Features on bound pronouns: an argument against syntactic agreement approaches[*]

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1.   Introduction and Overview

When a pronoun gets a bound interpretation, its φ-features (person, gender, number) can be semantically 'ignored'. For example, on the bound reading of (1a) *my* must correspond to a variable that isn't restricted to the speaker. Similarly, on the bound reading of (1b) *her* corresponds to a variable that doesn't have to be restricted to female individuals.

(1) a. Only I did **my** homework
         ⤳ *bound reading*: no one other than me did **their** homework
     b. Only Mary did **her** homework
         ⤳ *bound reading*: no one other than Mary, **male or female**, did their homework

The question of what mechanism allows ϕ-features on bound pronouns to be semantically inert has received a number of answers in the literature. According to a popular approach (Heim 2008, Kratzer 2009), a bound pronoun doesn't carry interpreted ϕ-features at all; its morphological realization is merely an overt exponent of an abstract syntactic agreement with its binder. Alternative approaches deny syntactic agreement, and employ special semantic mechanisms to explain the seeming mismatch between the form of the pronoun and its interpretation in (1a) and (1b).

This paper provides an empirical argument against agreement-based approaches. We show, based on observations by Sudo (2013) and McKillen (2016), that such approaches systematically undergenerate cases of uninterpreted ϕ-features on **donkey ('E-type') anaphora** - co-varying pronouns whose relationship to their intra-sentential antecedent does not respect conditions usually considered necessary for syntactic agreement. Examples of the core data are in (2).

(2) a. Only the woman who is dating ME_F says **I** make her happy (✓ *co-variation reading*)
     b. Only if I_F misbehave does the teacher call **my** parents   (✓ *co-variation reading*)

The structure of the paper is as follows. In section 2 we lay out in detail the challenge that the data in (1) pose to a naive theory of pronominal ϕ-features. In section 3 we present two approaches, the **morphosyntactic agreement** approach and the **semantic** approaches, to deal with the challenge. In section 4 we compare the two approaches in light of data like (2), explaining why they furnish an argument for the semantic approach and against the morphosyntactic approach. Section 5 presents another advantage of the semantic approach, coming from 'split-binding' configurations (Rullmann, 2004), and section 6 discusses open issues for future research.

Before moving on, a brief caveat is in order. This paper deals exclusively with focus constructions like (1), and will not cover other types of sentences that have been said to also involve uninterpreted ϕ-features on bound pronouns. In particular, the paper will not deal with the construction mentioned by Partee (1989, fn.3) given in (3) (see Kratzer 2009, Jacobson 2012, Wurmbrand 2017) that shows adjectival *only* rather than the focus-associating adverbial *only*, nor with cases of number features on pronouns bound by distributive quantifiers, as shown in (4) (see Rullmann 2004, Heim 2008, Sauerland 2013, Sudo 2014). The proper analysis of both of these constructions has been debated in the referenced literature.

(3)   I am the only one who did **my** homework
        $\rightsquigarrow$ *bound reading:* No one other than me did **their** homework

(4)   The boys each thought that **they** were the only person in the room
        $\rightsquigarrow$ *bound reading:* Each$_i$ of these boys thought that **he**$_i$ is the only person in the room

2.   The challenge

Our starting assumption is that the semantic contribution of ϕ-features (i.e. when they appear on free/deictic pronouns) is presuppositional: they introduce presuppositions on the value of the index they attach to (Cooper 1979, Dowty & Jacobson 1989, Heim 2008, Charnavel 2017). This is shown in (5). In this paper we focus primarily on person features, but the discussion extends to gender as well (number will be mostly irrelevant except for section 5). In (6) we illustrate this simple analysis for a 1ST person English pronoun.

(5)   a.   *Syntax of pronouns*: $\text{pro}_j \equiv [\text{PERS } [\text{GEND } [\text{NUM } x_j]]]$

        b.   *Semantics of person features*:
               (i) $[\![1\text{ST}]\!]^{g_c} = \lambda x : x$ includes the speaker in c. x
               (ii) $[\![2\text{ND}]\!]^{g_c} = \lambda x : x$ excludes the speaker and includes the addressee in c. x
               (iii) $[\![3\text{RD}]\!]^{g_c} = \lambda x : x$ excludes the speaker and addressee in c. x

        c.   *Semantics of number features*:
               (i) $[\![\text{SG}]\!] = \lambda x : x$ is an atom. x
               (ii) $[\![\text{PL}]\!] = \lambda x : x$ is a plurality[1]. x

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[1]Many assume that 3RD person and PL number are semantically vacuous and that they convey the inferences associated with them due to competition with the other feature values, via *Maximize Presupposition* (Sauerland 2003, a.o.). The paper is compatible with this view, but we opt for the simple version in the text to facilitate presentation.

(6) $[\![I_7 / me_7 / my_7]\!] = [\![[1\text{ST} [\emptyset [\text{SG } x_7]]]]\!]^{g_c} = \begin{cases} g_c(7), & \text{if } g_c(7) \text{ is the speaker in c} \\ \text{undefined}, & \text{otherwise} \end{cases}$

We now work through what happens if the pronoun is to receive a bound interpretation, as in (1a) *only I did **my** homework*. For concreteness, assume this sentence has the Logical Form (LF) in (7): *my* is bound by the focused pronoun I_F, and *only* is a sentential focus-sensitive operator.[2]

(7)   only $[I_F [\lambda_7 [t_7 \text{ did } \underbrace{[\mathbf{1ST\text{-}SG}\ x_7]}_{\mathbf{my}} \text{ homework}]]]$[3]

Presuppositions on a bound pronoun serve to restrict the range of the possible binders of that pronoun. In a compositional setting this requirement is standardly built into the Predicate Abstraction rule, by turning presuppositions in the scope of a λ-binder into definedness conditions on the resulting predicate (Heim & Kratzer, 1998). This means that the λ_7-predicate in (7) should be defined only for the speaker, because of the presuppositional contribution of the bound features:

(8) $[\![\lambda_7 [t_7 \text{ did } \underbrace{[\mathbf{1ST\text{-}SG}\ x_7]}_{\mathbf{my}} \text{ homework}]]\!] = \lambda x : x \textbf{ is the speaker}.\ x \text{ did } x\text{'s homework}$

The fact that (8) is only defined for the speaker is harmless when (8) composes with the subject *I*. The result is that the speaker did the speaker's homework, and this is the meaning of the sister of *only* (the 'prejacent' of *only*) in (7). But a problem arises at the level of focus alternatives, which *only* is supposed to quantify over. As usual, a focused phrase invokes focus alternatives (Rooth, 1992), but none of those alternatives can successfully combine with (8), as we illustrate in (9).

(9)   *The set of alternatives of the sister of* only *in (7)*:
    $\{[\lambda x : x \textbf{ is the speaker}.\ x \text{ did } x\text{'s homework}](\underline{[\![I]\!]}),$
    $[\lambda x : x \textbf{ is the speaker}.\ x \text{ did } x\text{'s homework}](\underline{\text{mary}}),$ Undefined!
    $[\lambda x : x \textbf{ is the speaker}.\ x \text{ did } x\text{'s homework}](\underline{\text{john}}),$ Undefined!
    ... $\}$

Due to the undefinedness, the set of alternatives in (9) cannot contain anything but the meaning of the prejacent itself (*I did my homework*). Thus a true bound reading for (1a) cannot be generated, contrary to fact. In the case of gender features, cf. (1b), the set of alternatives will contain more than just the prejacent; it will include any alternative that corresponds to the specified gender on the bound pronoun. But this is still not enough – as we showed in (1b), a bound *her* in focus contexts can intuitively range also over male individuals.

It is perhaps obvious what is going wrong: the presupposition contributed by the relevant ϕ-feature, e.g. person in (9), should not be present across focus alternatives. In the next section, we present two ways previously given in the literature to derive this desideratum.

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[2]Nothing crucial depends on the assumption that *only* is a sentential operator (i.e. attaches to the whole clause at LF); everything we say here carries over with minor modifications if one takes *only* I_F to be a constituent.

[3]The focused pronoun in (7) of course also carries φ-features, but those don't matter to illustrate the point. To reduce clutter, throughout the paper we omit representing φ-feature nodes explicitly if they are irrelevant.

3.   Two approaches

3.1   The morphosyntactic approach

According to the first approach (see Kratzer 1998, von Stechow 2003, Schlenker 2003, Heim 2008, Kratzer 2009, Wurmbrand 2017, a.o.), φ-features on bound pronouns are not interpreted; at LF the pronoun consists of a bare, featureless index (a 'minimal pronoun', Kratzer 2009):

(10)   <u>LF</u>: only I [λ_7 t$_7$ did $\boldsymbol{x}_7$ homework]
         <u>Interpretation of the predicate abstract</u>: [$\lambda x : \boldsymbol{x} \in \boldsymbol{D_e}$. x did x's HW]

This solves the problem with (9), since the restriction to the speaker is now removed from the predicate abstract. To predict why bound pronouns nevertheless appear on the surface with the overt ϕ-features they do, proponents of this approach hypothesize an abstract syntactic agreement relationship between binders and bindees that results in spell out of the binder's feature on the bound pronoun at Phonological Form (PF). We thus call it 'the morphosyntactic approach'. For concreteness, we illustrate this approach with Heim (2008)'s proposal, whose gist is in (11).

(11)   FEATURE TRANSMISSION UNDER VARIABLE BINDING (Heim, 2008):
         At PF, features on a DP are transmitted to all the variables that the DP binds.

The FEATURE TRANSMISSION rule ensures that the bound pronoun in (10) will be spelled out as first person, since its binder is first person. Note that (11) presupposes a suitable definition of 'binding'. Standardly, one condition that has to be met for α to bind β is that α c-command β at LF (the importance of this detail will be evident in section 4). In (10) *I* indeed c-commands *my*.

3.2   The semantic approach

There are alternative analyses of (1) that don't rely on anything like a Feature Transmission mechanism. We focus here on one such alternative, according to which the inertness of ϕ-features in the sentences in (1) arises because of the special properties of focus semantics. We call this 'the semantic approach'. The idea here is that φ-features are *always* interpreted, even in (1), but that they don't 'project' their semantic contribution to the level of focus alternatives (see Sauerland 2013, Jacobson 2012, Spathas 2010).[4] This view comes down to the conjecture in (12), where $[\![\,]\!]^g$ is the ordinary semantic value function, and $[\![\,]\!]^g_f$ is the focus semantic value function that compositionally interprets focus alternatives (Rooth, 1992).

(12)   *Conjecture: φ-features aren't interpreted in focus alternatives*
         a. $[\![1\text{ST-SG}]\!]^g = \lambda x : \boldsymbol{x} \textbf{ is the speaker}. x$
         b. $[\![1\text{ST-SG}]\!]^g_f = \{\lambda x : \boldsymbol{x} \in \boldsymbol{D_e}. x\}$

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[4]While these authors all share this idea, their implementations vary significantly from each other and from the version we implement. We abstract away from these differences for the purposes of this paper.

On the semantic approach, when a pronoun is bound its φ-features do serve to restrict the range of its possible binders, but only at the level of the ordinary semantic value, as shown in (13-(14).

(13)　　a.　$[\![\text{my}_7]\!]^g = [\![\text{1ST-SG x}_7]\!]^g = g(7)$　　　　**presupposition: $g(7)$ is the speaker**

　　　　b.　$[\![\text{my}_7]\!]^g_f = [\![\text{1ST-SG x}_7]\!]^g_f = \{g(7)\}$　　　　**no presupposition**

(14)　　a.　$[\![\lambda_7 \,[\text{t}_7 \text{ did } [\text{1ST-SG x}_7]\text{'s homework}]]\!]^g = \lambda x : \boldsymbol{x}$ **is the speaker**. $\ x$ did x's homework

　　　　b.　$[\![\lambda_7 \,[\text{t}_7 \text{ did } [\text{1ST-SG x}_7]\text{'s homework}]]\!]^g_f = \{\lambda x : \boldsymbol{x} \in \boldsymbol{D_e}. \ x$ did x's homework$\}$

The two-tier interpretation in (14) avoids the problem encountered in (9): applying (14b) to the alternatives of I_F derives a non-trivial set of alternatives, as shown in (15). The semantic approach, then, has no problem predicting the morphological shape of the bound pronoun based on its (ordinary) semantics, and a PF agreement rule as in (11) is rendered unnecessary.[5]

(15)　　a.　$[\![[I_5]_F \, \lambda_7 \,[\text{t}_7 \text{ did } [\text{1ST-SG x}_7]\text{'s homework}]]\!]^g = $ the speaker did the speaker's HW

　　　　b.　$[\![[I_5]_F \, \lambda_7 \,[\text{t}_7 \text{ did } [\text{1ST-SG x}_7]\text{'s homework}]]\!]^g_f = $

　　　　　　$\{[\lambda x : \boldsymbol{x} \in \boldsymbol{D_e}. \ x$ did x's homework$]([\![I]\!])$,

　　　　　　$[\lambda x : \boldsymbol{x} \in \boldsymbol{D_e}. \ x$ did x's homework$](\underline{\text{mary}})$,　　　　　　　　　Defined

　　　　　　$[\lambda x : \boldsymbol{x} \in \boldsymbol{D_e}. \ x$ did x's homework$](\underline{\text{john}})$,　　　　　　　　　Defined

　　　　　　$...$　　　　　　　　　　　　　　$\}$　$= \{x$ did x's homework $: \boldsymbol{x} \in \boldsymbol{D_e}\}$

3.3　Intermediate summary

The morphosyntactic and semantic approaches give sharply different analyses of (1). On the former approach, the semantic inertness of bound ϕ-features in (1a) and (1b) is a result of the fact that ϕ-features are simply not interpreted on bound pronouns. On the latter, it is because ϕ-features - *regardless of whether the pronoun is bound or not* - are not interpreted at the level of focus alternatives, but they are *always* interpreted at the dimension of the ordinary meaning. Both analyses come with a cost: the morphosyntactic approach needs to postulate a syntactic agreement mechanism in order to explain the surface realization of bound pronouns, and the semantic approach postulates that ϕ-features don't 'project' their meaning to focus alternatives.[6]

In the cases we have examined thus far, the predictions of the semantic and morphosyntactic approaches have lined up exactly. In the next section, we turn our attention to a case where the accounts make divergent predictions.

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[5]Note that the conjecture in (12) applies to all occurrences of pronouns, not just bound ones. But this does not make problematic predictions for ϕ-features on *free* pronouns. Assuming that the variable assignment g_c supplied by context is one and the same both for the ordinary dimension and across all focus alternatives, a free variable will denote the same individual in both of these levels. So even though ϕ-features on a free variable will be interpreted only in the ordinary level, this has no noticeable effect since the value that the variable takes will be the same in both levels.

[6]There are other approaches to the problem of ϕ-features on bound pronouns in cases like (1a)-(1b), which don't fall into either of the the two approaches we considered here. See e.g. Sudo (2012:161-164) and Cable (2005) for two different proposals that deny the morphosyntactic approach and adopt a more semantic perspective, but do not locate the problem in the special properties of focus semantics. As far as we can see, Neither Sudo's or Cable's analyses can straightforwardly explain the donkey anaphora data we discuss in section 4.2.

4.   Features on Donkey pronoun

4.1   Donkey pronouns

Famously, there is a class of pronouns that show co-variance with another element in the sentence without being (classically) bound by it. These are often called **donkey pronouns** (after Geach 1962). Donkey pronouns are attested in focus and ellipsis contexts (see Tomioka 1999). For example, (16) has a reading where the focused phrase *phonology* co-varies in interpretation with *it*, as the paraphrase indicates. Crucially, *it* is not c-commanded by *phonology*. Moreover, *phonology* is in (the object position of) a relative clause which are islands for (LF-)movement, suggesting that the co-variation is not a result of covert movement of *phonology* to a position from which it can bind the pronoun.

(16)   Only the student who took PHONOLOGY thought **it** was cool   ($\checkmark$ co-variation)
    $\rightsquigarrow$ No x$\neq$ phonology: the student who took x thought $\boldsymbol{x}$ was cool

Before showing how configurations like (16) can be used to tease apart the two approaches to ϕ-features on bound pronouns, we need to take a small detour into the analysis of donkey sentences in general. Broadly speaking, there are two main strategies in the literature for dealing with donkey pronouns: (i) dynamic binding theories (Kamp 1981, Heim 1982, Groenendijk & Stokhof 1991, Chierchia 1992, a.o.) and (ii) E-type theories (Parsons 1978, Cooper 1979, Evans 1980, Heim 1990, Elbourne 2005, a.o.). We will be assuming an E-type framework for dealing with data like (16) due to its relative simplicity. It should be noted that many of the points we will be making depend on this choice, but we believe that our main argument is not affected by it (in section 6 we briefly expand on this point).

The main idea of E-type theories is that donkey pronouns are underlyingly definite descriptions which contain a bound variable (but aren't themselves bound variables). Following tradition, we henceforth call donkey pronouns **E-type pronouns**. In broad strokes, the E-type pronoun *it* in (16) it taken to be equivalent, at some level of representation, to a full DP *the class he/she$_7$ took*, with *they$_7$* bound by the subject *the student who took PHONOLOGY*. To spell this out more concretely, it is sufficient for our current purposes to adopt the structure in (17a) along the lines of Cooper (1979) (but see section 6 for a proviso). The free variable R_6 supplies a contextually salient relation which can be resolved as in (17b). After *only* quantifies over the set of focus alternatives of its sister, the resulting meaning is in (17c).

(17)   a.   <u>LF</u>: Only [[the student who took phonology$_F$] λ_7 t_7 thought $\underbrace{\textbf{[the [R}_6\textbf{ x}_7\textbf{]]}}_{\textbf{it}}$ was cool]^7

    b. $g(R_6) = \lambda x.\lambda y.\ x$ took the subject y

    c.   ⟦17a⟧ $=$ the student who took phonology thought phonology was cool
        $\land \neg$ the student who took syntax thought syntax was cool
        $\land \neg$ the student who took semantics thought semantics was cool

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[7]A more sophisticated version of the E-type analysis that incorporates situation variables into the LFs is needed to overcome some well-known difficulties with the naive version we use here. See Elbourne (2005) for discussion. We do not incorporate situation semantics into the analysis since that would make the formulas more complex than necessary.

As (17c) makes clear, the interpretation of the E-type pronoun *it* ends up co-varying with the interpretation of *phonology* across focus alternatives, even though there is no formal binding relationship between the two - there is formal binding only between a phrase that *contains* the antecedent and a variable *inside* the E-type pronoun.

4.2 Comparing the two approaches to ϕ-features using donkey pronouns

Sudo (2013) and McKillen (2016) observe that ϕ-features on E-type pronouns in focus are semantically inert, just like ϕ-features on 'normally' bound pronouns. Consider the sentences in (18), in which a first person pronoun (in bold) has a co-varying interpretation with a matching focused pronoun that does not c-command it and is embedded in an island, hence the bolded pronouns are E-type pronouns with inert features.

(18)   a.   Only the woman who is dating ME says **I** make her happy.   (✓ *co-variation*)
           $\rightsquigarrow$ No x≠me: the woman who is dating *x* says *x* make her happy

       b.   Only if I$_F$ misbehave will the teacher call **my** parents.   (✓ *co-variation*)
           $\rightsquigarrow$ No x≠me: if *x* misbehaves the teacher will call *x*'s parents.

We argue that (18) pose a serious problem for the morphosyntactic approach (section 3.1), but are readily accounted for by the semantic approach (section 3.2). The reason is this: on the morphosyntactic approach, for a pronoun to bear semantically inert features the pronoun must be formally bound by its antecedent (cf. the Feature Transmission rule, (11)), and thus must be c-commanded by it at LF. Since E-type pronouns are not formally bound by the element they co-vary with, the morphosyntactic approach predicts that the 1ST-SG feature on the bolded pronouns in (18) must be based generated and semantically interpreted. And since 1ST-SG feature is only compatible with one individual (the speaker), this theory undergenerates the co-variation reading. The semantic approach, on the other hand, does not suffer from this problem; on this view a formal binding relationship is not a pre-requisite for ϕ-features to be semantically ignored on co-varying pronouns, as we show in detail in the next subsection.

    The same point holds for gender features. The sentence in (19) (based on Tomioka 1999:238) yields co-variation that isn't limited to female individuals. This, again, is problematic for the morphosyntactic approach, since there is no binding configuration between *Sue* and *her*.

(19)   Only if *SUE* has trouble in school I would help **her**   (✓ *co-variation, gender ignored*)

E-type pronouns are observed also in VP-ellipsis environments, which on many analyses are closely related to focus (Rooth, 1992; Tomioka, 1999). The felicity of (20) (for those speakers who accept feature-mismatches on bound pronouns in ellipsis to begin with) indicates that here too ϕ-features on those E-type pronouns are semantically ignored:

(20)   a.   The woman who's dating me says **I** make her happy, but the woman who's dating BILL doesn't ~~say **he** makes her happy~~.   (✓ *co-variation*)

       b.   If my car gets towed, people will offer **me** a ride. If BILL's car gets towed, people won't ~~offer **him** a ride~~.   (✓ *co-variation*)

4.3 Deriving the behavior of donkey pronouns in focus

We now turn to showing in detail how the semantic account straightforwardly derives the inertness of ϕ-features on E-type pronouns. We illustrate the analysis with (18a), whose LF we assume is (21). (21) is analogous to the LF in (17a), but with ϕ-features now represented on top of the E-type pronoun (see Sauerland 2003 for independent arguements that ϕ-features attach to full DPs).[8]

(21)   <u>LF</u>: Only $\big[$[the woman dating me$_F$] [λ_7 [says $\underbrace{\textbf{[1ST-SG [the [R}_6 \textbf{ x}_7\textbf{]]]}}_{I}$ make her$_7$ happy]]$\big]$

As before, R_6 is a contextually-supplied relation. The salient relation it encodes is the "dating" relation, defined in (22a). The E-type pronoun as a whole is thus resolved to *the person she$_7$ is dating*, which given the presupposition induced by the ϕ-features is the speaker, (22b). Crucially, the analysis says that ϕ-features aren't interpreted in focus alternatives, so the presupposition in (22b) is not represented at the level of focus semantic value, (22c).

(22)   a. $g(R_6) = \lambda x.\lambda y.\ x$ is dating y

   b. $[\![1\text{ST-SG [the [R}_6\ x_7]]]\!]^g =$ the person $g(7)$ is dating
                    presupposition: the person $g(7)$ is dating is the speaker.

   c. $[\![1\text{ST-SG [the [R}_6\ x_7]]]\!]^g_f = \{$the person $g(7)$ is dating$\}$
                    No (relevant) presupposition.

The difference in presupposition between (22b) and (22c) projects to the λ-binder of x_7, as shown in (23): at the level of the ordinary semantic value (23a), the predicate abstract is defined only for one person - the individual who is dating the speaker (assume people are dated only by one person). This restriction is absent at the level of the focus semantic value (23b) (for transparency, in (23) we replaced 'the [R$_6$ x_7]' with 'the person x_7 is dating').

(23)   a.   *Ordinary semantic value of the λ-abstract*:
            $[\![\lambda_7$ [t_7 says $\textbf{[1ST-SG [the person}\ \boldsymbol{x_7}\ \textbf{is dating]]}$ makes her$_7$ happy]$]\!]^g =$
            $\lambda x : \boldsymbol{x}\ \textbf{is dating the speaker}.\ x$ says the person x is dating (=the speaker) makes x happy

   b.   *Focus semantic value of the λ-abstract*:
            $[\![\lambda_7$ [t_7 says $\textbf{[1ST-SG [the person}\ \boldsymbol{x_7}\textbf{'s dating]]}$ makes her$_7$ happy]$]\!]^g_f =$
            $\{\lambda x : \boldsymbol{x} \in \boldsymbol{D_e}.\ x$ says the person x is dating makes x happy$\}$

Since the λ-abstract in (23b) is not restricted by the content of the 1ST-person feature, the co-variation across alternatives is correctly derived when (23) is composed with the subject, (24)-(25):

(24)   a. $[\![$the woman who is dating ME$_F]\!]^g =$ the woman dating the speaker = Mary
   b. $[\![$the woman who is dating ME$_F]\!]^g_f = \{$the woman dating me, the woman dating Sue,
            the woman dating Fred, ... $\} = \{$Mary, Jane, Lisa,...$\}$

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[8]Our account is also compatible with the more syntactically realistic view (see Danon 2011 and references therein) that while person features are introduced at the DP level, gender and number are introduced within the DP.

(25) $[\![\text{the woman who is dating ME}_F\ \lambda_7 \text{ says the person } x_7 \text{ is dating make her happy}]\!]^g_f =$
        {the woman dating **me** says **I** make her happy,
        the woman dating **Sue** says **Sue** makes her happy,
        the woman dating **Fred** says **Fred** makes her happy, ... }

We can now see more clearly why the morphosyntactic approach undergenerates the co-variation reading of (18a). Since that theory does not distinguish between the ordinary semantic value and the focus semantic value with respect to the contribution of ϕ-features (and again assuming that Feature Transmission at PF is beside the point with E-type pronouns), the 1ST-SG feature should be interpreted in *both* levels in (23), and the co-variation reading cannot be derived.

The same goes, *Mutatis Mutandis*, for the other E-type examples in section 4.2. Only the semantic approach can correctly capture these data.[9]

4.4   Two ways to save the morphosyntactic approach and their problems

To conclude this section, we briefly consider two mechanisms that suggest themselves for adapting the morphosyntactic approach to handle the data we have presented. In both cases, the modifications ultimately fall short, further strengthening our point against that approach.

The first modification is to adopt the movement theory of association with focus. Specifically, the idea is that the focused pronoun moves to associate with *only* (see (26a)-(26b)), and that from this position it can directly bind – and transfer features to – the co-varying 1ST-person pronoun. On this account, the relevant examples don't involve E-type pronouns at all, just ordinary binding.

(26)   a.   <u>LF</u>: Only ME$_F$ [λ_7 the woman dating t$_7$ says **x**$_7$ make her happy]
        b.   <u>LF</u>: Only I$_F$ [λ_7 if t$_7$ misbehave will the teacher call **x**$_7$'s parents]

As mentioned before, the obvious problem with this modification is that both (26a)-(26b) involve island-violating movement. Quantifiers cannot scope out of these positions:

(27)   a.   The woman dating each$_i$ man says he$_{*i}$ makes her happy
        b.   If each student$_i$ misbehaves, the teacher will call his$_{*i}$ parents.

It isn't clear what property of focus would make it exempt from conditions on scope-taking. As Tomioka (1999) points out, putting pitch accent on *each student* does not seem to facilitate binding in (27). Further consideration against focus movement comes from scope interactions. If island-insensitive focus movement is available, we predict that the scope of phrases that undergo such movement will be as high as the position of the focus-sensitive operator that associates with them

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[9]For the case of the conditional in (18b) the E-type analysis is perhaps less straightforward than (18a), since it is not obvious what kind of bound variable is going to be inside the E-type pronoun, and what its binder might be. One option is that the binder is the whole *if*-clause, and that it binds a world/situation variable, as in (i). The salient relation that $\mathbf{R}_6$ encodes must then be something like $\lambda s.\lambda x.\ x$ *is the misbehaving child in s*. But see section 6.

(i)   Only $\Big[$[if I$_T$ misbehave] [λ_4 the teacher will call **1ST [the [R$_6$ s$_4$]]] parents**]$\Big]$

(e.g. *only*). As (28) suggests, this is not so; there is no reading where the focused *most* together with its restrictor take scope over *the woman who...*.

(28)   Only the woman who is dating [MOST$_F$ men] arrived   (**most > the*)
        $\nrightarrow$ Only for most (but not all) men x is it the case that the woman dating x arrived.

The second strategy for saving the morphosyntactic account that we consider here is to essentially broaden the notion of Feature Transmission to apply also to the relationship between antecedents and E-type pronouns (this strategy is hinted at in McKillen 2016, §5.2.3 fn.12). This idea can be executed, for example, by allowing the 1ST-person feature on the focused pronoun to percolate at PF to the containing DP which binds into the E-type pronoun. This is schematized in the PF representation in (29), after percolation + transmission.

(29)   Only [the woman who is dating ME_{1st}]$_{1st}$ [λ_7 [says [the R$_6$ x$_7$]$_{1st}$ make her happy]]

The problem with this approach is that other pronouns bound by the container DP do not show 1ST person features (cf. *her* in 29). It isn't clear then how this mechanism can distinguish between E-type pronouns and normally-bound pronouns and transfer percolated features only to the former.

5.   Split Binding: another advantage of a semantic approach

In this section we discuss another advantage of the semantic approach which is independent of donkey pronouns, and comes from so called **Split Binding** (see Partee 1989, Rullmann 2004, Heim 2008). This section follows the discussion (and to an extent, the conclusions) of Heim (2008).
    'Split Binding' refers to cases where a pronoun has two separate antecedents, as in (30):

(30)   Every girl told John that **they** should get together
        $\rightsquigarrow$ split-bound reading: Every girl x told John that ***x+John*** should get together

Split binding can be modeled by letting a pronoun be composed of more than one index at LF:

(31)   <u>LF</u>: Every girl λ_7 t$_7$ told john that $\underbrace{\textbf{pro}_{[7+8]}}_{\textbf{they}}$ should get together   (where $g(8) = john$)

As Rullmann (2004) and Heim (2008) showed, 1ST (and 2ND) person pronouns can also be split-bound. For example, (32) uttered by one of John's ex-wives to John's other ex-wives has the reading in (32a). Once more, this reading can be captured with a complex structure for the pronoun, as in the LF in (32b) where one part is bound by the focused I_F and the other one refers to John.

(32)   ("All of us wanted to separate from John on peaceful terms, but)...
        Only I hoped **we** would eventually get back together"   (based on ex. 50 in Heim 2008)

        a.   split-bound reading: No ex-wife x besides me hoped ***x+john*** would be back together

        b.   <u>LF</u>: only [$_{TP}$ I$_F$ λ_7 t$_7$ hoped $\underbrace{\textbf{pro}_{[7+8]}}_{\textbf{we}}$ would get back together]   ($g(8) = john$)

Observe that the relevant reading in (32) *requires* the split-bound pronoun to surface as 1ST-person; pronouncing *you* or *they* instead of *we* loses the split-bound reading, which raises the question of how to explain it. In particular, how to predict that the LF representation **pro**$_{[7+8]}$ must surface as 1ST-PL in (32), but as 3RD-PL in (31)? More generally, the way that split-bound pronouns are morphologically realized follows the generalization in (33):

(33)   *Generalization about the morphological realization of split-bound pronouns:*

    a.   Whenever one part of a split-bound pronoun **refers to, or is bound by,** a 1ST person element, the split-bound pronoun is spelled out as 1ST-PL.   (e.g. in 32)

    b.   Else, whenever one part of a split-bound pronoun **refers to, or is bound by,** a 2ND person element, the split-bound pronoun is spelled out as 2ND-PL.

    c.   Else, the split-bound pronoun is spelled out as 3RD-PL.   (e.g. in 31)

As Heim (2008) points out, the morphosyntactic approach cannot derive (33) without unattractive stipulations. On this view the bound part of split-bound pronouns is a bare variable with no semantically interpreted features, so (33) cannot be explained based on the *semantics* of ϕ-features on split-bound pronouns. Instead, one must hard-code (33) into a separate PF mechanism that operates after Feature Transmission and generates PF features on a complex pronoun based on the PF features of its atomic parts (see Heim's paper for details). But this seems to miss an obvious generalization about the way plural pronouns behave *independently* of split-binding. To wit, whenever a group that contains the speaker is referred to, a 1ST-PL pronoun must be used, and whenever a group that contains the addressee but not the speaker is referred to, a 2ND-PL pronoun must be used; it is these observations that motivate the lexical entries in (5b) to begin with. The generalization about split-binding in (33) ought to fall out from this basic pattern of plural pronouns, but the morphosyntactic approach cannot deliver that. It is a disadvantage of a theory if it must invoke a new mechanism to account for what looks like a reducible phenomenon.

In contrast, the semantic approach, on which features on pronouns are always base-generated and semantically interpreted in the ordinary semantics, readily derives (33) without additional assumptions. (33) follows from the morpho-semantics of run-of-the-mill plural pronouns given our assumptions about the role of ϕ-features on bound variables as restricting the range of possible binders in the ordinary semantic value (cf. (14a). To be concrete, we show in (34) the ordinary semantic value of the λ_7-abstract in (32b), according to the semantic approach. The features on the split-bound pronoun are present at LF, imposing the requirement that the binder of the bound-part of the split-bound pronoun refer to the speaker, as is indeed the case in (32b).

(34) $[\![\lambda_7\ t_7\ \text{hoped}\ [\textbf{1ST-PL}\ \textbf{pro}_{[7+8]}]\ \text{would get back together}]\!]^g =$
       $\lambda x : \boldsymbol{x \oplus g(8)}\ \textbf{contain the speaker}.\ x\ \text{hopes}\ x \oplus g(8)\ \text{get back together}$ $(g(8) = \text{John})$

Crucially, neither 2ND nor 3RD in place of 1ST in (34) could derive a split-bound reading of (32). Those features are not compatible with groups that contain the speaker (cf. 5b), so if they were generated instead of 1ST, (34) would not be able to compose with the subject I_F at the level of the ordinary semantic value. This explains why the split-bound pronoun must be realized at PF as 1ST

person: the semantics of person features forces it to. The point generalizes: the description in (33) is *predicted* rather than stipulated (see Sudo 2014 for a similar claim in a different domain).

6.   Open issues

We end the paper with two open issues that we hope to tackle in future research. The first issue concerns the status of the core hypothesis of the approach we defended here, namely that ϕ-features don't contribute to focus alternatives (12). It remains to be seen how to derive this from something more basic. Note that this is not in general a property of presupposition triggers; (35) shows that e.g. *again* and *stop* must project their presuppositions to focus alternatives.[10]

(35)   a.   *Context: Mary talked to Ed before, and it's not known whether the other people did.*
            #Among these people, only Mary$_F$ is talking to Ed **again**

        b.   *Context: Mary smokes, and it's not known whether the other people do too.*
            #Among these people, only Mary$_F$ will **stop** smoking

    The second issue concerns the Cooper (1979)-style theory we adopted here for E-type pronouns, according to which their content is retrieved from a relation made salient by the context of utterance (cf. section 4.1 onwards). It has long been known that this approach to donkey dependencies faces serious problems, because it overgenerates readings that are empirically unavailable. The problems are essentially of the 'formal link' variety (see Heim 1990, Elbourne 2005 and references therein). To appreciate the issue, consider (36) from Jacobson (2012):

(36)   *For the departmental Christmas party, every faculty member was encouraged to bring their/his or her spouse. But* #only MICHAEL brought **me** (based on Jacobson, 2012:338)

(36) cannot mean that Michael brought me, his spouse, and no one other than Michael brought his or her spouse. That is, the pronoun in (36) does not have what is sometimes referred to as a 'paycheck' reading. But since the "spouse" relation was made salient by surrounding context, our Cooper-style theory overgenerates the LF in (37), where $g(R_6)$ is the "spouse" relation.

(37)   #Only Michael [λ_7 brought **[1ST-SG [the R$_6$ x_7]]**]

    The upshot is that donkey pronouns in focus environments (at least 1ST-person ones) cannot after all be said to retrieve their content from mere contextual information; rather, they must be anteceded by the focused phrase which matches it in features, as in all the examples we had until (36).[11] In order not to overgenerate in (36), a more restrictive, 'syntacticized' theory of donkey

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[10]Sauerland (2013) proposes that the class of triggers that don't contribute their presuppositions to alternatives are the *pure*-presupposition triggers, i.e. those items whose sole semantic contribution is a presupposition. This definition, however, is too broad: *again* and *too*, for example, also seem to be pure-presupposition triggers but their presupposition cannot be eliminated in the alternatives (see also McKillen (2016) on this point).

[11]Jacobson (2012) claims that the picture changes when it comes to gender features: *only Michael brought **her*** does allow for the relevant reading missing in (36), and crucially the spouses in question can be either female or male. Jacobson's judgments, however, are controversial; a reading where the gender is ignored is nearly inaccessible to us and to our informants (as well as to some of Jacobson's own informants – see fn. 18 in Jacobson 2012). We do agree,

dependencies is needed which requires some formal link between the focused antecedent and the dependent pronoun. Within the E-type framework, relevant proposals are found in Elbourne 2005 (formal link in terms of NP-ellipsis) and Sauerland 2007 (multi-dominant structures). On dynamic binding theories of donkey anaphora, which deny the E-type strategy altogether, it is possible to establish a formal link by way of mere coindexation between a donkey pronoun and its antecedent (we do not know of existing dynamic accounts of focus dependencies).

Space limitations preclude a thorough discussion of these proposals and their prospects, and we leave to future work how to refine the argument from donkey pronouns so that it may be stated in terms of a more adequate theory. We believe, nevertheless, that our point against the morphosyntactic agreement theory of ϕ-features is not affected by this issue. Even with a more 'syntacticized' theory of donkey dependencies, the purported structural relationship that must obtain is quite unique and is not characteristic of usual agreement dependencies. Specifically, all agreement dependencies we are aware of respect c-command at least, and are usually rather local; this does not hold for our donkey data. If the relationship between co-varying pronouns and their antecedents does not have to involve c-command, this speaks against a theory that invokes a morphosyntactic mechanism to explain why ϕ-features are inert on those pronouns.[12]

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though, that *her* can have a co-varying ('paycheck') interpretation in this sentence as long as it is restricted to females. More work is necessary to clarify the empirical picture.

[12]Note further that the argument from split binding (section 5), which is independent of donkey anaphora, is unaffected by this matter.

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