) depicts the subject as performing a transitive action, whereas the MM pictures for (46b,c) depict the subject as performing a reflexive action.

sentences such as (46b) is related to coreference. b. Moreover, the constructions on which children were tested may not be related to coreference either: no experiment I am aware of has used Condition B violations in parallelism contexts like those in (1).[22] The contexts preceding the test sentences in (46) are the norm (see Elbourne, 2005, for elaboration on this point).

Given these 2 points, the relation between children's scores and coreference is less than clear and requires a major revision. Hopefully, the current work will revive the debate, and lead some experimentalists to get back to the drawing board, and design new, exciting, experiments.

[22] There have also been attempts to study coreference through children's detection of violations of condition B through strict-identity in VP-ellipsis (e.g., in sentences such as *John touched her and so did Mary*, see Thornton & Wexler, 1999; Elbourne, 2005). Yet, the relevance of such results (once their validity is agreed upon) to coreference depends on the version of the co-determination rule that we end up accepting. That is, accepting the AEC would exclude these from discussion.

REFERENCES

Bach, Emmon & Barbara Partee. 1980. Anaphora and semantic structure. In J. Kreiman & A. Ojeda, eds, *Papers from the Parasession on Pronouns and Anaphora*, CLS, 1-28.

Büring, Daniel. 2005. *Binding Theory*. Cambridge: Cambridge University Press.

Chien, Yu-Chin, & Kenneth Wexler. 1990. Children's knowledge of locality conditions in binding as evidence for the modularity of syntax and pragmatics. *Language Acquisition, 1*, 225–295.

Chierchia, Gennaro. 1991. Anaphors and Attitudes De Se. In R. Bartsch, J. van Benthem, P. van Emde Boas eds. *Language in Context*, Dordrecht: Foris.

Chomsky, Noam. 1981. *Lectures on Government and Binding*. Dordrecht: Foris.

Chomsky, Noam. 1986. *Knowledge of Language*. New York: Praeger.

Cresswell, Maxwell & Arnim von Stechow. 1982. *De re* belief generalized. *Linguistics & Philosophy, 5*, 503-535.

Dahl, Östen. 1973. On so-called "sloppy identity". *Synthese, 26*, 81-112.

Elbourne, Paul. 2005. On the acquisition of Principle B. *Linguistic Inquiry, 36,:* 333–365.

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

Fox, Danny. 2000. *Economy and Semantic Interpretation*. Cambridge, MA: MIT Press.

Grimshaw, Jane & Sarah Rosen. 1990. Knowledge and Obedience: The Developmental Status of the Binding Theory. *Linguistic Inquiry*, *21*, 187-222.

Grodzinsky, Yosef & Tanya Reinhart. 1993. The Innateness of Binding and Coreference. *Linguistic Inquiry* 24, pp. 69–102.

Heim, Irene. 1993. Anaphora and Semantic Interpretation: A reinterpretation of Reinhart's approach. *MITWPL 25*, 205-246.

Heim, Irene. 1994. Puzzling reflexive pronouns in *de se* reports. Unpublished handout (Presented at Bielefeld), MIT.

Heim, Irene, Howard Lasnik & Robert May. 1991. Reciprocity and plurality. *Linguistic Inquiry, 22*, 63-101.

Higginbotham, James. 1983. Logical Form, Binding, and Nominals. *Linguistic Inquiry, 14*, 395–420.

Kaplan, David. 1969. Quantifying In. *Synthese 19.1-2*, 178-214.

Keenan, Edward L. 1971. Names, Quantifiers, and the Sloppy Identity Problem. *Papers in Linguistics 4.2*.

Lakoff, George. 1972. Linguistics and Natural Logic. In D. Davidson and G. Harman, eds. *Semantics of Natural Language*, Dordrecht: Reidel, 545–665.

Larson, Richard, Marcel den Dikken & Peter Ludlow. 1997. Intensional Transitive Verbs and Abstract Clausal Complementation. Ms. Stony Brook and CUNY.

Lewis, David. 1979. Attitudes *de dicto* and *de se*. *The Philosophical Review, 88*, 513-543.

Moltmann, Friederike. 1997. Intensional Verbs and Quantifiers. *Natural Language Semantics*, *5*: 1–52.

Reinhart, Tanya. 1983. *Anaphora and Semantic Interpretation*. London: Croom Helm.

Reinhart, Tanya. 1991. Self-representation. Ms. Tel Aviv University.

Ross, John Robert. 1967. *Constraints on Variables in Syntax*. PhD dissertation, MIT.

Thornton, Rosalind & Kenneth Wexler. 1999. *Principle B, VP Ellipsis, and Interpretation in Child Grammar*. Cambridge, MA: MIT Press.

Williams, Edwin. 1977. Discourse and Logical Form. *Linguistic Inquiry 8*, 101–139.