The Role of Topics in Licensing Anaphoric Relations in VP-ellipsis

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Abstract:
The paper addresses the role of topics in the licensing of anaphoric relations. I will show that the C-domain plays a crucial role in accounting for valid and invalid cases of coreference. In particular, I will argue that discourse anaphors are bound by a context operator, implying that the mechanism that corresponds to coreference is syntactically encoded. The crucial empirical evidence comes from the licensing of strict and sloppy readings in VP-ellipsis which are argued to follow from an alternative analysis of the role of focus binding in the account of Rooth (1992). A topic hypothesis is proposed which requires that a coreferential expression enters into an Agree-relation with a topic head in the C-domain. Impossible cases of coreference are ruled out as violations of the locality contraint imposed by the syntactic Agree-relation.

1 Introduction

This paper addresses the role of topics in the licensing of anaphoric relations. We will show that the C-domain plays a crucial role in accounting for valid and invalid cases of coreference. In particular, it is argued that a contrastive topic rather than focus as proposed by Rooth (1992) accounts for the presence of sloppy and strict readings in cases of VP-ellipsis.

For this matter, the paper starts out with discussing the traditional distinction between two types of anaphoric relations, binding and coreference, and takes issue with a prominent approach, initiated by Reinhart (1983) and further developed by Heim (1998), Fox (2000), Büring (2005), Reinhart (2006) and Roelofsen (2008), which assumes that only one type of anaphoric relation, namely binding, is syntactically encoded (and thus subject to rules of syntactic well-formedness), while coreference is not syntactically encoded and thus not constrained by rules of grammar.

Alternatively, I will argue that also coreference involves a binding relation that is mediated by a functional head in the C-domain. The empirical arguments for this approach come from a revised treatment of anaphoric relations in VP-ellipsis in terms of focus binding in the account of Rooth (1992). The discussion of the data is exclusively concerned with anaphoric relations in English (a minor comparison of parallel facts in German aside). As far as the architecture of topics is concerned, it is thus argued that even in languages like English, where discourse-given elements remain in their base positions, these elements enter in an Agree-relation with a Topic head in the C-domain.

1.1 Binding and Coreference

To see what is at stake, let us consider how standard cases of binding and coreference are treated in generative syntax (cf. Büring 2005, Heim & Kratzer 1998). A pronoun bound by a referential expression as in (1a) or by a quantified expression as in (1b) is interpreted as a variable bound by an operator with the relevant configuration being created by Quantifier Raising (QR) of the antecedent and predicate abstraction, as is illustrated in (1cd) respectively.

(1) a. *John$_1$ admires his$_1$ teacher*
b. *Every student$_1$ admires his$_1$ teacher*
c. *John λx. x admires x's teacher*
d. *Every student λx. x admires x's teacher* (quantifiers are of type ((e,t) (e,t), t))

A coreferential pronoun, in contrast to a bound pronoun is interpreted as a referential pronoun that is freely assigned a value via an assignment function from the domain of entities in the model, as is familiar from cases of cross-sentential anaphora and illustrated in (2a). Applying the same procedure as in (2a) to the pronoun *his* in (2b), yields a coreferent pronoun: if the possessive pronoun is assigned the value *John*, it accidentally corefers with the subject, without involving any binding relation.

(2) a. *Peter met Mary yesterday. He gave her a present* (he = Peter, her = Mary)
b. *John admires his teacher* (his = John)

From this approach it follows that cases of illicit (accidental) coreference, as in (3a) are not ruled out in the syntax (in terms of a violation of the binding theory) but requires an extra pragmatic principle which regulates the interaction between cases of binding and cases of coreference. Reinhart's (1983) Coreference Rule states that coreference is ruled out, if it yields exactly the same interpretation as its binding alternative. For instance, coreference between the subject and the object pronoun in (3a) is ruled out, since there is a licit binding relation in (3b) that yields the very same interpretation, while coreference in (3c) is not ruled out, since the binding alternative in (3d) does not have the same interpretation, stating that only John is a self-admirer, while (3c) expresses the proposition that only John and no other person is such that he admires John.

(3) a. **John admires him* (him = John)
b. *John admires himself* (binding alternative to (3a))
c. *Only John admires him* (him = John)
d. *Only John admires himself*

This approach works quite well for standard licit and illicit cases of coreference and has meanwhile been widely accepted in the field. But we will see in section 2.1 below that it runs into a number of problems in cases of VP-ellipsis.

1.2 The alternative proposal

Coreferential expressions, including coreferent pronouns are to be considered topics in the broadest sense. They presuppose an antecedent in the discourse to which they refer back. In other words, they behave like discourse anaphors. So far this has not been taken into consideration in standard accounts of coreference. In the terminology of Frascarelli and Hinterhölzl (2007), discourse anaphors count as familiar topics. Familiar topics in Italian and German undergo movement to a licensing position in the C-domain. No such movement is visible in a language like English. Nevertheless, I will argue in the present paper for the conjecture in (4).

(4) Topic hypothesis: A coreferential expression enters into an Agree-relation with a licensing head in the C-domain (in all languages)

In particular, I will argue that discourse anaphors are bound by a context operator (cf. Hinterhölzl 2013) implying that the mechanism that corresponds to coreference is syntactically encoded. Assuming that functional heads and not DPs are the real antecedents of bound pronouns (Kratzer 2009), I propose that a discourse anaphoric pronoun is in an Agree-relation with a functional head in the C-domain, F_{given}, that introduces a λ-operator binding the pronoun. The external argument A of this head is then retrieved from the context under the condition that A is the most salient discourse referent (DR) matching the ϕ-features of F_{given}.

In this way, illicit cases of coreference can be reduced to illicit cases of co-binding in the syntax, by adopting an absolute version of Fox's Rule H and Principle B of the binding theory, as is illustrated in (5) and (6).[1]

(5) a. *John voted for him.* *John = him b. *Only John voted for him.* ok John = him
(6) a. <John> λx. x voted for x b. <John> λx. No y (y ≠ John) y voted for x

(5a) is ungrammatical, because the (prepositional) object pronoun can neither be interpreted as a bound pronoun (bound by the subject) nor as a discourse anaphor coreferent with the subject. The bound pronoun interpretation is ruled out by Principle B of the binding theory and coreference is ruled out for the following reason. For the pronoun to be coreferent with *John* the latter must be an established discourse referent in the context, indicated by <John> in (6). If the subject in (5) is to be read as being coreferent with this discourse antecedent, it needs to be bound by the lambda-operator introducing this referent, as is illustrated in (6a). However, as we will see below, co-binding of the both the subject and the pronoun to the discourse antecedent is not possible without the pronoun being bound by the subject. Thus the ungrammaticality of a coreference relation between the pronoun and the subject is reduced to a violation of the binding theory.

It is important to note that the same problem does not arise in the grammatical (5b). As is illustrated in (6b), the subject in this case is not co-bound by the discourse operator, since it is bound by a separate operator. Hence the object pronoun can be bound by the discourse operator and coreference is possible giving rise to the reading that *John* was the only individual in the context that voted for John.

It is clear that this account presupposes that possible violations of the Binding principles A, B and C are restricted to antecedents in A-positions, but this assumption has become a standard one since Aoun (1992). A better alternative would be to assume that violations of the Binding principles are restricted to antecedents with formal features. Given that the discourse operator introduces a DP that does not come from the lexicon but is inserted from the semantic interface, <John> in (5) only possesses semantic features, but can be taken to lack formal features. I will leave this issue open for further research.

The paper is organized in the following way. In the subsequent sections, I will develop the alternative account in more detail and argue in particular that it is superior to the standard account when it comes to explain the anaphoric relations in cases of VP-ellipsis. Section 2 is thus concerned with standard accounts of VP-ellipsis and the phenomenon of parallelism which is at the basis of possible anaphoric relations in VP-ellipsis. Section 3 discusses the difficulties that the standard account has to explain the different anaphoric relations in cases of VP-ellipsis. In particular, we will address the problems it faces without respect to strict readings (Dahl's puzzle). In section 4, the alternative account is developed. The distinction between binding and coreference is dismissed and replaced by a distinction between pronouns which have their formal features deleted under identity with a syntactic antecedent (syntactic anaphor) and those whose formal features remain active during the derivation and are interpreted in the selection of the respective discourse referent (discourse anaphor). In section 5, we will return to Dahl's puzzle and show how it can be accounted for in the alternative approach. Section 6 takes up the question of identity and parallelism in VP-ellipsis and investigates in more detail the information structure of the two conjuncts. I will argue that identity can be stated on two levels: on the propositional level or on the speech act level. These

[1] An anonymous reviewer points out that (5b) is rather unnatural and that the intended reading is only present in (i) below. It must be noted that cases of coreferent pronouns require an appropriate context that (pre-)establishes an appropriate discourse referent as in (ii) below. In the present paper, I will use coreferent pronouns, since only pronouns give rise to sloppy and strict readings in cases of VP-ellipsis, as we will see in sections 2 and 3, and the availability of certain anaphoric relations in VP-ellipsis serves as core argument against the standard approach.

(i) Only John voted for John
(ii) Context: John's popularity is going down massively.
Only John (himself) voted for him

observations will lead us to revise Rooth's account of semantic parallelism, replacing binding by a contrastive focus with binding by a contrastive topic. Section 7 finally summarizes the paper.

2 Identity and Parallelism in VP-ellipsis

There is a huge literature on how to account for the phenomenon of and the restrictions on VP-ellipsis that I cannot fully do justice to in this paper. See Reich (2012) for an overview of the relevant literature. Summarizing somewhat the main lines of discussion, some authors propose that there is just a semantic or anaphoric relation between the ellipsis site and the antecedent, that is to say, the gap is to be treated as a null pronoun (cf. Hardt 1993, 1999), while others insist on the fact that there is strong evidence that VP-ellipsis is sensitive to syntactic structure and thus requires a syntactic account that makes use of syntactic identity (at some level) and of phonological deletion. Note in this respect that VP-ellipsis is sensitive to change of voice and to syntactic islands, as is illustrated in (7). In (7a), the ellipsis site cannot be interpreted as *look into this problem*. The examples in (7) are taken from Reich (2012).

(7) a. **This problem was looked into by John, and Bob did Δ, too*
b. ** Dogs, I understand, but cats, I don't know a single person who does Δ*

If we adopt a deletion approach the identity condition on VP-ellipsis must be stated on a syntactic level which interfaces with semantic interpretation, that is at LF, because of the phenomenon of antecedent contained deletion, as has been argued for already by May (1995). As is illustrated in (8), only QR of the direct object in (8a) derives the relevant configuration for copying the correct VP structure, avoiding an infinite regress.

(8) a. *Sandy hit everyone that Bill did Δ*
b. Sandy [everyone that Bill did Δ] [hit t]

On of the crucial issues of the theory of VP-ellipsis is the definition and explanation of semantic effects of parallelism between the antecedent and the ellipsis site, to which we turn in the following section.

2.1 Effects of Parallelism in VP-ellipsis

It is well known that all kinds of constituent ellipsis show parallelism effects. Consider the famous chicken-argument by Sag (1976) (which goes back to John Ross and George Lakoff), illustrated in (9). Let us first observe that the sentence in (9a) is ambiguous between the reading *the chicken are ready to start eating* and the reading *the chicken are ready to be* eaten. The point of the argument is that if the first conjunct is interpreted as *the chicken are ready to be eaten* so must the second conjunct, giving rise to the awkward interpretation *the children are ready to be eaten*.

(9) a. *The chicken are ready to eat*
b. *and the children are Δ, too*

Similar observations hold for quantifier scope, as discussed in detail in Fox (2000). First note that a sentence like *some girl hit everyone* is ambiguous between a wide scope reading of the existential quantifier (meaning there is some girl for which it holds that she hit everyone) and a narrow scope reading of it (meaning for everyone there is some girl or other that hit him). Fox points out that if the existential quantifier in (10a) is interpreted with narrow scope in the first conjunct, it is interpreted with narrow scope also in the second conjunct. The same holds true for the wide scope interpretation of the existential quantifier. Fox also notes that the existential subject in the first

conjunct in (10b) can only be interpreted with narrow scope. He surmises that this is so since QR of the quantifier *everyone* in the second conjunct is forbidden to apply since it does not give rise to a different interpretation with the subject being a referential DP and thus by parallelism of interpretation, the subject may not be interpreted with narrow scope in the first conjunct either.

(10) a. *Some girl hit everyone and some boy did Δ, too*
b. *Someone hit everyone and then Bill did Δ*

We can conclude from these data that the identity condition does indeed operate at LF and that it requires strict syntactic identity of the elided VP and its antecedent. Note furthermore that anaphoric relations in standard cases of VP-ellipsis give rise to the so-called sloppy (11a) and strict reading (11b).

(11) *John scratched his arm and Bill did Δ, too*
a. also Bill scratched his own arm (sloppy reading)
b. also Bill scratched John's arm (strict reading)

The above discussed requirements on identity and parallelism in cases of VP-ellipis are the reason why it is standardly assumed that the first conjunct in (11) is ambiguous such that the availability of the strict and sloppy reading are derivable as a parallelism effect. One of the best developed theories on semantic parallelism in VP-ellipsis and the one that is most widely accepted in the field is the account by Rooth (1992) to which we turn now.

2.2 Syntactic and Semantic Parallelism

Rooth (1992) imposes two conditions on the parallelism effects in cases of VP-ellipsis. The conjuncts must be parallel in syntactic form and in semantic interpretation, where syntactic parallelism is given, if the elided VP is a copy of the antecedent VP and semantic parallelism is given, if the target sentence (the second conjunct) contrasts with the antecedent sentence. The notion of *contrast* is crucial in the account of Rooth, who surmises that the subject in cases of VP-ellipsis is focused, giving rise to focus alternatives. In this account the target sentence S2 contrasts with the antecedent sentence S1, if the proposition expressed by the antecedent clause entails some proposition in the set of alternatives to S2, as is illustrated in (12).

(12) *John said that he is brilliant before* $[Bill]_F$ *did* Δ

In (12), the strict reading *Bill said that John is brilliant* has as its focus alternative the proposition that *John said that John is brilliant* which is implied by the first conjunct just in case no binding relation between the matrix subject and the embedded pronoun is assumed, while the sloppy reading *Bill said that Bill is brilliant* has as its focus alternative the proposition *John said that he /himself is brilliant* just in case the first conjunct involves a binding relation that is replicated via focus binding in the second conjunct.

This is exactly what seems to be needed to explain the parallelism effects in VP-ellipsis. Note, however, that Rooth's account inherits the problems of the standard account that we will discuss in detail in Section 3. Furthermore, even though Rooth's account is on the right track as far as the definition of semantic parallelism is concerned, it makes assumptions about the information structure of cases of VP-ellipsis which are not entirely correct and will need to be revised, as we will see in Section 4. In the following section, I will discuss in detail how the two readings in (11) above are taken to be derived in the standard approach and point out the most important problems connected with this account.

3 Anaphoric Relations and VP-ellipsis

The standard explanation for the ambiguity of (13) in the account that distinguishes between coreference and binding is that the first conjunct is amenable to two semantically equivalent syntactic analyses, as is illustrated in (14ab). Under the condition (16), these representations give rise to the following representation of the second conjunct, with (15a) representing the sloppy and (15b) the strict reading. In (15b), his carries the index $_1$ refering to *John* which by rule (16) must be distinct from the one referring to *Peter*.

(13) *John visited his mother and Peter did Δ, too*
a. Peter visited Peter's mother b. Peter visited John's mother
(14) a. John λ_1 did t_1 visit his_1 mother (binding) b. John did visit his mother (his = John)
(15) a. Peter λ_1 did [t_1 visit his_1 mother] b. $Peter_2$ did [visit his_1 mother]

(16) No LF-representation must contain both bound occurrences and free occurrences of the same index (Heim & Kratzer 1998:254)

This is all very well. One might in fact argue that the presence of sloppy and strict readings in cases of VP-ellipsis provides empirical support for the distinction between binding and coreference. Note, however, that at a closer glance strict readings as derived in Reinhart's (1983) approach are incompatible with the above observed effects of parallelism.

3.1 Coreference and VP-ellipsis

Heim (1998) shows that Reinhart's (1983) Coreference Rule, ruling out the strict reading of (17) specified in (17c), is not compatible with standard accounts of VP-ellipsis. The reason is that the possessive pronoun in the first conjunct cannot (accidentally) corefer with the subject (17b), since there is a licit binding alternative using an anaphor that yields the very same interpretation (*John loves his own mother*). Thus the problem is that the second conjunct is ambiguous, while the first conjunct is necessarily unambiguous, violating the constraint on parallelism. Note furthermore that an anaphor in the first conjunct can never give rise to a strict reading in the second conjunct in the standard account.

(17) a. *John loves his mother and Peter does Δ, too*
b. * his = John (coreference in the first conjunct is ruled out)
c. Peter loves John's mother too

One way out here would be to assume that coreference in the first conjunct is not ruled out by its binding alternative in Reinhart's pragmatic approach, since coreference gives rise to a different interpretation in the second conjunct that is not obtainable from its binding alternative. However, Heim (1998) argues that the coreference rule must operate locally on the smallest clause containing the pronoun, otherwise the impossible strict reading in (18) could not be ruled out.

(18) *John saw him and Bill did Δ, too* (* Bill did see John)

She also points out that strict readings are not restricted to referential pronouns, but also occur with bound pronouns, as is illustrated in (19). Here the second clause in (19) admits the reading given in (19b), a clear case of strict pronoun interpretation, since the possessive pronoun does not covary with the local subject *the teacher* but with the higher subject *every student*.

(19) a. *No student said he liked his paper, but every student thought the teacher would*
b. Every student x thought that the teacher would like x's paper

Furthermore, Heim points out that cases of illicit co-binding, as in (20), are not captured by Reinhart's theory. In (20), it is not possible to interpret the two pronouns as being simultaneously bound by the c-commanding quantifier in the higher clause, without the embedded subject binding the object pronoun, as is indicated by super- and subscripted numbers, for binder and (co-)bindees respectively.

(20) * *Every man*^{1} *said that he*$_{1}$ *called him*$_{1}$ (co-binding)

In the following subsection, we will discuss how these problems can be remedied in the standard approach.

3.2 Alternative accounts within the standard approach

In this section, I will briefly outline two accounts, the one by Heim (1998) and the one by Reinhart (2006), that address the above problem maintaining the distinction between binding and coreference. Furthermore, I will point out additional problems of the standard account which will lead us to abandon the latter.

The solution to these problems proposed in Heim (1998) involves a novel notion of *codetermination* that covers both binding and coreference as well as cases of co-binding, as is illustrated in (21). Furthermore, Heim invokes also an extended version of Principle B of the binding theory as given in (22). The core of her account is the exceptional rule of codetermination (ERC) in (23). In this proposal coreference becomes a matter of syntax with the essential result that coreferent but not co-bound coarguments are allowed in violation of condition B, if the relevant LF is semantically different from its binding alternative.

(21) Codetermination
Let C be a context, let LF be a logical form and let A and B be two DPs in LF, we say that A and B are codetermined in LF/C iff:
A binds B in LF, or
A and B corefer in C, or
there is a third DP which is codetermined with A and B in LF/C

(22) Heim's Condition B
Pronouns cannot be codetermined with their coarguments

(23) ERC
Let LF be a logical form in which a pronoun is codetermined but not bound by one of its coarguments. Then LF is (marginally) allowed, in violation of condition B, if it is semantically distinguishable from its binding alternative in the given context

Getting rid of the Reinhart's Rule of Coreference, strict and sloppy readings in cases of VP-ellipsis can be dealt with again in terms of base line accounts of the latter, since the ERC requiring distinct interpretations only comes into play if there is a violation of Principle B, as is the case in (4ac) but not in (17). My assessment of this proposal is that the solution works but comes at a high price, since it must be assumed that Principle B can be violated in specific cases and more importantly since the solution requires a complex system of coindexing involving different types of indices for binders and bindees.

The problem with the strict reading in cases of VP-ellipsis and Heim's account of it are specifically addressed in Reinhart (2006) who introduces the Interface rule, a revised version of her Coreference Rule, which states that coreference is only excluded if it would allow for a reading that is excluded by the respective binding alternative. As Roelofsen (2008) points out this solution solves the problem with strict readings in standard cases of VP-ellipsis, as in (17) above, but runs

into problems when confronted with Dahl's puzzle that I will discuss in detail below. A solution to Dahl's puzzle along the lines of Reinhart's interface rule is proposed by Roelofsen in (2009).

I will not discuss these accounts in any detail here, since they rely on two mechanisms, namely a) the complex indexing system of Heim (1998) and b) the comparison with binding alternatives that our alternative account can do without, as I will argue below. Heim's observations about co-binding and the possibly non-referential character of pronouns obtaining a strict interpretation in cases of VP-ellipsis, however, are important for our account, as I will argue below that illicit cases of coreference reduce to illicit cases of co-binding.

Returning to the illicit case of co-binding in (20) above, Fox (2000) proposes an elegant solution to this problem with the economy condition in (24).

(24) Rule H
A pronoun P can be bound to an antecedent A only if there is no closer antecedent B such that it is possible to bind P to B and get the same semantic interpretation

Note that Rule H is preferable to Heim's codetermination rule, since it avoids that condition B can be violated sometimes and since it also accounts for Dahl's puzzle. Dahl (1973) noted that cases of VP-ellipsis involving two pronouns in the elided VP allow for only three of the four logically possible interpretations derived by combining sloppy and strict readings, as is illustrated in (25).

(25) *Max said that he called his mother and Bob did too*.
a. $[\text{Bob}]_F$ too said that Max called Max's mother (strict-strict)
b. $[\text{Bob}]_F$ too said that Bob called Bob's mother (sloppy-sloppy)
c. $[\text{Bob}]_F$ too said that Bob called Max's mother (sloppy-strict)
d. *$[\text{Bob}]_F$ too said that Max called Bob's mother (strict-sloppy)

Within the complex indexing system outlined above, we have to consider the following possible logical forms of the first conjunct. For instance, (26b) is ruled out because it is equivalent to (26a) which involves a more local binding relation. Also (26f) that underlies the ungrammatical strict-sloppy pattern is ruled out since it is equivalent to, but less economical than (26d), if it is assumed that a binding relation is more economical than a relation of coreference.

(26) a. $[\text{Max}]^1$ t_1 said $[\text{he}_1]^2$ t_2 called his_2 mother (25b)
b. $[\text{Max}]^1$ $t_1$1 said $[\text{he}_1]^2$ t_2 called his_1 mother (25b)
c. Max said that he called his mother (he = his = Max) (25a)
d. Max said $[\text{he}]^2$ t_2 called his_2 mother (he = Max) (25b)
e. $[\text{Max}]^1$ t_1 said $[\text{he}_1]^2$ t_2 called his mother (his = Max) (25c)
f. $[\text{Max}]^1$ t_1 said he called his_1 mother (he = Max) (25d)

Note further that approaches based on indices predict that in a sequence of VP-ellipses, each ellipsis site is resolved sloppily, if the first one is. This is so since a sloppy pronoun requires binding and, given our assumptions about indices in (16), the bound index is no longer available for accidental coreference. However, Dahl (1974) presents an example in which the strict reading *Bill's wife is realizing that Bill is a fool* may follow the sloppy reading *Bill does not realize that Bill is a fool*, as is illustrated in (27).

(27) *John realizes that he is a fool, but Bill does not, even though his wife does.*

To conclude this section, we have seen above that the standard account that distinguishes referential pronouns from bound pronouns and uses a complex system of indices faces serious problems in cases of VP-ellipsis. In the following section, I will present an alternative account of coreferent pronouns in terms of variables bound by a context operator.

4 The alternative account

In the alternative account, the distinction between binding and coreference is given up and coreference is reduced to a binding relation to a context operator. Illicit cases of coreference can be reduced to illicit cases of co-binding in the syntax, by adopting an absolute version of Fox's Rule H, given in (28) and the Binding Principle B in (29). The crucial point of the principle in (28) is that the necessity of comparing interpretations evaporates.

(28) Absolute Ban on Co-binding
A DP A cannot be bound by DP C across an intervening DP B, if B itself is bound by C.

(29) Principle B
A pronoun P cannot be bound by one of its co-arguments

The working of the principle in (28) is illustrated again in (30) and (31). As noted above, (30a) is ungrammatical, because both binding of the (prepositional) object pronoun by the subject and coreference with it are out. Direct binding of the object pronoun by the subject is ruled out by the Binding Principle in (31), since subject and object are arguments of the same predicate (are co-arguments).

Let us see now, how coreference between the two can be excluded in the alternative account. For the pronoun to be coreferent with *John* the latter must be an established discourse referent in the context, indicated by <John> in (31). If the subject in (31) is to be read as being coreferent with this discourse antecedent, it needs to be co-bound by the lambda-operator introducing this referent, as is illustrated in (31a). However, co-binding in (31a) is ruled out by the principle in (28). The same problem, however does not arise in the grammatical (30b), as is illustrated in (31b). In this case, the subject is not (co-)bound by the discourse operator, hence the object pronoun can be bound by the discourse operator and coreference is possible giving rise to the reading that *John* was the only individual in the context that voted for John.

(30) a. *John voted for him.* *John = him b. *Only John voted for him.* ^{ok} John = him
(31) a. <John> λx. x voted for x b. <John> λx. No y (y ≠ John) y voted for x

The advantage of this account is that illicit cases of coreference via the independently necessary rule of co-binding can be reduced to standard cases of violations of the binding theory and possible cases of coreference can be accounted for without taking into consideration binding alternatives and the difficult issue of whether the latter give rise to alternative representations at LF that are semantically equivalent or not. Of course the approach will stand or fall depending on whether it can account for the presence of strict readings in cases of VP-ellipsis. This issue is discussed in more detail in the following subsection.

4.1 Strict readings without coreference

Note first that the rule in (28) above implies that the first conjunct in (32) is unambiguous, allowing only for the sloppy reading in a standard account like Rooth's account of VP-ellipsis.

(32) *John visited his mother and Peter did Δ, too*

To account for the presence of the strict reading, we may assume that VP-ellipsis involves the conjunction of two speech acts (rather than of two propositions). After processing of the first conjunct the context is updated, and *John* is added to the stack of given DRs. (33) shows the representation of the strict reading in the present account, which meets the two requirements on

parallelism of Rooth (1992): the proposition *John visited John's mother* is an element of the focus-value of (32) and the elided VP is a copy of the antecedent VP.

(33) < John> λ x. [$_F$ Peter] did [visit x's mother]

Is there any evidence for the assumption that in VP-ellipsis the conjunction of two assertions is involved? Krifka (1999) assumes that the conjuncts in VP-ellipsis constitute separate speech acts on the basis that pronouns in the second conjunct pick up referents in the first conjunct: "the second answer can have anaphoric elements that refer to the first answer, which shows that it should be interpreted after the context is updated with the first answer" (Krifka 1999), as is illustrated in (34).

(34) *What did the Permaneders eat?*
Péter ate pàsta and his wife at polènta

However, there are problems with a simple minded up-dating approach that will be discussed in detail in the following two sections.

4.2. Problems with the up-dating account

There are basically two types of problems with this account. One problem is technical and involves the treatment of pronouns in the grammar and that will be discussed in this section. The other problem points to the necessity of revising Rooth's proposal and will be taken up in section 6 below.

Note first that the strict reading cannot be derived in the present account if it is assumed that copying occurs at LF where the bound pronoun in the first conjunct is converted to a variable (bound by the subject). Note that under these assumptions the pronoun co-varies with the trace of the subject in VP and can never give rise to a strict reading, as is illustrated in (35).

(35) John λ x. x visited x's mother

This unwanted consequence can be remedied if it is assumed that what is copied into the ellipsis site is the pronoun with or without its φ-features. This proposal is based on two rather plausible assumptions, namely that a) syntactic anaphors lack φ-features, but discourse anaphors contain φ-features and b) that syntactic anaphors obtain φ-features in the Agree-relation with their antecent. Given these assumptions one may propose the following mapping condition between pronouns and variables.

Mapping condition between pronouns and variables:
A pronoun that shares formal φ-features with another DP A (in an Agree-relation) is mapped onto the same variable that A is mapped onto at LF

This mapping condition would then make the following prediction: discourse anaphors can only be bound by non overt antecedents, assuming, as we already did above, that a discourse antecedent enters the computation only with semantic features. This makes for a potentially interesting prediction. However, there is independent evidence that what is copied into the ellipsis site is always the pronoun **with** its φ-features. Consider the following case of constituent ellipsis in German. (36) only allows for the strict reading *also Mary loves his mother.* The sloppy reading *also Mary loves her mother* is out. The intuition here is that the sloppy reading is out since the φ-features of subject and possessive pronoun in the object do not match. However, if syntactic anaphors are copied into the ellipsis site without their φ-features, the sloppy reading cannot be excluded on anybody's account.

(36) *Hans liebt seine Mutter und Maria auch*

a. John λ x. x loves x's mother and Maria λx. x loves x's mother
b. * Maria^{i} loves his^{i} mother
c. <John> λy. Maria λx. x loves y's mother (strict reading)

The sloppy reading is excluded if it is assumed that re-binding by *Maria* requires an Agree-relation in which the φ-features of antecedent and pronoun are matched. Thus, I will make the following proposal: a) the φ-features of the pronoun are always copied into the ellipsis site and b) the φ-features of the pronoun can be deleted under identity with those of its antecedent, giving rise to a bound pronoun, or remain visible for the rest of the computation, building the basis for a coreferent pronoun when the latter enters into an Agree-relation with a discourse operator.

4.3 Updating and speech acts

Having resolved this (important) technical issue, let us now turn to the main problem with the above assumed updating account. Consider the following case of VP-ellipsis in (37) which clearly allows for a strict reading of the possessive pronoun.

(37) *John visited his mother before Peter did*

Given the nature of the type of embedded clause containing the ellipsis site - it is a central adverbial clause in the terminology of Haegeman (2002) - it cannot be argued that the before-clause in (34) constitutes a separate speech act, implying that updating must be independent of the utterance of speech acts. As an alternative, I will propose that DRs are updated after the processing of each clause, be it a main clause constituting a speech act or an embedded clause constituting only a proposition. Evidence for this assumption comes from the observation that even discourse antecedents in central embedded clauses give rise to de-accenting, as is illustrated in (38). Assuming that de-accentuation is a phonological correlate of d-linking, that is, of discourse anaphors, (38a) can be analysed as given in (38b).

(38) a. *If John does not come in time, Mary will hit_m (him)*
b. If John does not come in time, <John> Mary will hit_m

To summarize the last two sections, we have argued that pronouns in cases of VP-ellipsis are not ambiguous between a bound and a referential construal. Due to the principle in (28) only a bound variable interpretation is admitted in the first conjunct. The strict reading in the present account is due to an update of DRs that occurs after every clause which provides the relevant antecedent for the discourse operator binding the pronoun in the second conjunct. The difference between bound pronouns and referential pronouns in the standard theory is replicated in the present account by assuming that the φ-features are deleted with bound pronouns but remain visible and interpretable in the interface with referential pronouns. What remains to be shown is why re-binding of the pronoun by the context operator does not violate the parallelism constraint. To this issue we turn in the following section.

5 Returning to Dahl's puzzle

To remind us of the case at hand, only three of the four possible readings are available if the ellipsis site contains two positions for pronominal variables, as is illustrated again in (39).

(39) *Max said that he called his mother and Bob did too.*
a. $[\text{Bob}]_F$ too said that Max called Max's mother (strict-strict)
b. $[\text{Bob}]_F$ too said that Bob called Bob's mother (sloppy-sloppy)
c. $[\text{Bob}]_F$ too said that Bob called Max's mother (sloppy-strict)

d. *[Bob]$_F$ too said that Max called Bob's mother (strict-sloppy)

Dahl's puzzle is explained in the present system by syntactic parallelism of binding relations: focus binding in the ellipsis site needs to be parallel to the binding relations in the antecedent clause. In (39), there are two binding relations in the antecedent clause: one between the matrix subject and the embedded subject and one between the embedded subject and the pronoun.

Note that the proposition (Max said Max called Max's mother) is an element of the focus value of (39b), since the embedded subject and the possessive pronoun covary with the matrix subject in the ellipsis site via parallel binding relations in the antecedent site. The two mixed readings differ in that there is a parallel binding relation in the antecedent site between matrix and embedded subject for (39c), but there is no such parallel relation between the matrix subject and the possessive pronoun in the antecedent site for (39d).

This account raises the question of why parallelism of binding relations is required for obtaining sloppy readings but not for obtaining strict readings. To answer this question let us go back to Heim's observation that strict readings are also possible with bound pronouns, given again in (40a), where the second conjunct can be interpreted as specified in (40b). As is evident in (40), the relevant binding relation between the matrix subject and the embedded possessive pronoun in the second conjunct is not paralleled by a corresponding binding relation in the first conjunct.

(40) a. *No student said he liked his paper, but every student thought the teacher would*
b. Every student x thought that the teacher would like x's paper

Given these observations, I would like to put forward the following generalisation given in (41) to account for the grammaticality of (40b) and the ungrammaticality of (39d). In (40b), the binder *every student* (including its trace in the vP) is outside of the ellipsis-site. In (39d), however, both the trace of the matrix antecedent *Bob* and the possessive pronoun to receive a sloppy reading are contained in the ellipsis-site, while the antecedents of pronouns to receive a strict reading are always necessarily outside of the ellipsis-site in the present account. Thus Dahl's puzzle in (39) is reduced to the independently given availability of the strict reading in (40). I consider this to be strong evidence in favour of the present account.

(41) Only binding relations properly contained in the ellipsis site need to be paralleled by corresponding binding relations in the antecedent clause.

Let us finally tackle the second challenge to the standard account posed by Dahl. The relevant example is given again in (42).

(42) *John realizes that he is a fool, but Bill does not, even though his wife does*

The problem with the strict reading in the third conjunct in (42) is the differential representation of coreference and binding, pronoun versus variable, in the standard account. Furthermore, the use of a complex indexing system with the restriction on index assignment in (16) above makes it impossible to derive the strict reading *his wife does realize that Bill is a fool*, as we have seen above. In the present account which operates without indices, the problem does not arise: the pronoun *he* in *x realizes that he is a fool* is copied with its φ-features into the ellipsis-site and the pronoun may receive a strict reading by entering into an Agree relation with F_{given} in terms of its interpretable φ-features and is in this way subject to re-binding by an operator outside of the ellipsis site voiding any requirement of a strict parallelism effect in binding relations with the antecedent, as is illustrated in (43). In (43), the Agree relation between the functional head and the pronoun is indicated via co-indexing only for ease of exposition.

(43) <Bill> F_i even though his wife does x realize that he_i is a fool

To summarize this section, I have shown that Dahl's puzzle can be accounted for in a much simpler fashion without considering binding alternatives. Furthermore, I have argued that the switch between strict and sloppy readings is allowed - as long as semantic parallelism is respected - by the independently needed mechanism of copying a pronoun **with** its **Φ** features into the ellipsis site and by the important empirical generalisation that only binding relations properly contained in the ellipsis site must be matched by parallel binding relations in the antecedent site. As became evident in the examples discussed, including those comprising Dahl's puzzle, binding relations in the antecedent site do not need to be matched with parallel binding relations in the ellipsis site.

The latter observation makes a lot of sense since the ellipsis site, due to being phonologically null, is highly ambiguous. It thus seems to be a cogent strategy to interpret only the ellipsis site as parallel to the antecedent site (but not vice versa). Different and also contrastive interpretations, as we will see in the next section, are possible in the second conjunct if these interpretations are indicated by lexical material that necessarily is added outside of the ellipsis site. In the following section, we will thus have a closer look at the parallelism constraint in VP-ellipsis. We will see that in standard cases of VP-ellipsis the information structural value of the ellipsis-site differs from that of the antecedent cite. In this case parallelism or semantic identity is observed at the propositional level. We will also discuss special cases in which parallelism or semantic identity is observed at the speech act level. The latter cases will lead us ultimately to revise Rooth's classical analysis replacing focus binding with binding by a contrastive topic.

6 Contrast and Contrastive Topics in VP-ellipsis

In the final section, I will address the question of whether Rooth's analysis of the information structure of standard cases of VP-ellipsis is correct. Remember that in Rooth's account, a case of VP-ellipsis like (44a) is analysed as given in (44b), in which the subject in the second conjunct is necessarily focused, raising the question of what type of focus is at stake in cases of VP-ellipsis.

(44) a. *John visited his mother and Peter did too*
b. John visited his mother and $[\text{Peter}]_F$ did Δ, too

The intuition behind standard cases of VP-ellipsis like (44) is that what *Peter* does is contrasted with what *John* does in some sense, as is also assumed by Rooth, implying the presence of a contrastive focus. Note, however, that the analysis of cases of VP-ellipsis as containing two contrastive foci in (45) is out, since these sentences can be uttered out of the blue, as is illustrated in (46). In the context of (46), the whole first conjunct has to be assumed to be focused. Note furthermore, as is also evident in (46) that while the antecedent site is typically part of the focus domain, the ellipsis site is necessarily given, to meet the requirement of deletion under identity.

(45) $[\textit{John}]_F$ *visited his mother and* $[\textit{Peter}]_F$ *did Δ, too*
(46) *What's going on here?*
$[\textit{First, John insulted his mother}]_F$ *and then* $[\textit{Peter}]_F$ *did Δ*

Moreover, the question arises what is contrasted in cases of VP-ellipsis, if there is no parallelism in terms of contrastive foci. In the following section, I will thus motivate and outline an alternative account that draws heavily from Krifka's (1999) account (cf. also Winkler & Konietzko 2010).

6.1 The role of contrastive focus and contrastive topic in VP-ellipsis

Krifka (1999) argues that stressed additive particles like *too, also* and *auch* behave differently from their unstressed versions associated with focus and argues that they associate with a contrastive topic (CT) where he defines a CT as a constituent that refers to an entity about which information is required at the current point of the discourse, but there are other entities for which information of a similar type is required. He furthermore assumes that a stress that identifies a focus within the topic indicates the presence of such alternatives (Krifka 1999).

The analysis of CTs is a much debated issue. I follow Molnàr (1998:135) that a CT can only occur in obligatory combination with an additional focus in the sentence. Furthermore, a CT seems to involve a selective focus within the topic constituent and another selective focus within the comment, while contrastive focus is (mostly) corrective. See Molnàr 2006, Frascarelli & Hinterhölzl 2007 and Bianchi, Bocci & Cruschina (2013) for further discussion of this issue.

It is also standardly assumed that a CT presupposes a Question under Discussion (QUD) (cf. Roberts 1996, Büring 1997) for which each sentence connected to the topic provides a partial congruent answer, as is illustrated in (47). I use two types of accent to indicate that *Peter* and *Per* constitute CTs and *pasta* and *polenta* constitute contrastive foci in the context of (47). *C* in (47) indicates the comment part of the utterance.

(47) *What did Peter and Per eat?*
a. *Péter ate pàsta (and)* [$_{CT}$ *Peter*] [$_{C}$ *he ate pasta*]
b. *Pér ate polènta*

Furthermore, I will adopt the distinctiveness condition on constrastive answers (Krifka's 1999 (47)), as given in (48). Note that (48) rules out the non-distinctive answer to (49a) in (49b) requiring an answer like (49c).

(48) If [T_F ...C_F] is a contrastive answer to a question Q, then there is no alternative T' to T such that the speaker is willing to assert [T' C]

(49) a. *What did Peter and Per eat?*
b. ** Péter ate pàsta, and Pér ate pàsta*
c. *Peter and Per ate pàsta*
d. *Péter ate pàsta and Pér ate pasta, too*
e. *Péter ate pàsta and Pér did Δ, too*

Based on (48), Krifka (1999) defines the role of the additive particle in the following way: it cancels the implicature of distinctiveness and constitutes the real focus in the second conjunct. Note futhermore that (49d), where the VP is de-accentuated may be considered the basis of VP-ellipsis in (49e). Following this argumentation, I propose that the focus of the second conjunct in (49d) is the additive particle, indicating an affirmation or denial of the respective proposition. The analysis of the second conjunct of (49d) is given in (50). Note that the focus on the particle presupposes that someone else ate pasta, suggesting the alternative requirement on parallelism in (51).

(50) [*Pér*]$_{CT}$ *ate pasta*, [*too*]$_{F}$

(51) Alternative Requirement on Parallelism (ARP):
The first conjunct must entail the presupposition of the second conjunct

Based on the ARP in (51), we can assume that a standard case of VP-ellipsis as in (52a) has the information structural representation given in (52b).

(52) a. *John visited his mother and Peter did too*
b. [*John*]$_{CT}$ [*visited his mother*]$_{F}$ *and* [*Peter*]$_{CT}$ *did* Δ [*too*]$_{F}$

What is important in (52b) is that the two conjuncts have different information structures. The part that is deleted in the second conjuncts constitutes given (or presupposed) information but is asserted as new information in the first conjunct, suggesting that parallelism is computed on the propositional level in cases like (52a). Some evidence for this analysis comes from an re-interpretation of the phenomenon of vehicle change addressed in the following section.

6.2 Vehicle Change and Parallel Interpretation

Fiengo & May (1994) argue that the identity condition on VP-ellipsis cannot be strictly syntactic, since VP-ellipsis displays a phenomenon of switching from a name or pronoun to another pronominal representation (called vehicle change), as is illustrated in (53).

(53) a. *Mary voted for Ben and he did ~~vote for *Ben/ himself~~, too*
b. *Mary thinks that Ben will win and he does ~~think that *Ben/ he will win~~, too*
c. *Ben voted for himself and Mary did ~~vote for him~~, too*

To avoid violations of Principle C in (53ab), it is assumed that a name can be replaced with an anaphor or a pronoun in these cases. Likewise in (53c) to obtain the strict reading an anaphor (a bound pronoun) must be taken to be changeable into a pronominal representation, in standard terminology into a referential pronoun. The big question behind vehicle change is the one why these changes are available and licit in cases of VP-ellipsis but unavailable in other cases.

I would like to argue based on my judgments on parallel cases of stripping in German (for stripping in German cf. Konietzko (2016)) that vehicle change crucially involves contrastive focus on the element to be changed, as is illustrated in (54). (54ab) are completely parallel in judgment to (53ab). (54c) with the anaphor *sich* in German only allows for the sloppy reading. A strict reading, however, is marginally possible to my ear, if a pronoun is reinforced with the focus particle *selbst*.

(54) a. *Maria hat für* [*Hans*]$_{CF}$ *gestimmt und er (selber) auch*
b. *Maria glaubt dass* [*Hans*]$_{CF}$ *gewinnt und er (selber) auch*
c. *?? Hans hat für* [*ihn*]$_{CF}$ *selbst gestimmt und Maria auch*

According to our assumptions what is copied into the ellipsis cite is the verb plus the name or the pronoun (with its φ-features) leading to violations of the BT or to wrong interpretations. Note, however, that if it is assumed that the contrastive focus information is copied into the ellipsis site as well, both the subject and the object are bound by a separate operator in (55). Given that variables bound by two different operators can covary, as is illustrated in (56a) (if co-variation is to be excluded (56b) must be used in English), no violation of the binding theory is expected in (55).

(55) [he]$_{CT}$ voted for [Ben]$_{CF}$ [too]$_{F}$

(56) a. *everyone loves everyone*
b. *everyone loves everyone else*

This analysis raises the question of how parallelism is computed in cases like (53) and (54). In a Rooth-style analysis, one would have to assume that every proposition that is an element of the focus value of the first conjunct entails a proposition that is an element of the focus value of the second conjunct and vice versa, leading to wrong results.

Alternatively, I would like to make the following suggestion: the identity condition is also stateable at the level of the assertion comprising information structural distinctions and not just at the level of the proposition as seems to be the default in standard cases of VP-ellipsis. The presupposition of (55) is that someone else voted for Ben rather than for another person. This is

implied by the first conjunct *Mary voted for Ben rather than for someone else* guaranteeing a parallel interpretation in our account. The informal LF of (53a) in this analysis is given in (57).

(57) for Mary the speaker asserts that it was Ben (and not some else) that she voted for and for Ben, the speaker asserts that it was Ben as well (and not some else) that he voted for

If this account of the data in (53) and (54) is on the right track, it forms an important argument against Rooth's analysis. Recall that most cases of VP-ellipsis involve identity on the propositional level such that the two conjuncts can have an independent and possibly different IS, as is illustrated again in (58). While *ate pasta*, as is also indicated by the obligatory accent on the object, is part of the focus domain in the first conjunct, *ate pasta* is necessarily given, de-accented and thus deletable in the second conjunct.

(58) a. *Péter ate pàsta and Pér ate pasta, too*
b. *Péter ate pàsta and Pér did Δ, too*

Furthermore, note that the accent on *Per* in (58a) cannot correspond to a CF since the latter would require identity of assertion, contrary to fact. A CT on the other hand - contrary to a contrastive focus - can be assumed to scope outside of the assertion, as is illustrated in (59), and can either allow for identity at the propositional level or at the speech act level.

(59) [CT [$_{\text{Assertion}}$ ...CF...]]

There is evidence for this distinction between CTs and CFs in VP-ellipsis and for the structure assumed in (59) coming from German data discussed in Konietzko & Winkler (2014). They show that in cases of bare argument deletion a CT precedes sentence adverbs and negation, while a CF follows these elements, as is illustrated in (60) and (61). The context of (60) requires the presence of CTs which must be realized in a high position in the clause, while the context in (61) does not trigger the obligatory presence of a CT topic and is compatible with a CF, as is indicated in (61). In this context, however, also a CT topic is admissible suggesting that the relevant QUD can always be accomodated as well.

(60) *Will both of the siblings go to France?*
a. *Maria wird wohl fahren, aber* [*Hans*]$_{\text{CT}}$ *vermutlich nicht*
b. **Maria wird wohl fahren, aber vermutlich (Hans) nicht (Hans)*
Maria will PART go, but presumably not Hans

(61) *Will Maria go to France?*
a. *Maria wird wohl nicht fahren, aber vermutlich* [*Hans*]$_{\text{CF}}$
b. *Maria wird wohl nicht fahren, aber* [*Hans*]$_{\text{CT}}$ *vermutlich schon*
Maria will PART not go, but presumably Hans

To summarize this section, the role of contrastive focus in the account of Rooth (1992) has to be replaced with the role of contrastive topic to arrive at a comprehensive account of the information structure involved in VP-ellipsis. As far as anaphoric relations are concerned, focus binding has to be replaced with binding by a contrastive topic. Everything else remains the same, including the solution to Dahl's puzzle in the alternative account. The present analysis of coreference in terms of binding by a context operator thus provides further support for the role of CTs in VP-ellipsis, as argued for by Krifka (1999), and is in line with recent work by Winkler and Konietzko (2010) on bare argument ellipsis in German.

7 Conclusions

The paper set out to tackle the traditional distinction between binding and coreference, arguing that coreference is better replaced by a binding relation to a discourse operator. It is shown that the alternative approach can account in a much simplier way for the anaphoric relations found in cases of VP-ellipsis, including Dahl's puzzle. In particular, it explains the presence and absence of strict readings without appealing to a complex index system and without necessitating the comparison between binding alternatives. Instead it shows that sloppy and strict readings are possible since the antecedent site makes at the same time available a binding relation and a discourse antecedent. The latter is then available as antecedent for re-binding an appropriate pronoun without violating the parallelism constraint to obtain the strict reading, since it is shown that only binding relations properly contained in the ellipsis site need to be paralleled by appropriate binding relations in the antecedent site.

Finally, it argues that the crucial element that allows for focus binding in VP-ellipsis contexts is a CT and not a CF, as proposed by Rooth (1993). The most important point of the paper is however the conclusion that a simple account of coreference and of anaphoric relations in VP-ellipsis is achieved by the assumption that a syntactic head in the C-domain, a familiar topic in the framework of Frascarelli and Hinterhölzl (2007) enters into an Agree-relation with discourse given elements that are spelled out in their base position. The paper thus provides strong cross-linguistic evidence for the presence of topic positions in the C-domain even in languages like English that are not discourse configurational like Italian or German. Furthermore, the paper argues that contrastive topics play a crucial role in the licensing of anaphoric relations in cases of VP-ellipsis and argues that a syntactic account of coreference is superior to a pragmatic account in terms of a complex evaluation of binding alternatives at LF, as it is generally assumed in the standard approach.

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