

Economy conditions and coreference: From minimal pronouns to referential acts

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Abstract:

It is well known that possible coreference relations between noun phrases in a sentence are constrained by syntactic structure. Lasnik (1976) argued that coreference relations, thought to be a matter of pragmatics, are available or excluded according to the structural configuration and introduced the (grammatical) notion of obligatory non-coreference. In the 1980s, the binding theory was devised in which the binding principles A, B and C acted as filters, ruling out impossible interpretations of noun phrases in a grammatical system which assumes free, optional indexing. This particular implementation of restrictions on coreference relations led to a system in which noun phrases were either co-indexed to account for the grammatically determined coreference between variables and (syntactic) anaphors and their antecedents or contra-indexed to account for the grammatically determined non-coreference between nouns and pronouns.

Various researchers have pointed out that this implementation is too general and simplistic since it rules out systematic cases of possible coreference and proposed alternative solutions (cf. Evans 1980, Higginbotham 1980, Fiengo & May 1995). A particularly elegant solution has been proposed by Tanja Reinhart (cf. Reinhart 1983, Reinhart and Grodzinsky 1993). Reinhart argues that only one type of coreference relation is syntactically represented and constrained by syntactic principles, namely the relation of variable binding. Semantic relations between two referring nominal expressions are not represented in the syntax and thus are not subject to structural constraints. They are regulated by an extra-grammatical principle and thus cannot be ruled out by structural conditions. Reinhart's coreference rule states that coreference is excluded whenever the same meaning can be conveyed by means of variable binding.

While Reinhart's approach is empirically superior to the standard binding theory, it leads to an unwelcome division of regulating coreference relations between nominal expressions: some are accounted for in the syntax and some are regulated in the semantic component. In this paper, I argue that also coreference relations between referring nominal expressions are represented and constrained in the syntax. In particular, I will argue that coreference relations are constrained by syntactic economy conditions that are also operative in other grammatical relations (cf. Fox 1993).

1 Introduction

One case of coreference relations that will be of interest in this paper is the so-called Adenauer-sentences, illustrated in (1). What is special with the example in (1) is that two occurrences of the same name in a binding configuration can be taken to refer to the same individual, namely Adenauer. As is illustrated in (2), this state of affairs is generally excluded and gave rise to the Binding Principle C in (6) below. As is common practice, I will indicate coreferent interpretations of nominal expressions with co-indexation and non-coreferent interpretations with contra-indexation.

- (1) At the meeting many members voted for Adenauer.
Even Adenauer voted for Adenauer
- (2) John₁ likes John_{*1/2}'s brother¹

In the classical treatment of the binding theory, the class of pronouns that constitute the core elements in language for establishing coreference relations is divided into two groups. Anaphors comprise reflexive and reciprocal pronouns which need to have a local c-commanding antecedent, as is illustrated in (3), while pronominals contain non-reflexive and non-reciprocal personal pronouns, which are relatively free to choose their antecedent unless the antecedent c-commands the pronominal within a certain local domain, as is illustrated in (4). Bound pronouns are similar to anaphors in that they require a c-commanding antecedent, but outside of their local domain, as is illustrated in (5).

- (3) a. John₁ likes himself₁.
b. *John₁ said that she likes himself₁
- (4) a. *John₁ likes him₁ / John₁ likes him₂
b. John₁ said that she likes him₁
- (5) a. Every boy₁ likes himself₁
b. Every boy₁ said that she likes him₁

The Binding Principles A, B and C, given in (6), have been designed to regulate the relevant configurations with obligatory coreference for anaphors and bound pronouns (= variables) and the configurations with obligatory non-coreference for nouns in all domains and for pronouns within their local domain (cf. Lasnik 1976).

- (6) Binding Principles (Chomsky 1981)
A binds B iff A and B are co-indexed and A c-commands B
Principle A: Anaphors must be locally bound.
Principle B: Pronominals must be locally unbound.
Principle C: All other NPs (including names) must be unbound.

It is immaterial for the purposes of this paper to characterize what the relevant local domain for anaphors and pronouns is. It is important, however, to point out

¹ In this paper, as is common practice, I will use indices to indicate a coreferent interpretation between two nominals for expository reasons only. The account that I am developing is free of indices, since I am proposing that bound pronouns and coreferent pronouns alike are bound by a λ -operator.

that this system of co- and contra-indexation leads to wrong results in various domains that are discussed in detail in Section 2. In section 3, I present the account of Fiengo and May (1995) and Heim's (1998) elaboration of the classical account by Reinhart (1983) and discuss their merits and shortcomings. In Section 4, I present my alternative account, in which coreference relations are represented in the syntax in terms of a binding relation to an abstract head in the C-domain representing given discourse referents. In this account, the approach to binding in Kratzer (2009) is extended to discourse anaphors. Section 5 discusses how coreference relations in VP-ellipsis sentences and in embedded contexts can be dealt with in the alternative account. Section 6, finally summarizes the paper.

2 Problems with the Extensional Interpretation of Indices

There are at least three contexts where the system of co- and contra-indexed nominal expressions causes problems. First, already Evans (1980) pointed out that the extensional interpretation of indices imposed by the binding theory renders true identity statements ungrammatical, while negated identity statements would be necessarily true, that is trivial, contrary to fact, as is illustrated in (7).

- (7) Who is Oscar?
- a. He₁ is Oscar₁ (ungrammatical, if true)
 - b. He₁ is not Oscar₂. (uninformative)

Second, there are cases of non-intended coreference. These are cases in which the speaker is not sure (8) or unaware (9) about the identity of the persons referred to. In the context of (8), a person watches a man leaving the room without seeing his face and asks who that man was and receives the following answer which indicates that the person referred to was in all likelihood Oscar (given that people usually wear their own coats), but this interpretation would be excluded by the obligatory contra-indexation with the subject pronoun *he* required by the name *Oscar*.

- (8) I do not know, but he wore Oscar's coat

The following example constitutes a core case of unintended coreference. In the context of a mask ball, one person is overhearing a conversation in which another person claims that Oscar is crazy and pointing at that person utters the sentence in (9). If at the end, it turns out that the person pointed at was indeed *Oscar*, we again have a case in which a true sentence would have to count as ungrammatical according to the binding principles.

(9) He thinks Oscar is crazy.

Third, the following cases have been called contexts without referential dependency in Higginbotham (1980). The examples in (10) and (11) are due to Evans (1980). (12) is another instance of an Adenauer-sentence.

(10) a. Everyone has finally realized that Oscar is incompetent.
b. Even he has finally realized that Oscar is incompetent.

(11) I know what John and Mary have in common. She thinks John is terrific and he thinks John is terrific too.

(12) In this election only a few members voted for Adenauer.
In fact only Adenauer had voted for Adenauer

Higginbotham (1980) accounts for these cases by suggesting that the names *Oscar*, *John* and *Adenauer* are not referentially dependent on the c-commanding pronoun within the same clause, but refer back to the occurrence of this name in the preceding clause. Thus pronoun and name within the same clause end up with the same index, instantiating a typical case of accidental coreference. While this intuition is probably on the right track, it is far from clear under which circumstances two referential expressions, one c-commanding the other, can be linked to a common antecedent in the discourse. For instance, as is pointed out by Grodzinsky and Reinhart (1993), these linking relations are not generally available, as is illustrated in (13).

(13) * Oscar₁ is sad. He₁ thinks Oscar₁ is incompetent

Given these and many other cases discussed in the literature (see also Heim 1988, 1998), we can savely conclude that this system of contra-indexation imposed by the Binding Principles B and C is too powerful and incorrectly rules out many cases of possible intended and unintended coreference. The difficult issue is only to work out under which circumstances coreference is possible between two referential expressions in a clause, as in (12) and under which circumstances it is excluded, as predicted by the Binding theory, as in (13).

3 Possible Solutions

In this section, I will discuss two solutions that both build on Reinhart's original proposal in (1983). The first one is the account of Fiengo and May (1995) and

may be called – a pragmatically oriented account and the second one is Heim’s (1998) reinterpretation of Reinhart’s approach.

3.1 The pragmatic account of Fiengo and May

Fiengo and May (1995), like Reinhart (1983), assume that only the interpretation of co-indexed expressions is grammatically determined and are interpreted as obligatorily coreferent. Unlike Reinhart (1983), they do not dispense with contra-indexing, but assume that the interpretation of contra-indexed expressions is a matter of pragmatics. They argue that dependent on the context, contra-indexed expressions can be interpreted as non-coreferent or as coreferent. In particular, they propose that contra-indexed expressions only conversationally implicate non-coreference. However, since conversational implicatures are subject to cancellation, also the implicature of non-coreference can be cancelled in specific contexts.

In their account, referring expressions are either co-indexed or contra-indexed as demanded by the Binding Principles. For instance, contra-indexation of the two referring expressions in (14) correctly indicates that the speaker intends non-coreference in the context of the mask ball above. The sentence simply conveys the meaning that according to the knowledge state of the speaker, the person over there thinks that Oscar is crazy. If it later turns out that the person pointed at was indeed Oscar, this would not create any problems since the speaker’s implicature, arising from incomplete knowledge, is subject to cancellation.

(14) He₁ thinks Oscar₂ is crazy.

In the following, I will scrutinize their account by discussing how they treat the three cases of exceptions introduced in the previous section. As far as identity statements are concerned Fiengo and May (1995) argue that the standard implicature of non-coreference, imported by contra-indexation demanded by the grammar in (15), is cancelled, since the predicate of identity logically implies that both arguments are coreferent. This is a good result, even though it is not clear to me why a speaker should implicate non-coreference in an identity statement in the first place.

(15) He₁ is Oscar₂

As far as contexts without intended coreference are concerned, Fiengo and May (1995) point out that in the case of the person leaving the room unrecognized by the speaker, the standard implicature of the contra-indexation in (16), namely that the person in question cannot be Oscar would lead to a violation of the

maxim of relevance and is thus cancelled. The explanation of the second case (in the context of a mask ball) is already given in (14) above.

(16) He₁ wore Oskars₂ coat.

As far as the contexts without a referential dependency are concerned, Fiengo and May (1995) discuss the case first provided by Evans (1980) in (17) and argue that also in (17) the standard implicature of contra-coindexation is cancelled since the if-clause entails that no one can be excluded from the admirers of Oscar.

(17) If everyone admires Oscar₂, then also he₁ admires Oskar₂

To summarize, this seems like an elegant and adequate solution to the problem at hand. Fiengo & May (1995) point out that their system is superior to the original account by Reinhart (1983), since it does not require that the hearer has access to any particular sentence that the speaker did not use. In Reinhart's view, a hearer will take a speaker to not intend coreference in his utterance, because the speaker did not use some other particular sentence that expresses the coreference that the speaker might have intended with a bound pronoun. I will come back to this point in section 4.2 below. In the following section, I would like to discuss some cases that cast doubt on the general validity of the approach of Fiengo and May (1995).

3.2 Problems with the account of Fiengo and May

While their treatment of identity statements and of the so-called cases without intended coreference is rather convincing, a closer look at other cases without referential dependency reveals that their account is insufficient for at least this domain. Note that the cancellation of the implicature of non-coreference in (17) above in their account crucially depends on the type of quantifier. If we change the quantifier, as in (18) and (19) below, it becomes unclear what could lead to the cancellation of the standard implicature and yet coreference is possible in these cases. Certainly there is no entailment provided by the first clause which would exclude the implicature of non-coreference in the continuations in (18) and (19). Furthermore, the standard implicature can also not be taken to fall prey to the maxim of relevance, since both continuations may be taken to provide relevant information in the case of a non-coreferent interpretation of the two nominal expressions.

(18) Most people like John. Even / also John₁ likes John₂.

(19) Who the hell likes John? Well, at least John₁ likes John₂.

In section 4, I will argue that what is crucial about Adenauer-sentences and the examples in (18) and (19) is that the object is interpreted as discourse anaphor (following the intuition of Higginbotham 1980) and that the subject is not referential. In the following section, I discuss Heim's reinterpretation of Reinhart's approach.

3.3 A semantic account of coreference

I will not do full justice to Heim's reinterpretation of Reinhart's original approach, since, as Heim puts it herself, her reformulation is not a correction or overhaul of Reinhart's account, but only makes somewhat more explicit what is already there in the original proposal. Rather I would like to concentrate on two issues that Heim raises and which are important for the account to be developed in Section 4.

In her paper, Heim (1998) goes over the standard cases of excluded coreference and over the three contexts discussed in the previous section to show how they either follow directly or can be made to follow from Reinhart's (1983) coreference rule given in (20)². The interested reader is referred to Heim's paper for the details.

(20) Coreference Rule:

α cannot corefer with β , if an indistinguishable interpretation can be generated by replacing β with a variable A-bound by α

The first issue that I would like to discuss concerns the status of indistinguishable interpretation in the rule in (20). Obviously the interpretations of two utterances count as indistinguishable if they express the same proposition. Heim shows that coreference is possible even in cases in which two different utterances express the same proposition, as is illustrated in (21). The original utterance and the alternative utterance with a bound pronoun (she praises herself to the sky) express the same proposition in (21), namely that z praises z to the sky.

(21) Is this speaker Zelda?

How can you doubt it? She praises her to the sky

Heim notes that it is commonplace in the philosophical literature to distinguish the proposition expressed by an utterance from its cognitive value and argues that when an utterance contains referring terms, the proposition expressed

² In addition, she discusses (i), Lakoff's example which I will not treat in this paper.

(i) I dreamt that I was Brigitte Bardot and I kissed me

depends not only on their referents, but that its cognitive value depends also on the way these referents are presented. In the example in (21), the person *z* is presented in two different guises: as the speaker in the discourse situation and as person called *Zelda*. Each of the two pronouns in (21) connects to its referent via one of these two guises, giving rise to the proposition that the speaker in the discourse situation (possibly visible in the context) praises the person called *Zelda* to the sky. This proposition clearly has a distinct cognitive value from the proposition of the utterance in which one of the guises in object position is replaced by an anaphor.

Heim concludes from this that an utterance context does not only provide referents for referring pronouns, but rather supplies them with guises that in turn link them to referents. This raises the question when two guises (of the same referent) are admissible in a specific context. Heim (1988: 215-320) proposes the restriction that no context assigns distinct but pre-supposedly coreferential guises to any pair of NP-occurrences, yielding the effect that reference to the same object via two different guises is possible only as long it is still an open question in the discourse whether the same object is behind two different guises.

This implies that interlocutors negotiate the use of referential expressions in achieving their referential goals and that speakers tend to use pronouns rather than names and definite descriptions when referring back to already established discourse referents. I will come back to this point in section 4.3 below.

The second issue concerns the role of coreference relations in contexts of VP-ellipsis. It is well-known that standard cases of VP-ellipsis, as given in (22a) are ambiguous between a sloppy (22b) and a strict identity reading (22c). It is assumed that while the reading in (22b) is due to a parallel interpretation in which the pronoun *his* is bound by the subject in the first conjunct, the reading in (22c) is due to a parallel interpretation in which the pronoun *his* is interpreted as coreferential with the subject *John* in the first conjunct.

- (22) a. John loves his mother and Peter does too.
 b. Peter loves his own mother too.
 c. Peter loves John's mother too.

Heim argues that not only coreferential pronouns but also bound pronouns can give rise to strict readings. She discusses the example in (23) and focuses on the reading in which the correspondent of *the teacher* is the embedded subject and both *he* and *his* are anaphorically related to *every boy*. The relevant readings are specified in the paraphrases for the second conjunct in (23bc). While (23b) expresses a sloppy identity reading, (23c) expresses a reading that may be defined as a strict identity with the variable reading of the pronoun in the first conjunct.

- (23) a. Every boy said the he called his mother and the teacher too

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

How can the two readings in the second conjunct be derived? To account for these readings, Heim (1998) introduces the notion of co-binding and proposes a mechanism of double indexing that mimics or is equivalent to Higginbotham's (1983) system of anaphoric linking. Heim (1998) devises a rather complex system in which every nominal expression has an inner and an outer index, indicating whether it is a coreferent binder or a coreferent bindee. Since I will argue in the following section that this system cannot solve the problem for which it has been introduced, I will simply illustrate how the strict reading and the sloppy reading are thought to come about in Higginbotham's framework. In his account, the first conjunct in (23) is generated with two different linked structures, as indicated in (24).

- (24) a. every boy said that he called his mother (binding)

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b. every boy said that he called his mother (co-binding)

While the representation in (24a) is thought to give rise to the sloppy reading in the second conjunct, the strict reading in the second conjunct is based on the representation in (24b). Note that the interpretations of the two linked structures are logically equivalent. The problem with this account is that the representation in (24b) is ruled out by economy, as I will show in the following section.

3.4 Coreference and co-binding in VP-ellipsis

There is an interesting contrast between the interpretation of pronouns and the interpretation of quantifiers in cases of VP-ellipsis that to my knowledge has been left unaddressed so far.

Note that the two readings required for the first conjuncts in (22) and (23) are unavailable within Reinhart's account and Heim's reformulation of it. In particular, the coreferent interpretation of the pronoun in (22) in the first conjunct is excluded by the Rule of Coreference in (20), since it does not yield an interpretation that is distinguishable from the one derived by its bound pronoun interpretation. For sure the coreferent interpretation of the pronoun in the first conjunct is taken to give rise to a different interpretation, namely the strict reading, in the second conjunct, but that should not matter since the evaluation of two representations in terms of economy is strictly clause-based, as has been shown by Fox (1993).

Let us look at the example in (25), which is one of Fox's examples adjusted for our purposes. While (25a) is ambiguous with respect to the scope of the two quantifiers, (25b) is unambiguous and only expresses the meaning that a certain boy loves every teacher too. In particular, the interpretation, available in (25a), that for every teacher there is also a potentially different boy that admires him is excluded.

- (25) a. Some girl admires every teacher and some boy does too
 b. Mary admires every teacher and some boy does too

Fox (1993) argues convincingly that the unambiguity in (25b) follows from an interplay between a condition on parallelism in contexts of VP-ellipsis and an economy condition that rules out QR which does not have an effect on interpretation within the same clause. To put it in simple terms, (25b) is unambiguous, since QR of *every teacher* is ruled out in the first conjunct by economy (since it would not yield a different interpretation from the one achieved without QR) and since QR in the second conjunct is ruled out by the condition of parallel interpretation in both conjuncts. If we apply the same logic to (22), the strict identity reading of the second conjunct cannot be derived, since the coreferent interpretation in the first conjunct on which it is based is ruled out by economy.

The same problem arises for the derivation of the strict reading of the bound pronoun in (23) in Heim's account. Co-binding of the object pronoun and the subject pronoun by the higher quantifier (cf. 24b) is ruled out by economy, since it does not give rise to a distinct interpretation from the one achieved by direct binding between the embedded subject and the embedded object (cf. 24a). This leaves the behaviour of pronouns in contexts of VP-ellipsis unaccounted for. In the following section, I will develop a syntactic approach to coreference relations that does not run into the difficulties of the two accounts discussed above.

4 An economy-based integrated approach

In this section, I will argue that coreference is a matter of grammar after all. In particular, I will show that coreference relations are crucially constrained by economy conditions in the syntax. There are two main ingredients that make this account an integrated syntactic-pragmatic approach. First, I argue that the application of the Binding Principles A and B is restricted to apply only within a referential act. Second, I argue that the Binding Principle C is dispensed with and replaced by an economy principle that restricts the number of referential acts, where a referential act is defined as given in (26).

(26) Referential act:

A speaker S uses the referential force of a linguistic expression E in the utterance context c to indicate to the hearer H that S is referring to the individual x, with $[[E(c)]] = x$

In this account the class of nominal expressions is divided into those that have a referential force and those that lack referential force. It is in the spirit of Reinhart (1983) that the use of nominal expressions with referential force is preempted by the use of nominal expressions without referential force, if the latter gives rise to the same reference (based on binding by its syntactic antecedent) according to the shared knowledge state of speaker and hearer.

Let us see what this means by discussing how the three exceptional cases of coreference treated in the previous section are accounted for in this approach.

4.1 Three case studies in the integrated approach

Let us start with discussing the interpretation of referential expressions in identity statements. A particularly interesting solution to the problem of the informativeness of identity statements was given in Frege (1892), which gave rise to the notion of cognitive significance of referring expressions and which Heim (1998) adopted to provide a more accurate characterization of the notion of indistinguishable interpretation in a Reinhart's type of approach to coreference. Frege put forward the question of how it is possible that an identity statement like (27) is informative, given that the meaning of referring expressions is (reduced to) their denotation.

(27) Der Morgenstern ist der Abendstern.
The morning star is the evening star

Frege introduces the famous distinction between sense and meaning (*Sinn* und *Bedeutung*), where sense stands for the way in which a speaker connects with or presents a certain referent. Frege concludes that (27) is informative and does not present a tautology, since the same referent is presented in two different ways, or guises as Heim (1998) has put it. In other words the statement in (27) is informative, since the two presentations potentially may connect with two different referents and the speaker informs the hearer that these two presentations or guises, in fact, connect with the same individual. The way a speaker connects with a certain referent, I identify with a referential act.

Thus I would like to propose that an identity statement *presupposes* two independent referential acts, but asserts that these references (or guises) denote the same object. Since the statement in (27) contains two distinct referential acts the binding theory does not come into play. Normally, two distinct referential acts that connect with the same referent are excluded by economy (see below).

However, in the case of an identity statement, a more economic way of referring to the same individual (via a binding relation) is not possible, since by our assumptions two referential acts are required to secure the informativeness of an identity statement.

Things are slightly different in the case used by Heim (1998), discussed in the previous section and repeated here in (28). Heim argues that the two pronouns in (28B) hook up with two different guises. Hence we have two distinct referential acts in (28B): the subject pronoun *she* is used as an indexical and connects with its referent via the referential act of ostentation, while the object pronoun *her* is used as a discourse anaphor that connects with the name *Zelda*. Thus the object pronoun is part of the referential act of referring by a proper name (which has different properties from the act of referring by a definite description).

- (28) a) A: Is this speaker Zelda?
 B: Well, she praises her to the sky
 b) Well, she praises herself to the sky

In this case, however, two referential acts are not presupposed and thus the question of a more economic way of referring arises. Note that speaker B may or may not be aware of the identity of the two women in (28). Thus, he may be taken to either imply or to assert the identity of the two persons in question. But for sure speaker A is unaware about the identity of the two women. Therefore speaker B would miss his referential and communicative goals if he conveyed his belief or knowledge with the utterance in (28b). Using (28b), he could not imply to A or inform A that he believes that the two women are the same person. This suggests the relevance of the following economy condition on the use of distinct referential acts, given in (29).

(29) **Economy of Reference (substitute of Principle C):**

Use the minimal referential acts to achieve your referential and communicative goals

How does this approach work in contexts without intended coreference? The two cases are repeated in (30ab). Both utterances exhibit two distinct referential acts.³ The higher pronouns are used indexically (indicated by “!”) and constitute the referential act of ostentation, while the lower referential nominal expressions constitute referential acts by naming.

- (30) a. He! wore Oscar’s hat

³ Note that this already follows from their different semantic/pragmatic type. While one is based on the gesture of ostentation, the other is based on a (specialized form of) description.

- b. He! thinks Oscar is crazy

Also in these cases two distinct referential acts are necessary to convey the referential goals of the speaker *s*, since the speaker wants to refer to a person present in the utterance context and convey that person's propositional attitude about a second person called Oscar, about whose identity there is not sufficient common knowledge between the speaker and the addressee.

Finally, let us have a look how this account fares in the so-called contexts without referential dependency. (31) provides another example of an Adenauer-sentence. Also here we could assume that there are two distinct referential acts present and try to argue that economy is not violated by this, since the alternative utterance in (31b) could not convey the referential and communicative intentions of the speaker. Moreover, we could argue in a Reinhart-style fashion that the alternative utterance in (31b) is not truth-conditionally equivalent to the utterance in (31a). But this would miss the point for two reasons.

- (31) Almost noone voted for Adenauer.
 a) Only Adenauer voted for Adenauer.
 b) Only Adenauer voted for himself

First, such an account would neglect the fact that Adenauer-sentences are not possible in out of the blue contexts. The particular sentence in (31a) with two coreferent occurrences of the name *Adenauer* is possible, since at least the second occurrence is used discourse-anaphorically. This is the insight in Higginbotham's linking account and is also stressed by Heim (1998).⁴

Second, such an account must revert to a costly Reinhart-style evaluation and comparison of two propositions to explain why coreference is possible in (31a), given that (31a) and (31b) express different propositions, but is not available in (32), since (32a) and (32b) express the same proposition.

- (32) a. *Oscar₁ is sad. He₁ thinks Oscar₁ is incompetent
 b. Oscar₁ is sad. He₁ thinks he₁ is incompetent

In the following section, I will provide a solution that takes into account the discourse anaphoric nature of the second occurrence of coreferent expressions in cases like (31) and explains the difference between cases like (31) and cases like (32) in a simple and structural way.

⁴ In her conclusions, she makes the following remark on an observation credited to Hans Kamp: "If we have not been talking about Lucifer before, an utterance like *Only he pities him/Lucifer* is quite bad under a coreferential reading. So the condition identified by Reinhart ... is not by itself sufficient, and a common antecedent seems to be required on top of it. This needs further exploration."

4.2 The grammatical nature of discourse-anaphoric elements

So far we have encountered two different types of interpretations of referential expressions. Nominals and also pronouns, the latter when used indexically, have referential force and represent independent referential acts (RAs). Pronouns can also be interpreted as variables and (syntactic) anaphors. In this case, I will assume they lack referential force and hence do not represent an independent RA. They simply take their reference from the syntactically specified antecedent. Below I will argue that this property follows from their lacking of semantic and formal features (cf. Kratzer 2009).

Now, I would like to make the following proposal: A) Discourse anaphors (DA) do not represent a referential act by themselves either. Like bound pronouns and anaphors, they lack referential force and assume the reference of an antecedent. B) The antecedent relation is abstract and involves a syntactic relation to a functional head in the C-domain that represents an ordered set of pre-established, given discourse antecedents. Note that these assumptions are contrary to assumptions made within the standard theory. The notion of accidental coreference implies the presence of two referential expressions with independent referential force which happen to refer to the same individual. Consequently rules of non-coreference in syntax (cf. Lasnik 1976) and semantics (cf. Reinhart 1983) were established to filter out illicit cases of coreference.

The syntactic background of this proposal is the observation that discourse-anaphoric expressions, pronouns and DPs alike, are deaccented and move to the top of the middle field in German, as is illustrated in (33). In the mini-text in (33), the DP *seine Freundin* is interpreted as coreferent with *Sabine*, if the former is de-accented and scrambled across the sentential adverb *sofort*, as in (33b), while if the DP is stressed in situ, it is interpreted as introducing a new discourse referent and hence as non-coreferent with the potential discourse antecedent *Sabine*.⁵

⁵ Christer Platzack (pc.) informs me that the parallel effect is not present in Swedish. According to him, the DP *his girlfriend* in (iib) must be interpreted as a discourse anaphor and cannot be taken to introduce a new discourse referent. I have nothing to say about this interesting difference between Swedish and German. For the purposes of this paper, however, it is only relevant that Swedish, like German, allows for the discourse-anaphoric reading of the DP *his girlfriend*.

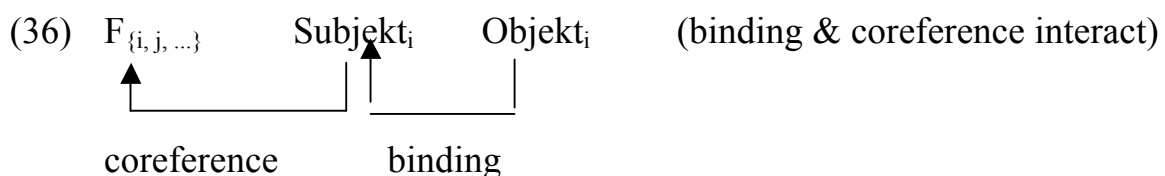
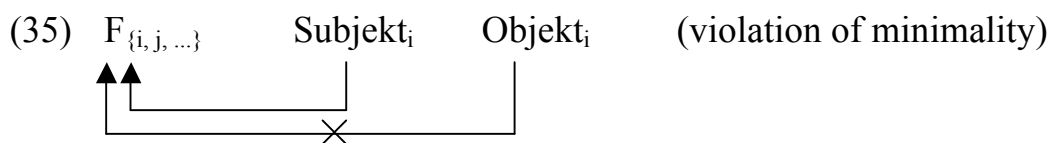
- (ii) a. Rune träffade Sabine igår
Rune met Sabine yesterday
b. Han omfamnade genast sin vännima

- (33) a. Hans hat gestern Sabine getroffen.
Hans has yesterday Sabine met
b. Er hat *seine Freundin* sofort umarmt. (seine Freundin = Sabine)
He has his girlfriend immediately embraced
c. Er hat sofort *seine Freundin* umarmt. (seine Freundin \neq Sabine)
He has immediately his girlfriend embraced

We may assume that with using the specific grammatical form of de-accenting and scrambling the speaker instructs the hearer not to establish a new discourse referent but to identify the referent with the most salient suitable antecedent in the discourse. I will come back to this point in section 4.3 below.

What is the advantage of assuming such a syntactic discourse anaphoric relation? As is illustrated in (34), the relation of a DA to its antecedent can be made subject to the syntactic condition of minimality (cf. Rizzi 1991). Thus the impossibility of a coreferent interpretation between the pronouns *he* and *him* in (34a) can be given a simple syntactic explanation. As is illustrated in (35), an intervening referential expression blocks the discourse anaphoric relation between F_{given} and the object pronoun *him*, since the subject represents a closer potential referential antecedent. As is illustrated in (36), binding of the object by the subject represents a more economical option (cf. Chomsky 1995 for MLC, Fox 2000). The same explanation holds for the case in (32) above, repeated in (34c).

- (34) a. Oscar_i is is my best friend. *He_i considers him_i very intelligent.
b. Oscar_i is my best friend. Oscar_i's father considers him_i very intelligent
c. Oscar_i is sad. *He_i thinks Oscar_i is incompetent

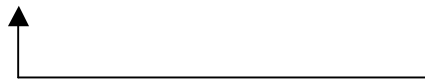


In (34b) on the other hand, there is no c-command relation between *Oscar* and *him*. Thus, *Oscar* does not intervene between the discourse anaphoric head and the pronoun and two discourse-anaphoric relations can be established with the head F_{given}

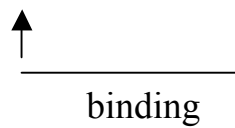
In my opinion it is crucial that in the example (31) above, the intervening expression *only Adenauer* has a focus-affected quantified interpretation and does

not constitute a referential expression. Thus, it cannot block the establishment of a discourse anaphoric relation between the object DP *Adenauer* and the functional head F_{given} , as is illustrated in (37).⁶ In this case, there are two economically equivalent alternatives: a discourse-anaphoric reading as in (32/37) and a binding relation as in (38), which however gives rise to a different, truth-functionally non-equivalent interpretation.

(37) $F_{\{i\}}$ only Adenauer voted for Adenauer_i (no violation of minimality)



(38) $F_{\{i\}}$ [only Adenauer_i]_k for himself_k (binding-configuration)



In conclusion, the discourse anaphoric reading in (32) is excluded due to economy. A more economic representation of the same meaning arises if the discourse anaphoric relation is replaced with a binding relation. The same situation does not arise in (31/37) though, since the non-referential subject cannot block the establishment of a discourse-anaphoric relation between the object and the head F_{given} in the C-domain.⁷

In particular, I propose that the context with respect to which an utterance is evaluated does not only contain the speech participants, speech location, speech time and the so-called common ground, assumed to be the set of propositions shared by speaker and hearer, but also an ordered set of discourse referents shared by speaker and hearer (cf. Reinhart 1991). This set of discourse referents is ordered according to the salience of each discourse referent (DR) and like the common ground is potentially updated after each utterance.

The notion salience is used a lot in linguistic literature and is thus multiply ambiguous.⁸ The notion that is relevant for our purposes here, is the entity-based notion as it is used in dynamic semantics (Kamp 1981, Heim 1982, Groenendijk and Stokhof 1991), where the relative salience of a DR for an anaphor in a given utterance *U* is determined by the input context of *U*.

⁶ Note that we have the same configuration as in (34b). The referential expression *Adenauer* that may be taken to be discourse anaphoric is embedded in the non-referential expression *no one but Adenauer*.

⁷ Christer Platzack points out that in Swedish the relevant reading in (31/37) is also possible without a quantifier. This is also true for German. The reading is available as long as the subject is either focussed or quantificational.

⁸ The notion salience may refer to things that stand out from the ground, that can be easily recognized, or are in the focus of attention or foremost to a person's state of mind (cf. Heusinger 1997 for a history of the term and its uses).

These assumptions about the context are fairly standard. What is special in this proposal is that the ordered set of DRs is represented in the syntax, by a functional head in the C-domain. The advantage of this move is that the regulation of coreference relations anew becomes the subject of simple structural conditions in the syntax and does not require anymore transderivational considerations as in Reinhart's type of approach as to whether there exists an alternative representation that expresses an indistinguishable meaning (and we have seen the difficulties that this poses) by variable binding. Coreference is possible whenever there is a salient discourse-antecedent and the discourse-anaphoric relation (to the functional head F_{given}) is not blocked by a more economic binding relation in the syntax, that is to say, at LF.

The proposal thus follows recent work on the interaction between syntax and pragmatics. Sigurðsson (2011) proposes that deictic first and second person pronouns are licensed by respective functional heads in the C-domain. Frascarelli (2007) argues that null referential subjects in Italian are licensed by entering into an agree relation with a functional head that encodes aboutness topics in the sense of Reinhart (1981) (for the distinction between aboutness topics and given (familiar) topics see Frascarelli & Hinterhölzl 2007). In section 5.1 below, I will discuss in more detail the properties of the functional head F_{given} that is proposed above.

4.3 A typology of referential expressions

The empirical claim of the previous section was that quantificational, including focus-affected subjects will allow a discourse-anaphoric interpretation of the object, but if the subject is itself a referential expression, this reading is blocked by a more economic binding relation between subject and object. This claim needs to be evaluated in a broader empirical perspective. The data discussed in the literature so far suggest that this is the correct generalization.

In this section, I would like to return to the notion of referential force of a nominal expression. The above account rests on the assumption that DA lack referential force and thus need to establish a relation with an antecedent that provides them with a referential value.

Bound pronouns and (syntactic) anaphors are semantic variables. I argue that they are interpreted in a binding configuration and lack both semantic and formal features (cf. Heim 2005, Kratzer 2009). Heim (2005) discusses the interpretation of deictic pronouns bound by an operator, as in (39). If the reference set, quantified over, contains next to the speaker, John, Mary and Peter, (39a) is ambiguous between the readings specified in (39b) and (39c).

- (39) a. Only I did my homework
 b. John, Mary and Peter did not do my homework
 c. John, Mary and Peter do not do their (own) homework

In (39b), the pronoun *my* is interpreted indexically, rigidly referring to the speaker in the utterance context, but in (39c), it co-varies with the local antecedent. For this to be possible, it is necessary that its formal features are ignored/not interpreted in logical form. Kratzer (2009) proposes that bound pronouns are minimal pronouns in the sense that they lack formal features altogether and argues that bound pronouns acquire their formal features in a binding configuration. Given the assumption that bound pronouns lack referential and formal features, it follows straightforwardly that they should lack referential force. As minimal pronouns they are only interpretable in a binding configuration.

What about DAs? Can we make the case in a convincing manner that they lack referential force as well? For sure, they do not establish a discourse referent. It is already given in the context. Arguably they do have formal features that are used to discriminate between possible discourse antecedents. Thus, I would like to make the following proposal. DAs come with the presupposition that the antecedent is an element of the ordered set of given DRs and use their formal features < number, gender > to identify the correct DR. Note, however, that these features are interpreted as presuppositions as well rather than as being asserted.

To provide a concrete example, *he* used as a DA does not “assert” that there be a unique male individual in the context as the nominal expression *the/a man* does. In other words, I would like to argue for the following parallelism. A proposition that is asserted by a speaker (if agreed upon) is added to the common ground of shared propositions, a referential expression that is asserted by the speaker is added to the ordered set of shared discourse referents. A proposition that is marked as presupposed by the speaker has to be retrieved from or activated in the common ground, a referential expression that is marked as presupposed leads to the retrieval of the appropriate antecedent from the set of given discourse referents.⁹

This implies that also deictic pronouns of first and second person lack referential force (cf. Sigurðsson 2011). The identity of the speaker cannot be established within the content of an utterance. It is already fixed and hence given by the mere execution of an utterance. The same considerations apply for the identity of the hearer. Matters are different for indexicals of the third person. The identity of a third person present in the utterance context is not fixed by the

⁹ Despite this similarity between the assertion of a proposition and the assertion of a discourse referent, I will continue to use the term referential force to denote the illocutionary effect that (the use of) a referential expression may have. The reason is that we will see in the following section that the descriptive content of a discourse-anaphoric DP is interpreted as being asserted. To distinguish between definite descriptions that have and that lack referential force, I will speak of the illocutionary and the discourse-anaphoric use of a referential expression below.

mere act of utterance itself. Several persons may be visible and referred to in a specific utterance context. As we have seen above, the indexical use of a third person pronoun is accompanied by a pointing gesture, indicating the illocutionary nature of this use. Such a gesture is not necessary in the indexical use of first and second person pronouns, indicating that they differ from indexicals of the third person.

Third, there are referential expressions that do have referential force as defined above. Names, indefinite and definite descriptions (when not used discourse-anaphorically) have referential force in the sense that their formal and lexical features are interpreted to establish a new DR. The lexical content of the nominal thereby serves as mental address (cf. the file card metaphor in Heim 1982), that is, as the cognitive label with which a certain DR is identified, stored and retrieved. To clarify the difference between the illocutionary and the discourse-anaphoric use of a definite description, let us reconsider the example in (33) above. With the illocutionary use of the nominal expression *seine Freundin*, the speaker informs/instructs the hearer that the story contains a third individual that stands in the relation girl-friend to the protagonist *Hans*, while with its discourse anaphoric use, the speaker informs/instructs the hearer about an additional property of the already familiar individual *Sabine*.

To summarize, I have provided a typological classification of referential expressions in terms of their richness in formal and semantic (illocutionary) features. (i) Bound pronouns are minimal pronouns in the sense of Kratzer (2009), since they lack both formal and semantic (illocutionary) features. (ii) Discourse anaphoric pronouns are less minimal in the sense that they possess formal features but lack illocutionary features and (in)definite descriptions and names have both formal and illocutionary features.

It stands to reason that this difference in feature structures corresponds to a difference in syntactic structure. It has been proposed by Cardinaletti & Starke (1999) that deficiency in features corresponds to structural deficiency. So one could surmise that minimal pronouns have a D-layer and no (or only a deficient) ϕ -layer. DAs have a D-layer and a ϕ -layer (cf. the IP-layer in the clause), but lack a C-layer (or only have a deficient one), while fully referential nominal expressions also have a (non-deficient) C-layer expressing independent referential force. I will not pursue this point any further here.

Note that it already follows from this typology that bound pronouns represent the most economical way for expressing coreference, since they constitute the minimal effort and means of achieving reference to an individual already denoted by the antecedent. Along the same lines, the use of a DA constitutes a more economic way of referring back to a certain individual than re-establishing the reference with a nominal expression with its own referential force. In essence, the principle of economy of reference in (29) (Section 4.1) above can be taken to follow from this typology of referential expressions. The

use of all three types of nominal expressions can be taken to be regulated by the following overarching principle.

- (40) Economy condition on the use of nominal expressions:
Use the minimal referential means to achieve your referential and communicative goals

5 Some consequences of the integrated approach

In this section, I would like to discuss some implications that this approach has for the proper analysis of discourse-anaphoric definite descriptions, for the analysis of referential dependencies in cases of VP-ellipsis as well as for the analysis of referential expressions in embedded contexts.

5.1 Coreference and VP-ellipsis revisited

Let us come back to the question why a discourse anaphoric reading is possible in cases of VP-ellipsis like (41). In section 3.4 above, we have concluded that neither syntactic economy conditions nor Reinhart's coreference rule allow that the first conjunct is ambiguous in the manner sketched in (42) below. Reinhart's (1983) proposal is that the first conjunct is ambiguous, since the subject *Max* can be interpreted as a name (42a) or as a generalized quantifier (42b).

(41) Max loves his mother and Oscar does too

- (42) a. Max_i loves his_i mother (coreference)
b. (Max) $\lambda x. x$ loves x 's mother (binding)

In the present account, the only source of potential ambiguity in (41) is the pronoun *his*. It can be a minimal pronoun (lacking ϕ -features) or it can be a discourse-anaphoric pronoun endowed with ϕ -features. Independently of this, the discourse-anaphoric reading is excluded in the first conjunct due to economy, as we have concluded in section 3.4 above.

However, a discourse-anaphoric reading is possible in the second conjunct nevertheless. To answer why this should be so, two cases have to be distinguished in the present approach. A) Let us assume that *Max* is already discourse-given before the utterance of (41). This means that it is an element of the ordered set of discourse referents. Let i be its index, as illustrated in (43b), then linking the pronoun *his* with this DR does not violate the minimality condition, since the intervening subject in the second conjunct refers to *Oscar*. B) If *Max* is not already discourse-given before the utterance of (41), then the

set of ordered discourse referents will be updated with *Max* after the utterance of the first conjunct, if we make the assumption that (41) constitutes a conjunction of two assertions rather than the assertion of two conjoined propositions. As before, the pronoun *his* can be linked to this newly added discourse referent without giving rise to a violation of minimality (cf. again 43b).¹⁰

- (43) a. $F_{\{i,j\}}$ Oscar_k does too **love his_k mother**
 b. $F_{\{i,j\}}$ Oscar_k does too **love his_i mother**

Note that this explanation of the availability of the discourse-anaphoric interpretation of the pronoun *his* in (41) can be applied in a parallel fashion to Heim's example of the strict interpretation of a bound pronoun in (23) in Section 3.2 above, repeated here in (44a). The reading that we are interested in is given in (44b), where the pronoun is interpreted as co-varying with the quantifier in the matrix clause. The structural configurations of (44b) and (43b) are identical. In (44b), the higher quantifier can directly bind the pronoun, since it does not bind the intervening subject (contrary to what is claimed in Fox 2000).

- (44) a. Every boy said that he called his mother and the teacher too
 b. Every boy said that the teacher called his mother too

This parallelism in the explanation of (43b) and (44b) provides further support for the assumption that discourse-anaphoric elements do have an antecedent in the syntactic representation.

The crucial question now becomes whether the representations in (43) and (44) can be taken to respect the principle of structural and interpretational parallelism. Without question, the syntactic structure of the second conjunct in either interpretation in (43) is parallel to that of the first conjunct. What about

¹⁰ An interesting test for theories of VP-ellipsis is posed by Swedish data, pointed out to me by Christer Platzack. Swedish distinguishes between a possessive anaphor (*sin*), to refer to the subject, as in (iiia), and a possessive pronoun (*hans*), to refer to a discourse referent other than the subject, as in (iiib).

- (iii) a. Max älskar sin mor och det gör Oscar också
 Max loves his mother and that does Oscar too
 b. Max älskar hans mor och det gör Oscar också
 Max loves his mother and that does Oscar too

Nevertheless, (iiia) is ambiguous between a strict and a sloppy reading of the ellided VP. This fact constitutes a real challenge to any account of discourse anaphors in cases of VP-ellipsis. In the present account, this can be explained by assuming that the anaphor *sin* is copied both with and without its ϕ -features into the ellipsis site. The present approach then has the advantage over other accounts that there is indeed a syntactic antecedent for the anaphor in the C-domain. I leave this issue for further research.

the interpretation? In the first conjunct, the pronoun is interpreted as coreferent with the subject *Max*. In the representation (43a), this pronoun is interpreted as coreferent with the new subject *Oscar*. In the representation (43b), this pronoun is interpreted as coreferent with *Max*. In the first case, the parallelism is more strictly structural, in the second case, it is more strictly interpretational, but both representations may be said to respect the principle of parallelism. Also in (44), the second conjunct is structurally and interpretationally parallel to the first conjunct. In both conjuncts, the pronoun is interpreted as a bound pronoun. In the first conjunct, it is bound by the local subject (which in turn is bound by the higher subject), while in the second conjunct, it is directly bound by the higher subject.

It is well-known that there are interpretive asymmetries in cases of ellipsis of pronominal dependencies, called Dahl's puzzle (cf. Dahl 1974, Fiengo & May 1995, Fox 2000 among others). Dahl's puzzle is illustrated in (45) and (46). Of the four potential readings, the strict-sloppy pattern in (46d), which requires binding of the pronoun in object position by the matrix subject, is excluded. Fox (2000) argues that the unavailability of the reading (46d) is due to a lack of parallelism in binding relations. Since non-local binding of the pronoun in object position by the matrix subject is excluded by economy in the first conjunct, this relation is not available in the second conjunct either, due to the requirement on parallel interpretation.

(45) Max_i said he_i saw his_i mother and Oscar did too.

- (46) a. Oscar said Max saw Max's mother [strict + strict]
 b. Oscar said Oscar saw Oscar's mother [sloppy + sloppy]
 c. Oscar said Oscar saw Max's mother [sloppy + strict]
 d. * Oscar said Max saw Oscar's mother [strict + sloppy]

Note, however, that this interpretation of the facts would also rule out the interpretation of the bound pronoun in (44b) and the discourse anaphoric interpretation, that is, the strict reading of the pronouns in (43b) and (46c).

What is the difference between (46c) and (46d)? Or put differently, why does (46c) obey parallelism but (46d) fails to do so? The explanation is parallel to the explanation we have given for (43b) and (44b) above. In the first conjunct, two local binding relations, one between the matrix subject and the embedded subject and one between the embedded subject and the pronoun in object position, render the three referential expressions coreferent. Obviously, these binding relations need not necessarily be preserved all in the second conjunct, as is evident from the interpretations in (46a) and (46c). In (46a) only the lower binding relation and in (46c) only the higher binding relation is paralleled. In (46c), the lower binding relation is dismissed, but the pronoun in object position preserves the interpretation obtained in the binding relation by this element in the

first conjunct, namely *Max*. In (46d), both the higher and the lower binding relation are dismissed, but in addition, the pronoun in object position does not preserve the interpretation of the parallel element obtained in the local binding relation in the first conjunct, since it refers to *Oscar*. This leads to the following empirical generalization about parallelism of pronominal dependencies in ellipsis contexts.

(47) Parallel interpretation of pronominal dependencies

In the second conjunct either the binding relation or the interpretation obtained by this binding relation in the first conjunct must be preserved.

Things are slightly different in the case of quantifier interpretation in VP-ellipsis contexts discussed by Fox (1993) and repeated in (48).

(48) Mary admires every teacher and some boy does too

Since QR of the object quantifier over the subject in the first conjunct is excluded by economy, QR of the object quantifier over the subject in the second conjunct results in a representation that is not structurally parallel to the first conjunct.¹¹ Hence the interpretation requiring QR of the object quantifier over the subject is ruled out in (48).

This implies that the discourse-anaphoric pronoun in (43b) does not undergo movement to the head F_{given} at LF, otherwise also (43b) should be ruled out for lack of structural parallelism. Consequently, the relation between F_{given} and the discourse-anaphoric pronoun in (43b) must be taken as a licensing relation that employs agreement but not movement.

Assuming that there is a relation between a functional head and a referentially dependent or deficient element, like a discourse-anaphoric expression, is in line with Kratzer (2009), who proposes “that verbal functional heads, rather than DPs, are the true syntactic antecedents for bound pronouns” (p. 12). Thus, I propose to extend Kratzer’s analysis of bound pronouns to DAs. In the case of a bound pronoun, the binder is a λ -operator, introduced by a verbal functional head, that has its argument specified in the syntax, the specifier of v in (49a) taken from Kratzer (2009). In the case of a DA, the most salient DR that matches the formal features of the DA, shared with the functional head, is inserted in the Specifier of F_{given} at the relevant point of the derivation (or at the end of the derivation in a strictly modular approach), as is illustrated in the representation of (43b) in (49b).

¹¹ Even the interpretation may be said to be non-parallel in this case: while the object quantifier is interpreted with narrow scope over the subject in the first conjunct, it is interpreted with wide scope over the subject in the second conjunct.

- (49) a. I blame myself [v_{VP} I [v λ_n [v_{VP} blame n]]]
 b. [c_{CP} <Discourse antecedent >[c λ_i [i_{IP} Oscar_k loves i's mother]]]
 c. [v_{VP} Every boy [v λ_i [v_{VP} said [c_{CP} that [i_{IP} teacher called i's mother]]]]]

This assumption makes the structures in (43b) and (44b) even more parallel. The quantifier phrase in (44b) is the argument of a λ -operator introduced by a functional head that binds the pronoun across the non-coreferential subject in Kratzer's (2009) proposal, as is illustrated in (49c). If we assume that the functional head F_{given} also introduces a λ -operator that licenses the discourse-anaphoric pronoun, then the only difference in (49b) is that the argument of the λ -operator must be retrieved in the (interface to the) pragmatic component. In this approach, the functional head must be taken to also express an instruction to access the ordered list of given DRs in the interface.¹²

5.2 On the proper analysis of discourse anaphoric definite descriptions

In this section, I want to discuss some observations and implications of the discourse-anaphoric use of definite descriptions. The interpretation of cases like (33b) above has not been discussed much in the literature (a notable exception is Umbach 2004). Note that the de-accented referential expression *seine Freundin* is not only prosodically weak due to its discourse-given status, which hints at an interaction between pragmatics and prosody, possibly mediated by the syntax, but represents a different grammatical object. As is illustrated in (50) (taken from Umbach 2004), a discourse-anaphoric definite description loses its referential force and its potential descriptive content is interpreted as an apposition rather than as a (referential) restriction.

- (50) a. Hans hat sich neulich ein kleines Häuschen am Land gekauft.
 Hans recently bought a little house in the countryside
 b. Nächstes Wochenende will er die alte Hütte abreißen
 c. Next weekend he will tear down the old shed
 d. Next weekend he will tear down the house which is an old wrack

Depending on whether main stress falls on the direct object or on the verb in (50b), the direct object *die alte Hütte* is either interpreted as a new discourse referent (cf. 50c) or as referring back to the house, as is indicated in (50d). With the object stressed, the speaker informs the hearer via a standard bridging relation that the small house in the countryside came with an old (garden) shed that the protagonist will tear down shortly. With the object unstressed, the

¹² In this approach, the meaning of this functional head must be represented as a predicate that relates individuals and contexts, where MSDR stands for most-salient-discourse-referent: $\lambda.x \lambda.c \text{MSDR}(x, c)$.

speaker informs the hearer that the acquired house in the countryside is in a deplorable state (constitutes a wrack) and must be torn down.

This means that the content of the NP of a discourse anaphoric DP is asserted and does not restrict the reference of the determiner. Very much like the content of an appositive relative clause is asserted, that is to say, provides additional information on a given DR rather than restricting the reference of its head noun, as a restrictive relative clause does.

In (50), the descriptive content of the discourse-anaphorically used DP takes on an expressive meaning (cf. Potts 2005). Potts (2005) proposes that expressive meanings are allocated at a separate level of semantic representation. But discourse anaphoric definite descriptions do not necessarily contribute only expressive meaning. This is shown in the example (33) above as well as by the following example. In (51a), a new female discourse referent is introduced. In (51b), the speaker provides relevant information about this referent synoptically with describing the circumstances of their meeting. This information about the new discourse referent is simply added to the common ground of shared propositions.

- (51) a. John met a woman in the park
 b. He bumped into the (good-looking) actress from London, while jogging

Taking up once again the file card metaphor, we may conclude that the descriptive content of an NP within a DP with referential force acts as restriction on the referent and constitutes the address of a newly added file card, while the descriptive content of an NP within a discourse anaphoric DP constitutes an entry on an already established file card under the address of the appropriate discourse antecedent.

Finally, let us have a look at the case in (52). While the definite description *der exzellente Physiker* can be used discourse-anaphorically to refer back to *Hans* in (52a), coreference between the discourse anaphoric expression and the matrix subject in (52b) is excluded. The relevant reading is made available in (52c), where the DP is interpreted as expressing a property of *Hans*, with coreference being achieved by the pronominal within the added PP *in ihm* that refers back to the matrix subject.

- (52) Gestern hat Hans Maria zum ersten Mal ausgeführt.
 Yesterday Hans took out Maria for the first time
 a. Sie soll sich in den exzellenten Physiker verliebt haben.
 She is reported to have fallen in love with the excellent physicist.
 b. ?? Er hofft, dass sie sich in den exzellenten Physiker verliebt hat.
 He hopes that she has fallen in love with the excellent physicist

- c. Er hofft, dass sie sich in den exzellenten Physiker in ihm verliebt hat
 He hopes that she has fallen in love with the excellent physicist in him

The improved status of the parallel utterance with a pronoun in (52c) seems to indicate that (52b) is ill-formed due to a violation of economy/the binding theory. Note first that cases like (52b) are a problem for a Reinhart-type of account. Since the discourse anaphoric interpretation of the DP gives rise to a different proposition than the parallel sentence using a bound pronoun instead of it, as specified in (53ab) for the sentence in (52a), Reinhart would predict (52b) to be okay.

- (53) a. She has fallen in love with Hans which (by the way) is an excellent physicist
 b. She has fallen in love with Hans.

In the present account, the ill-formedness of (52b) can be explained as a violation of economy. It seems natural to interpret the contribution of the descriptive content of the NP within the discourse anaphoric DP as the speaker's (additional) description in (52a). If the content of the NP in the discourse-anaphoric DP in (52b) is interpreted as the speaker's description, then the D-head of embedded object should enter into an antecedent relation with the functional head F_{given} in the C-domain of the matrix clause, crossing the matrix subject. This is clearly ruled out by minimality/economy that requires the establishment of a more economical binding relation between the matrix subject and the embedded object instead, as in (52c).

At this point, one may ask the question why the nominal description in (52b) cannot be interpreted as the description of the embedded "speaker" *Hans*? In this case, the discourse-anaphor could enter into a relation with the local C-domain, only crossing over the disjoint local subject *she* which would not lead to a violation of economy.

More data have to be checked to see whether this could be an option in grammar in principle. It would require that embedded C-domains also contain an ordered set of discourse referents, possibly copied from the matrix C-domain (also see section 5.3 below for further discussion). In this case, however, this is irrelevant, since the nominal description cannot be interpreted in the embedded clause for independent reasons. If indeed the descriptive content of the nominal within a discourse anaphoric definite description is interpreted as an assertion, it must be interpreted with respect to the actual speaker and cannot be interpreted within the scope of an attitudinal verb like *hope*, as is illustrated (54). Such a

reading is not possible and is excluded by the principle in (55), adapted from Green (2000).

(54) %Hans hopes that she has fallen in love with him and that he is an excellent physicist

(55) Embedded Force Exclusion:

If ϕ is either a part of speech or a sentence, and ϕ contains some indicator f of assertive force, then ϕ does not embed.

Since the descriptive content of the nominal embedded in a discourse anaphoric definite description is asserted and interpreted in the matrix clause, the discourse anaphoric interpretation of its determiner must be licensed by being anchored to the matrix C-domain leading to a violation of the minimality condition on coreference, while it is not clear how these facts could be explained in a Reinhart-type of approach.

Finally let us address the question why names and definite description can be used as discourse anaphors but resist binding. Note that this question becomes relevant since, names and definite descriptions used as discourse anaphors lose their referential force and since we have also dispensed with Principle C of the binding theory. In the present account, the answer must be that these categories resist binding, since their nominal head has inherent formal features which are shared with the determiner by agreement (cf. Longobardi 1994). Thus the D-head with names and definite descriptions is never featureless as we have assumed bound pronouns are. Thus we can assume the following corollary about bound pronouns in (56) (cf. also Kratzer's 2009 notion of minimal pronouns).

(56) Corollary about the relation between binder and bindee:

A bound pronoun must have all its features valued by its antecedent

To summarize, let us briefly discuss how invalid referential possibilities are excluded in a standard case of combining a name c-commanded by a pronoun, like in (57), in this approach.

(57) *He_k admires John_k

First, binding is impossible since the name has inherent features and thus cannot be fully valued by its antecedent. Second, a separate referential act by the name is excluded by the economy condition on coreference in (29) above. Third, a discourse anaphoric interpretation of the name is excluded by minimality. In conclusion, the difference between a bound pronoun and a discourse anaphor in the present approach boils down to a difference in the interpretation of its ϕ -

features: they are uninterpretable with bound pronouns, but interpretable with discourse anaphors. With bound pronouns they derive from an Agree-relation with a syntactic antecedent, with coreferent pronouns they are there from the outset, hence present in the numeration.

5.3 On the interpretation of referential expressions in embedded contexts

In this section, I would like to discuss the different interpretations that referential expressions in embedded contexts may have. Before that, I would like to briefly discuss the parallelism between DAs and pronouns that refer to the speaker or the hearer in the present account.

Indexicals of first and second person and discourse anaphors have in common that they lack referential force. In the present approach, indexicals of first and second person thus will also require a syntactic binder, that is, the presence of a functional head that licenses them. These functional heads must then trigger access to two separate indices of the context, namely the one for the speaker and the one for the hearer (rather than to the set of given DRs, as is the case with discourse-anaphoric expressions). This implies that the actual pronouns do not denote the speaker or the addressee themselves but only presuppose that there is a speaker and an addressee. In other words, they presuppose/require the presence of the respective functional head since it is these functional heads that express the relevant interpretations (cf. Sigurdsson 2011). Thus, I propose that these functional heads denote a predicate relating individuals and contexts: $\lambda x \lambda c$ speaker (x,c) and $\lambda x \lambda c$ addressee (x,c).

Let us now look at the interpretation of referential expressions in attitude reports. Sentences that report what someone desires, hopes or dreams about can do so in different modes. The best known distinction between different modes of reporting is the one between *de re* and *de dicto*. On the *de dicto* reading of (58), Gianni has an attitude towards whoever happens to win the specific beauty contest. On the *de re* reading of (58), Gianni has an attitude towards a specific individual (the *res*), say, *Maria*, who we know has just won the relevant beauty contest. On the *de dicto* reading the definite description clearly constitutes an embedded RA. On the *de re* reading, the descriptive content of the definite DP in (58), is interpreted in the matrix clause as constituting the speaker's description of *Maria*, parallel to the discourse anaphoric use of the definite description in (52b) above. Can we thus assume that an embedded DP interpreted *de re* constitutes a DA? The interpretation of the definite description in (59) shows that this is indeed correct. In (59), the speaker gives the hearer additional information about the DR *Maria*, while specifying Gianni's attitude towards *Maria*. Of course, the definite description in (59) also has a *de dicto* reading that is irrelevant for our purposes here.

- (58) Gianni wants to date the winner of the Miss Italy contest
 (59) Maria is a beautiful young woman. Thus, Gianni wants to date the winner of the Miss Italy contest

(58) and (59) only differ in the respect that while the discourse antecedent is established in the preceding clause in (59), the respective discourse antecedent must be accommodated in the input common ground, on the basis of which (58) is evaluated. In particular, we can assume that the descriptive content of the discourse anaphoric definite description in (58) serves to specify the *acquaintance relation* (cf. Lewis 1979) that the speaker holds with respect to the *res*. In the present account, specifying the so-called acquaintance relation is equivalent to specifying the respective discourse antecedent, that is to say, the relevant RA that a referential expressions in its *de re* reading connects to. In other words, the definite description in (58) is a DA that is linked to a functional head in the C-domain of the matrix clause.

It is often argued that DPs interpreted *de re* cannot be analysed as DAs, since also quantificational expressions allow for a *de re* reading (cf. Schlenker 2003). It is clear that the quantified expression itself may not function as a DA, but it may contain a DA, as in the example (60) below, discussed in detail in Maier (2011). Maier (2011) provides a context in which the description a *woman from South Carolina* is interpreted *de dicto* and takes wide scope over the quantified expression *every Red Socks player* which is interpreted *de re*. Maier (2011) convincingly argues that this scope paradox (cf. Bäuerle 1983) is resolved if the set quantified over by the universal quantifier, namely the set of Red Socks players, is a DA.

- (60) George thinks a woman from South Carolina loves every Red Socks player.

On the other hand, it should be clear from the discussion of example (52b) in the previous section that not every referential expression interpreted *de re* is a DA. If the expression interpreted *de re* has a syntactic antecedent in the matrix clause, the DA is illicit and replaced with a minimal pronoun, since the syntactic antecedent would constitute a more local binder provided that the same interpretation can be obtained with a minimal pronoun.

Let us briefly discuss Percus and Sauerland's (2003) puzzle involving quantified reports in mixed *de re* / *de se* contexts, to work out the difference between reports *de re* and reports *de se* and the special role that DAs have in these reports. It has been proposed that a *de se* belief is just a special kind of a *de re* belief, in which the acquaintance relation happens to be the identity relation. In other words a belief *de se* is a conscious belief *de re* about oneself.

The scenario is a bit complicated and discussed in detail in Maier (2011). During the beauty contest Elisa, Maria and Mathilde see their latest photoshoot.

Elisa takes a look and sobs, “I can’t make it. It is over for me”. Her *de se* belief can be reported as in (61a). Maria and Mathilde instead, not lacking self-confidence and not recognizing themselves in their photos, but not liking what they are seeing, exclaim: “She looks awful. She will be eliminated for sure.” Without realizing it, Maria and Mathilde express *de re* beliefs about themselves which can be reported as given in (61bc).

- (61) a. Elisa thinks she will be eliminated
 b. Maria thinks she will be eliminated
 c. Mathilde thinks she will be eliminated

Note that in such a mixed *de re / de se* scenario (62a) is felicitous: every girl has a (de re) belief that she herself should be eliminated. Percus and Sauerland note that (62b) is false, because Elisa thinks about herself (de se) that she should be eliminated.

- (62) a. Each girl thinks she will be eliminated
 b. No girl thinks she will be eliminated

Now, Elisa is indeed voted out leaving a situation in which just Maria and Mathilde are left. In this reduced context (62a) is still true, but also (62b) becomes true. This implies, as Percus and Sauerland argue, that *de se* is more than just one among the many possible *de re* beliefs about the self: all three beliefs in the above scenario are *de re*, but only Elisa’s *de se* belief can falsify the negative report.

How can we explicate the difference between a report *de se* and a report *de re*? In the present account, the LF of the *de re* reading of (62a) can be given as in (63a). While the LF of the *de se* reading of (62b) is given as in (63b).

- (63) a. every x girl(x) $\exists y$ givenDR(y) [x thinks that y will be eliminated
 & S knows $x=y$]
 b. no x [girl (x) & x thinks x will be eliminated]

The crucial element in the LF in (63a) is the presence of a given DR *the girl on the photo* that y is connected with (for the *de re* interpretation of (61a), the respective DR is *Elisa* itself). In other words, *she* in (61bc) is analysed as a DA that despite minimality is licensed by a functional head in the matrix C-domain, since it gives rise via the description *the girl on the photo* to a possible *de re* ascription.

Note, however, that the LF-representation in (63b) incorrectly proposes that an expression interpreted *de se* is directly bound by an antecedent in the matrix clause. That expressions interpreted *de se* are primarily linked to the speaker of the embedded context in speech reports or to the author of the

embedded context for other attitudinal verbs is implicated by the use of a special class of pronouns, called logophoric pronouns in many languages (cf. Clements 1975, Sells 1987). In these languages a distinct set of logophoric pronouns exists for the sole purpose of referring to an antecedent whose speech, thoughts, feelings or general state of consciousness are reported. These pronouns are strictly interpreted *de se*.

It is argued most forcefully in Schlenker (2003) that referential expressions interpreted *de se* including logophoric pronouns are linked to the embedded context. In our approach, this implies that these expressions are licensed by a functional head in the embedded C-domain with the interpretation $\lambda x \lambda c'$ author (x,c'), where c' refers to the embedded context. However, this functional head itself is licensed (linked to) a functional head that introduces the attitude holder in the matrix clause. In other words, the interpretation *de se* is composed of a *de dicto* part, namely the predicate author (x, c'), and a *de re* part which ascribes as the value of this predicate the attitude holder deriving the correct semantics of *de se* interpretations: while the attitude holder may not be aware of his own identity (for instance that his name is John), he is necessarily aware of the identity between the attitude holder and the author of the embedded context.

This account of *de se* interpretation is further supported by the observation that there is a similar binding asymmetry between pronouns *de se* and *de re*, as there is between DAs and bound pronouns. Percus and Sauerland (2003) observe that no obligatory *de se* anaphor can be c-commanded by a *de re* counterpart, while we have seen in this paper that no discourse anaphor can be c-commanded by a coreferent referential expression. Furthermore, as with discourse anaphors, this intervention effect is obviated, that is, an object can be interpreted *de se* if the intervening subject in the embedded clause has a quantificational or focus-effected interpretation (cf. Anand 2007). This parallelism speaks for a common treatment of DAs and pronouns interpreted *de se*, in my opinion, in terms of a (primary) licensing relation to a functional head in the relevant C-domain.

5.4 Open ends and questions for further research

We have seen that both deictic pronouns (of first and second person) and third person pronouns can be used as bound pronouns which are devoid of any features and as DAs when they are endowed with formal features which serve to discriminate between potential discourse antecedents. It seems that anaphors, that is, reflexive and reciprocal pronouns are special in that they can only be used as bound pronouns indicating that they are inherently featureless or minimal pronouns in the sense of Kratzer (2009).

However, there are cases of syntactic anaphors in main clauses which are interpreted discourse-anaphorically, as is illustrated in (64) and (65) below.¹³ Note that the bound pronoun interpretation of the reflexives in (64) and (65) would give rise to the presuppositions given in (64b) and (65b) respectively, which are not warranted in their context. Rather (64a) means that even Adenauer voted for Adenauer and (65a) means that only Adenauer did not vote for Adenauer. How is this possible?

- (64) a. Die meisten Abgeordneten haben für Adenauer gestimmt
 Most representatives have voted for Adenauer
 Selbst Adenauer hat für sich gestimmt
 Even Adenauer has voted for himself
- b. % also the other members of the parliament voted for themselves
- (65) a. Fast alle Mitglieder haben für Adenauer gestimmt.
 Almost all members have voted for Adenauer
 Nur Adenauer hat nicht für sich gestimmt
 Only Adenauer did not vote for himself
- b. % all other members voted for themselves

One way of accounting for these readings in (64) and (65) would be to assume that the reflexive pronouns in (64) and (65) are ambiguous between a minimal pronoun and a DA. It has been observed that long distance reflexives in embedded contexts are interpreted *de se* (cf. Huang & Liu 2001), suggesting that they are interpreted as being licensed by a head in the local C-domain. The two readings of the anaphor can then be represented, as given in (66ab), respectively.

- (66) a. Selbst / nur Adenauer hat für sich gestimmt
 |-----|
 b. F_{given} selbst/nur Adenauer hat für sich gestimmt
 |-----|

This account, of course, raises the question of when to use a pronoun and when to use an anaphor to establish a discourse-anaphoric reading. In the present context, the use of a pronoun should be preferred, since it does not give rise to ambiguity as the use of an anaphor does. However, as noted above, in the context of (64) and (65), the interpretation as a local anaphor is excluded, leaving both options as virtually unambiguous. I will have to leave this issue for further research.

¹³ This was pointed out to me by Hubert Haider during a presentation of this paper at the meeting of the Austrian Society of Linguistics in Salzburg 2009.

So far, the standard assumption within GB and the principles and parameters framework has been that anaphors probably lack (referential) features, while pronominals are endowed with (referential) features. If the present approach is correct, then pronominals may contain ϕ -features if used as DAs or lack them if used as bound pronouns and also anaphors may lack ϕ -features if used as bound pronouns or contain them if used as DAs (as in the case of long distance anaphors).

This raises the question of how to distinguish between anaphors and pronominals. In the present approach, anaphors and pronominals can only be distinguished in the following way. Anaphors (putting long distance anaphor to the side) typically relate to the closest binder, while pronominals would skip the closest binder. Since binding relations by default are local, we can assume that anaphors are grammatically unmarked. Pronominals, on the other hand, would be marked in the lexicon as obviating binding by the closest functional head (that agrees with the verb) and hence must be interpreted as being disjoint from the local subject in the clause. While these observations are rather preliminary and are still in need of further argumentation, they can be taken as an initial step towards replacing the standard Binding Principles A and B within the approach to binding advocated in this paper. However, exploring this issue any further goes beyond the scope of this paper.

6 Conclusions

I have argued in this paper that the use of referential expressions is subject to pragmatic and grammatical conditions. In particular, I have argued that the assumption of a functional head that triggers access to the set of given DRs and acts as λ -binder of discourse anaphoric pronouns enables a simple explanation of the availability of discourse anaphoric interpretations. This move allows for a complete omission of indices as well as for the dispensation with cross-derivational comparisons necessary in a Reinhart-type of approach. In conclusion, the use of referential expressions follows from economy conditions in the syntax and from economy conditions that derive from the differences in feature structure of minimal pronouns, DAs and fully referential expressions.

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