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Presuppositions and the Alternative Tier*

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Abstract In at least three environments—de se binding, distributive binding, and focus quantification—some presuppositions exhibit unexpectedly weak projection behavior. This holds for the presuppositions of bound pronouns, but also several other cases of presupposition. In this paper, I first describe a general approach to capture the interaction of presuppositions with quantificational operators within a multi-tiered evaluation procedure. Secondly I discuss data from Condition A, in particular non-bound occurrences of reflexives, that motivate a presuppositional account of Condition A and confirm the general approach.

Keywords: presuppositions, phi-features, pronouns, focus, distributivity

1 Introduction

The paper addresses a class of examples where presuppositions in the scope of a quantifier exhibit an unexpected projection behavior. Several examples of this type have been discussed in the recent literature, and a number of different proposals for their explanation have already been made. However, no prior proposal extends to all examples of this type. My goal in this paper is to provide a general account of presupposition that can extend to all cases. In this section, I illustrate what I see to be the full range of the phenomenon: bound variable pronouns, full singular definites, and factive verbs. I use the descriptive label *Weakened Projection* for all these cases.

The most widely discussed case of weakened projection are bound variable pronouns. Consider briefly the evidence for weakened projection in this case. The argument is based on the presuppositional approach to ϕ-features (i.e. person, number, and gender marking) on pronouns (Cooper 1979). Specifically, we assume that pronouns always consist of an index and a set of ϕ-features. For example, *I*

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is analyzed as an index (for example, *j*) and the features SING and 1PERS; *she* as another index (e.g., *i*) and the features SING, FEM and 3PERS. Since the index fully determines the pronoun's interpretation, the ϕ-features are interpreted as presuppositions on the value assigned to the index. Assuming the standard truth-value gap account of presuppositions, the ϕ-features are interpreted as restricted identity functions of type $\langle e, e \rangle$. Specifically, SING is restricted to atomic entities, FEM to entities consisting only of female atomic parts, 1PERS to entities that contain the speaker, and 3PERS to entities that contain neither speaker nor addressee. While they can be satisfied for unbound pronouns, the presuppositions of the ϕ-features are too strong at least for the following: bound pronouns in the scope of *only* as in (1a), *de se* bound pronouns as in (1b), and distributively bound pronouns as in (1c): (1a) has a bound interpretation that entails that other people didn't do their homework. But, even when *my* is bound, the presuppositions 1PERS and SING should restrict its interpretation to the current speaker. In (1b), the referent of the *de se* pronoun *he*, Brigitte Bardot, is clearly female, so the presupposition of MASC should fail. Finally, the pronoun in (1c) must be used even in a scenario where each boy bought a different bike and therefore there is no bike that a plurality of boys bought. In such a scenario, all referents of *they* considered in the evaluation of the sentence must be singular, but SING cannot be used.[1]

(1) a. Only I did my homework.
b. Lakoff dreamt that he was Brigitte Bardot.
c. The boys all were riding the bike they had recently bought.

Weakened projection, however, isn't restricted to bound pronouns. To my knowledge, the first example with a full definite DP in (2) is due to von Heusinger 2007. In the scenario given below, (2) entails that Sam didn't talk to the Japanese professors, and didn't talk to the English professors. At the same time, (2) makes no entailment as to whether Sam talked to non-professors.

(2) *Scenario:* One German professor attended the party, three Japanese professors, five English professors, and also two office workers.
Sam only talked to the German$_{\text{F}}$ professor.

Since focus in (2) is on *German*, alternatives such as *John talked to the Japanese professor* are expected to be relevant for the interpretation of (2). However, the uniqueness presupposition of *the Japanese professor* is not satisfied in the scenario under consideration.

1 English speakers often prefer using the plural *bikes* in (1c). However, the singular *bike* is fully acceptable at least in German, and still a plural pronoun must be used inside of the relative clause.

More recently Sudo (2012) and Walker (2012) suggest that there are further cases of weakened projection with other presupposition triggers. I return to this discussion below. One further clear example of weakened projection is (3), where *waitress* could be analyzed as presupposing that its argument be female. The alternatives to *Mary* in (3) are both male. So unless projection is weakened, we expect that (3) should be acceptable even if John or Bill were still waiters.

(3) *Scenario:* John, Mary, and Bill all worked as waiters. But John and Bill moved on to different jobs.
Only Mary is still a waitress.

As already mentioned, the goal of this paper is to develop and defend a general account of weakened projection. I present the core proposal in the following section. In Section 3, I present data from Condition A that confirm the general account. Section 4 is the conclusion.

2 The proposal: Tiered alternatives and pure presuppositionality

My proposal takes some inspiration from existing proposals though none of the existing proposals explains all five examples from the introduction. Briefly, consider the existing approaches to weakened projection. The most popular approach to weakened projection is a syntactic agreement mechanism operating on variable binding relationships (Kratzer 1998; Heim 2008; Kratzer 2009; Collins & Postal 2012). I believe this idea should be abandoned: I see no way to extend this proposal to cases of weakened projection not involving a bound pronoun such as (2). My proposal is closer to an idea for bound pronouns due to Benjamin Spector (p.c.) cited by Heim (2008).[2] Namely, Spector suggests that the presuppositions of ϕ-features on bound pronouns don't contribute to focus interpretation. I will seek to expand this idea to cases not involving a bound pronoun.

At least three recent proposals already discuss cases of weakened projection that occur not with bound pronouns. However none of these develops a fully general proposal that covers all the cases of weakened projection I introduced above. von Heusinger (2007) develops a proposal that is specific to singular definite descriptions. Walker (2012) focusses on establishing a generalization—-namely that all cases of soft presupposition triggers of Simons (2001) and Abusch (2010) allow weakened projection. However, it seems to me that Walker's generalization doesn't cover some bound pronoun cases, e.g. first person marking of *my*. Finally, Sudo (2012) proposes two different approaches for two classes of weakened projection. For cases such as (2), he argues for a two-dimensional approach to presuppositions

2 See also Jacobson (2012).

and inherits the problems of that approach. Sudo's second proposal, however, is specifically intended for cases of distributive binding such as (1c). Sudo proposes that distributive quantification ranges not over the atoms that are part of a plurality, but over functions mapping the plurality to an atomic part of it. Plural agreement then is accounted for by reference to the range of this function. This proposal is, as will become evident below, quite close to my proposal.

In the following, I focus initially on the cases of focus alternative quantification such as (1a) and (3) with *only*. The extension to *de se*-binding and distributive binding is presented at the end of this section. Before presenting the proposal, I argue that weakened projection is indeed limited to quantifiers over focus alternatives. Note first that quantifiers not involving focus alternatives don't exhibit weakened projection. For example (4) presupposes that all students in the class are female.[3]

(4) No student in the class except for one criticized herself.

Furthermore, let's consider quantifiers with *exactly* plus a numeral. Sudo (2012) observes weakened projection in examples such as (5) and analyzes them as not involving quantification over focus alternatives.[4]

(5) Exactly one student criticized herself.

However, an account involving focus alternatives is possible. Specifically, I propose the focus semantic entry for *exactly* given in (6) within the framework of focus semantics of Rooth (1992).

(6) $[\![\text{exactly}]\!]^w(C)(p) = 1$ iff. C is totally ordered by entailment and $p(w) = 1$ and for all $q \in C$: $(p \rightarrow q \vee q(w) = 0)$

With this lexical entry, (5) entails that the focus alternative (7) must be false. Because weakened projection allows us to ignore both singular number and feminine gender on *her*, (7) entails that there can be no second student who criticized him- or herself.[5]

(7) two student λ_x x criticized her$_x$ self

3 Example (4) with focus *her* allows a reading where the feminity presupposition is accommodated. The resulting interpretation entails that the other students are either male or they didn't criticize themselves or both. It is therefore still different from weakened projection interpretation of Sudo's *Exactly one student criticized herself*, which entails that no male student criticized himself.

4 I leave other modified numerals to future work.

5 Note that I assume that the noun *student* is numberless (see Sauerland 2003 and below).

2.1 Focus alternatives are pairs

The basic idea of my proposal is that during the evaluation of a focus alternative, the actual semantic value of a constituent is always available. The idea is compatible with different approaches to alternative semantics as far as I can see. For concreteness, I propose that the meaning of each focus alternative is actually a pair of the actual value and the focus alternative value. So, the set of focus alternatives of a simple sentence such as *John loves Mary*$_F$ is then a set of pairs as shown in (8). Each pair has the same first member—-the actual interpretation of the sentence—, but the second member differs with respect to the focussed constituent.

(8) FocAlt(John loves Mary$_{\mathrm{F1}}$) = $\{\langle$John loves Mary, John loves Mary$\rangle$, $\langle$John loves Mary, John loves Sue$\rangle$, $\langle$John loves Mary, John loves Anna$\rangle$, ...$\}$

For the concrete semantics to generate such focus meanings, I follow Beck (2006) and others and assume that foci are indexed and the h is focus assignment that assigns to each focussed constituent a meaning that may differ from its actual meaning in the second member of the pair as stated in (9a). Non-focussed constituents are interpreted only as the actual meaning as in (9b). Furthermore, functional application of the focus alternatives is point-wise as in (9c) (Let $a = [\![\alpha]\!]^{g,h}$ and $b = [\![\beta]\!]^{g,h}$).

(9) a. $[\![\alpha_{\mathrm{F}j}]\!]^{g,h} = \langle [\![\alpha]\!]^g, h(j)\rangle$

b. $[\![\omega]\!]^{g,h} = [\![\omega]\!]^g$ for any terminal ω

c. $[\![\alpha\ \beta]\!]^{g,h} = \begin{cases} \langle b_1(a_1), b_2(a_2)\rangle & \text{if } a,b \text{ are both pairs} \\ \langle b(a_1), b(a_2)\rangle & \text{if } a \text{ is a pair and } b \text{ isn't} \\ \langle b_1(a), b_2(a)\rangle & \text{if } b \text{ is a pair and } a \text{ isn't} \\ b(a) & \text{otherwise} \end{cases}$

Finally, I assume that abstraction forms functions that take pairs as arguments.

(10) $[\![\lambda_{\mathrm{i}}\ \alpha]\!]^{\mathrm{g,h}} = \lambda \vec{x} \in D_e \times D_e \cup D_e\ .\ [\![\alpha]\!]^{g',h}$
where $g'(i) = \vec{x}$ and $g'(j) = g(j)$ for $i \neq j$

Note that unfocussed pronouns receive a pair interpretation when the argument of their binder is focussed. This predicts bound pronouns to receive a covariant interpretation within the focus alternatives in the way shown in (11):[6]

(11) FocAlt(John$_{\mathrm{F1}}$ loves himself.) = $\{\langle$John loves John, John loves John$\rangle$, $\langle$John loves John, Mary loves Mary$\rangle$, $\langle$John loves John, Bill loves Bill$\rangle$, ...$\}$

6 At this point, I haven't investigated the predictions of the system for cases of multiple focus and focus on bound pronouns (see Mayr 2012 and references therein.)

2.2 Multi-tier and front-tier interpretation

The system proposed so far predicts that unfocussed semantic content will always contribute to both elements of the pair-meaning of a focus alternative. At this point, this prediction also holds for presuppositions. However, we saw above that the prediction isn't empirically correct for at least some cases of presupposition. I therefore propose that presuppositions in some cases need only be verified for the first member of the paired evaluation. But I show below that a second interpretation where the presupposition applies to both members of the paired evaluation is also available. So, I assume an ambiguity. The relevant clause of the focus evaluation is (12):[7]

(12) If the non-focus interpretation of a word ω is the identity function on some subdomain of type τ, i.e. $[\![\omega]\!]^{g} = \mathrm{id}_S$ for $S \subset D_\tau$ (or in another way purely presuppositional, see (30) below), then $[\![\omega]\!]^{g,h}$ can be either a or b:

a. multi-tier: $[\![\omega]\!]^{g,h} = \langle [\![\omega]\!]^{g}, [\![\omega]\!]^{g} \rangle$
b. front-tier: $[\![\omega]\!]^{g,h} = \langle [\![\omega]\!]^{g}, \mathrm{id}_{D_\tau} \rangle$

Consider for example the evaluation of an alternative for example (1a) in (13) with $h(1) =$ Mary. The argument of the predicate starting with λ_x is then the pair $\langle$Uli S., Mary$\rangle$ and therefore the presupposition of the first person feature of *my* is satisfied if the front-tier interpretation is used.

(13) $[\![\mathrm{I}_{\mathrm{F1}}\ \lambda x\ x$ did my$_x$'s homework$]\!]^{g,h}$

The multi-tier interpretation of first person doesn't allow alternatives to Uli S. as arguments. Since *only* requires alternatives, the multi-tier interpretation isn't attested.

In general, the single- and multi-tier interpretations are logically related. Specifically, without accommodation, the multi-tier interpretation always predicts a stronger presupposition than the single-tier interpretation and, for all alternatives that satisfy the presuppositions of the multi-tier interpretation, the two interpretations have the same truth value. So, in a situation where the presupposition of the multi-tier interpretation is satisfied, the single-tier interpretation and the multi-tier interpretation predict the same truth value. Hence the multi-tier interpretation can only be detected if accommodation applies. This prediction is shown by (14):

(14) *Scenario:* Mary and three of the guys each criticized themselves. Nobody else engaged in any self-criticism.
Only Mary$_{\mathrm{F1}}$ criticized HER$_{\mathrm{F2}}$self.

7 At this point, nothing in the proposal formally assures that across all alternative meanings that are computed, the choice between (12a) and (12b) is uniform though I suspect uniformity is required.

For the analysis of (14), I assume that selective, focus-sensitive accommodation is required and underlies the focus on *her* that (14) requires. Modifying a proposal of Krahmer (1998) for unselective accommodation, I propose the accommodation operator in (15). The third clause in (15) restricts accommodation to the focussed trigger whose focus is coindexed with the accommodation operator.

$$(15)\qquad [\![\mathscr{A}_i\,\mathrm{XP}]\!]^w = \begin{cases} 1 & \text{if } [\![\mathrm{XP}]\!]^w = 1 \\ 0 & \text{if } [\![\mathrm{XP}]\!]^w = 0 \\ 0 & w \notin \mathrm{domain}([\![\mathrm{XP}]\!]) \wedge \\ & \exists \langle p,q\rangle \in \{[\![\mathrm{XP}]\!]^{[2\mapsto a]} \mid a \in D_{\langle e,e\rangle}\} : w \in \mathrm{domain}(q) \\ \text{undefined} & \text{otherwise} \end{cases}$$

The account of weakened projection of presuppositions triggered by ϕ-features is now complete. The account rests on the pure presuppositionality of the features in a way I clarify in the next section. I also argue in the next section that weakened projection with singular definites follows from the presupposition of the singular.

2.3 Pure presuppositionality and other triggers

The account of presupposition projection based on single-tier interpretation as defined in (12) cannot straightforwardly apply to all presupposition triggers. Consider the case of a function f of type $\langle et,e\rangle$ with some presupposition. If we apply f on the front tier, but an identity function (necessarily of type $\langle et,et\rangle$) on the alternative tier, we generate meanings of different types on the two tiers. This will in most cases create problems for the further composition. For this reason, (12) applies only to presupposition triggers that are purely presuppositional.[8] At this point, I mean by *purely presuppositional* that the meaning of an item is the identity function on some domain that is a subset of the full set of entities of that type. The ϕ-features all fit this description: They are restricted identity functions of type $\langle e,e\rangle$. However, other presupposition triggers are arguably not purely presuppositional in this sense (and also not in a second sense which I introduce below). For example, the singular definite determiner is often analyzed as a presuppositional function of type $\langle et,e\rangle$ and therefore is not purely presuppositional. In this section, I show that my approach to weakened projection nevertheless carries over to the singular definite determiner.

For the account, I assume a general presuppositional account of ϕ-features. This extends both the account of Cooper (1979) and Sauerland (2003). Cooper's account was restricted to pronouns, while my own 2003 account treated unbound pronouns and full DPs uniformly, but made an exception for bound pronouns. Now I claim

8 Schlenker (2013) argues for a similar, but not identical restriction for sign languages. At this point, I have not been able to extensively compare the two proposals.

that this exception for bound pronouns was unnecessary, but otherwise adopt the Sauerland 2003 account: Full DPs always are the complement of a ϕ-head, and DP internal ϕ-features, whether on the noun, adjectives, or the determiner, are always due to agreement with the ϕ-head (see also Scontras 2013). Specifically, this entails that singular and plural noun forms are interpreted the same.

Now consider again example (2) with the structure in (16a). The meaning of *only* requires that the two propositions in (16b) and (16c) must be false. Because SING is only interpreted on the front tier, (16b) and (16c) don't trigger a presupposition failure. In the scenario given for (2) above, (16a) is correctly predicted to be true.

(16) a. Sam only talked to SING[the German$_F$ professor(s)]
b. Sam talked to the English professor(s).
c. Sam talked to the Japanese professor(s).

However consider the scenario described in (17). In this scenario, (16c) is intuitively false. Therefore (2) is incorrectly predicted to be true.

(17) *Scenario:* One German professor attended the party, three Japanese professors, and five English professors. Sam talked to the German professor and to one Japanese professor.

My solution to this issue is based on the property of (16c) that both it and its negation are judged false in scenario (17) (Fodor 1970; Gajewski 2005). I propose an account of this phenomenon assuming a fourth truth value in addition to 0, 1, and undefined, namely $\frac{1}{2}$ as in fuzzy logic (see Alxatib, Pagin & Sauerland 2013). I assume that a proposition with truth value $\frac{1}{2}$ is intuitively judged false, but its negation will also have truth value $\frac{1}{2}$ and be judged false too. Distributive quantification receives truth value $\frac{1}{2}$ in the non-uniform case (cf. Gajewski 2005; Romoli 2013) as in (18).

(18) $$*P(X) = \begin{cases} 1 & \text{if } P(x) = 1 \text{ for all atomic } x \sqsubseteq X \\ 0 & \text{if } P(x) = 0 \text{ for all atomic } x \sqsubseteq X \\ \frac{1}{2} & \text{otherwise} \end{cases}$$

Only, however, requires that its focus alternative have truth value 0 as in (19).[9] This is needed independently of weakened projection for examples like *John only talked to the Japanese$_F$ professors*, which entails that John talked to all the Japanese professors, but none of the English ones.

(19) $[\![\text{only XP}]\!]^g = 1 \text{iff.} [\![\text{XP}]\!]^g = 1 \wedge \forall h \forall \langle p, q \rangle \in [\![\text{XP}]\!]^{g,h} : [\![\text{XP}]\!]^g \rightarrow q \vee q(w) = 0$

9 I use here what Rooth (1992) calls a *direct* association with focus on account for ease of exposition.

In this way, my approach extends to example (2). Sudo (2012) and Walker (2012) discuss weakened projection with several other presupposition triggers such as factives, change of state verbs, and focus particles. Their empirical results, however, do not converge and at this point I have not done extensive empirical work myself. Therefore, I leave it open whether the approach based on (12) can extend to all cases of weakened projection. In the following section, I present the extension of my approach to distributive and *de se* binding.

2.4 Distributive and *de se*-binding

For distributive binding, I propose that distributive quantification involves quantification over pairs of the plurality and atomic parts thereof as in (20).[10]

(20) $$*P(X) = \begin{cases} 1 & \text{if } P(\langle X,x\rangle)_2 = 1 \text{ for all atomic } x \sqsubseteq X \\ 0 & \text{if } P(\langle X,x\rangle)_2 = 0 \text{ for all atomic } x \sqsubseteq X \\ \frac{1}{2} & \text{otherwise} \end{cases}$$

Consider the representation in (21) for (1c). The λ_x-predicate is evaluated for pairs $\langle B,b\rangle$, where B is the sum of all boys and b one individual boy. I furthermore assume that PL is actually also satisfied by singular individuals (Sauerland, Anderssen & Yatsushiro 2005) as long as in at least one case it appplies to a true plurality. Therefore PL on *they* is licensed regardless of whether the front-tier or the multi-tier interpretation is chosen because B is a plurality.

(21) The boys all $*\lambda_x$ x were riding the bike they$_x$ had recently bought.

For attitude verbs like *dream*, I also propose that *de se*-quantification involves quantification over pairs. In this case, the pair must contain the *de se*-center as one element while the other must be the real world counterpart of the *de se*-center to license the appropriate agreement properties. In (22), I provide a sample lexical entry for *dream*.[11]

(22) $[\![\text{dreamt}]\!](P^{\langle e^2,st^2\rangle})(y) = 1$ iff. for all pairs $\langle w,x\rangle$ such that $\langle w,x\rangle$ is consistent with y's dream that he is x in world w: $[P(\langle y,x\rangle)(w)]_2 = \top$.

10 As I noted already, the approach of Sudo (2012) to plurality for (20) is similar. Sudo proposes that distributive quantification quantifies over choice functions with a single mapping from a plural to one atomic part, e.g. the function represented by the unit set $\{\langle B,b\rangle\}$. Sudo's approach can now be seen as a special case of the general approach.

11 The types e^2 and t^2 here indicate the types of pairs of individuals and truth values. Since 1 and 2 are used as subscripts for the pairs, I use $\top$ instead of 1 as a truth value.

Given this entry, MASC in (23) is licensed by the real world component in the front tier.[12]

(23) George dreamed that he was Brigitte Bardot.

There's one potential issue for both extensions mentioned in this section: The two components of the pair introduced have different properties either with respect to number or with respect to which worlds they occupy. Therefore, the composition of the two tiers may not be able to proceed in parallel. But before engaging that issue in the conclusions, I point out one potential area of empirical support for the unifying approach proposed here: namely, evidence from binding theory in the next section.

3 English reflexives

The evidence in this section comes from the interpretation of reflexive pronouns in English. First, I spell out a presuppositional account of Condition A—the condition that often requires reflexives like *himself* to be locally bound in English. Then I argue that there is weakened projection of Condition A across the three domains considered above: alternative quantification, *de se* binding, and distributive quantification.

The presuppositional account of Condition A that I propose can be seen as a semantically precise formulation of parts of the approach to binding theory of Pollard & Sag (1992) and Reinhart & Reuland (1993). These authors argue that a *self*-reflexive in a verbal argument position reflexive-marks a predicate.[13] I propose that the notion of *reflexive marking* is semantically captured as the following presupposition of *self*:

(24) $[\![\text{self}]\!](P)(x)(y)$ presupposes that $x = y$ and denotes P.

When it is the object of a transitive verb, *self* can incorporate into the verb as shown in (25b) and (25c) (for (25a)):

(25) a. Mary criticized herself.
b. Mary λ_x x self-criticized her$_x$ *(binding)*
c. Mary self-criticized her$_x$ *(coreference)*

12 With *de se* binding, multi-tier interpretation cannot be available. Otherwise a *de se* interpretation should be possible for *he* in (i) because the unmarked MASC is licensed on the multi-tier interpretation for the pair $\langle BB, George \rangle$.

(i) *Brigitte dreamed λ_x that he$_x$ kissed George.

13 Charnavel & Sportiche (2012) argue that in French a similar condition applies but not only to reflexives in argument positions. I believe such variation can be accommodated within my proposal.

Note that the presuppositional approach doesn't require the object pronoun *her* in (25a) to be bound. Though binding is an option, representation (25c) is also possible. But the reflexivity presupposition of *self* in (25c) is only satisfied if the variable assignment that context provides assigns Mary to the variable x.

The case of reflexive binding most relevant for the following are exceptional case marking (ECM) structures. In example (26) *herself* is the subject of *to win*, but not an argument of *expect*—only the entire infinitival clause is an argument of *expect*.

(26) Mary expected herself to win.

Therefore the reflexive in (26) cannot reflexive-mark a lexical predicate since (26) doesn't contain any predicate of type $\langle e, et \rangle$. I follow Lechner (2012) who proposes that a suitable predicate for reflexive marking must be created in the syntax by λ-abstraction. Following Sauerland (1998) and Nissenbaum (2000), Lechner assumes that movement can target the position between an existing λ-operator and its argument, trigger the insertion of a second λ-operator, and thereby create a binary predicate. On the presuppositional approach, this allows the analyses of (26) in (27). Both representations in (27) can be derived by first moving the matrix subject *Mary*, then the embedded subject *herself*, and finally moving *self* to a position where its sister is the binary predicate $\lambda_y\ \lambda_x\ x$ *expected [* y *to win]*. As already noted in (25), (26) also permits both representations (27a), where *her*$_z$ is bound by *Mary*, and (27b), where coreference of *Mary* and *her*$_z$ is presupposed, but no binding relation obtains.

(27) a. Mary $\lambda z\ z$ her$_z$ self [$\lambda_y\ \lambda_x\ x$ expected [y to win]] *(binding)*
b. Mary her$_z$ self [$\lambda_y\ \lambda_x\ x$ expected [y to win]] *(coreference)*

In the ECM case, there is evidence for the ambiguity in (27): Fiengo & May (1994) discuss the strict interpretation in VP-ellipsis as in (28) (see also Oku 1998).

(28) Romney expected himself to win and his wife did too.

Data from focus alternative interpretation like (29) corroborate this point.[14]

14 I focus here on the new data in (29) because the account of the ellipsis data like (28) require also an account of Condition B. I believe though that the ellipsis fact in (28) can be fully accounted for within my account. One related fact Hestvik (1995) discusses is the differing availability of a strict reading in (ib). At this point, I have no account for the contrast in (i).

(i) a. John defended himself well, and Bill did too.
b. John defended himself better than Bill did.

(29) Only Romney expected himself to win.

a. Nobody other than Romney expected himself to win.
b. Nobody other than Romney expected Romney to win.

To determine whether weakened projection (i.e. front-tier application) can apply to the meaning of *self* we need to determine whether *self* is purely presuppositional. While *self* doesn't satisfy the formal definition given above (*self* cannot be interpreted as a restricted identity function), it intuitively doesn't do anything but add a presupposition. I therefore define a second notion of pure presuppositionality as follows in addition to the one defined in (12):

(30) A functor F applied to function g is *purely presuppositional* if both of the following hold:

a. F doesn't change the type of g
b. wherever $F(g)$ is defined, g is defined too and $F(g)$ and g have the same result

In this case of pure presuppositionality too, I propose that the alternative interpretation procedure can apply the presupposition either only to the front tier or to both tiers. For the front-tier interpretation, the identity function of the same type as the purely presuppositional function must be applied on the other tier—i.e. the type τ in (12) needs to be understood as the argument type of F, but otherwise (12) can remain unchanged.

Consider the application of weakened projection to (29). (29) allows both the bound and coreferent representations from (27). If the multi-tier interpretation of *self* is chosen, the reflexivity presupposition can only be satisfied on the bound representation. But, if the front-tier interpretation of *self* is chosen, both binding and coreference satisfy the reflexivity presupposition on the front tier. The coreferent representation corresponds to the unbound reading noted for (29). In this way, the presence of the coreferent interpretation argues for weakened projection of the reflexive presupposition.

The clause-mate reflexive raises an additional issue: For most speakers, examples like (31) only allow the bound interpretation of the reflexive in contrast to the ECM example just discussed.

(31) Only Romney praised himself.

I propose the following account of the difference between the ECM case (29) and the transitive (31): First of all, note that the transitive case could in principle be structurally ambiguous between a structure like (25) and a structure where both

the subject and object undergo movement just like the ECM structure in (27). I assume, however, that syntactic economy considerations block the latter type of structure for (31). Then, only the two structures noted in (25) are syntactically available. Both of these structures contain a verbal complex *self criticize* composed of the reflexive and the verb. Note that while the reflexivizer on its own has a purely presuppositional interpretation, the complex *self criticize* does not. I suggest therefore that the relevant level for principle (12) may be the maximal syntactic head. Then the front-tier interpretation is predicted to be unavailable in (31), and therefore the reflexivity presupposition cannot be weakened. Furthermore, only the bound representation of (31) is compatible with a multi-tier reflexivity presupposition. As a result, we predict that (31) only allows a bound interpretation of *him*.[15]

The uniform analysis of weakened projection I propose in combination with the application of weakened projection to reflexive interpretation in alternative quantification makes a prediction: Similar effects of weakened projection should be detectable also under *de se* binding and distributive binding. I believe that there is considerable evidence that this prediction is borne out, which corroborates the uniform analysis in an interesting way. In the following, I discuss first a case with reflexives and *de se* binding (data from Sharvit 2011) and then a case with reciprocals and distributivity (data from Higginbotham 1980).

Consider example (32) of Sharvit 2011. Sharvit points out that even when a *de re* interpretation of the object of *vote for* is targeted, the reflexive *himself* must be used. This is surprising because the PRO-subject of *vote for* must receive a *de se*-interpretation. Therefore, the verb *vote for* doesn't seem to receive a reflexive interpretation.

(32) Every male politician promised Palin PRO to vote for himself/*him.

Sharvit's approach to (32) essentially adds a complex additional clause of Condition A for cases like (32). Note though that (32) follows from the approach to weakened projection we have developed here. On this approach the arguments of *vote for* are two pairs: The *de se* subject is interpreted as pair of a male politician and its *de se* counterpart. The object, when it is interpreted *de re*, denotes the pair of the same male politician twice.[16] Therefore the reflexivity presupposition is satisfied on the front tier even when the object is interpreted *de re*. Furthermore the same

15 With a coreferent interpretation, (31) is also not fully acceptable with a pronoun instead of a reflexive (Heim 1998). Fox (2003) independently suggests that the analysis of ellipsis requires that pronouns come with a silent counterpart of *self* that carries an anti-reflexive presupposition (i.e. $[\![\text{anti-self}]\!](P) = \lambda x \lambda y : x \neq y . P(y)(x)$). If anti-reflexivity must be applied multi-tier just like reflexivity, then it follows that a coreferent interpretation of (31) is ineffable.

16 I assume that *de re* involves furthermore application of a concept generator as specified in Percus & Sauerland 2003 (see also Pearson 2013), but this is irrelevant for the reflexivity presupposition.

considerations as in footnote 15 argue that a pronoun would not be acceptable in (32). Therefore, the obligatory use of the reflexive in (32) is expected.[17]

Secondly, consider example (33) with a reciprocal under distributive quantification. As Higginbotham (1980) has pointed out already, the salient interpretation of (33) is one where the predicate *are taller than* is interpreted neither reflexively nor reciprocally—indeed, *they* doesn't receive a plural interpretation in (33).

(33) John and Mary believe that they are taller than each other.

Fact (33) follows very naturally from my approach. I assume that reciprocals also must reflexive mark a binary predicate, and furthermore assume an approach to reciprocal interpretation similar to Schwarzschild 1996. Specifically, note that the two components introduced by distributive binding correspond to the *range* and *contrast* argument of reciprocals in Schwarzschild's analysis. Therefore I propose the lexical entry in (34) for the reciprocal:[18]

(34) $[\![\text{each other}_i]\!]^g(P)_2 = 1$ iff. $P(g(i)_1)$ is defined and $\forall y \in g(i)_1 \setminus g(i)_2 \colon P(y)$

The approach predicts that reciprocals must be interpreted bound by a distributive plural since they provide the necessary pair interpretation of the variable.[19] For (33), the approach predicts the logical form representation (35), where *self* reflexivizes the derived binary predicate $\lambda_y\lambda_z$ [y are taller than z]:

(35) John and Mary *[λ_x x believe that each other$_x$ they$_x$ self λ_y λ_z [y are taller than z]

Because both *each other* and *they* are distributively bound by the same binder, the first components of their assignments will both refer to the plural individual John$\oplus$Mary. Therefore the reflexivity presupposition of *self* is satisfied within the embedded clause.

4 Conclusions

In this paper, I have explored a unified approach to a set of phenomena that haven't received a unified treatment before: quantification over focus alternatives, distributive binding, and *de se* binding. My approach has focussed on a commonality across

17 One prediction that I hope to still explore is that examples like (25) under an attitude verb should behave differently from (32) as the multi-tier interpretation should be required in this case as well.

18 I assume here that the first component $[\![\text{each other}_i]\!]^g(P)_1 = P(g(i)_1)$.

19 A focussed binder or a *de se* binder, though also providing a pair in the variable assignment, would never necessarily denote a part of a plurality and an atomic part thereof as required by the reciprocal.

all these phenomena: weakened projection. Specifically, presuppositions from the scope of the quantifier seem to not be satisfied even for all the instances relevant for the evaluation of the quantifier in all three cases.

I believe that the unifying approach has at least two advantages over existing proposals. In particular, I have shown that a bound pronoun agreement mechanism is unnecessary at least for what have been held to be core cases of the phenomenon by Kratzer (2009) and others. Instead, the present approach allows a fully general analysis of ϕ-features building on Cooper 1979 and Sauerland 2003. The second advantage of the unified approach is discussed in section 3. There I showed that on the basis of the unified approach a new direction to three open problems in binding theory is possible: the problem of the difference between ECM vs. coargument reflexives, the problem of binding reflexives under *de se*, and the problem of scope with reciprocals.

The unified approach also may lead us to discover interesting differences between the phenomena I started out with. Specifically, one such issue that for reasons of space I cannot discuss exhaustively here concerns the licensing of number on full DPs. As I argued above, example (2) shows that number marking on full DPs can be licensed by single tier evaluation with focus alternatives. The facts in (36) and (37) indicate, however, that with *de se* and distributive binding this option doesn't exist. Specifically, (36) is set up such that in the actual world the plural *children* should be licensed. But only the singular is possible.

(36) George, who has three children, was dreaming that he was the mother of one child and that he was breastfeeding his child(*-ren).

For (37), assume that the men aren't brothers, and the mothers each only like one bride. Since the plurality of men have a plurality of mothers, plural marking on *mothers* ought to be licensed. But actually singular is required.

(37) These three men each are marrying the woman that their mother likes best.
*... that their mothers like best.

At this point, I suggest that this difference relates to the issue noted at the end of section 2.4: With alternative semantics, composition in the front tier evaluation will always be possible since it is just computing the ordinary meaning. With *de se* binding and distributive binding, however, composition in the front tier may be impossible. In fact, composition is probably impossible in (36) at a relevant level: in (36), the predicate *child* in the evaluation world is applied to the real world entity George. The counterpart ontology of Lewis (1968) predicts this to be illicit since George isn't an individual of the world where *child* is evaluated. Example (37) might also be impossible to compose if the transitive noun *mother* cannot be interpreted

cumulatively: Then there is no individual or group of individuals that stands in the mother relation to the plurality of men. Therefore both (36) and (37) could be explained using the assumption that if evaluation of the front tier violates a condition of existence in the current world of evaluation, the front tier evaluation is abandoned without triggering a presupposition failure. Then only the second tier evaluation is available to license number marking.

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