

Binding Theory

Introduction to Syntax
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In these notes, I'll introduce a system that is used to account for certain kinds of referential relationships among DPs. The system is known as "the Binding Theory," because one of its central components involves a relation known as "binding."

The kinds of referential relationships that the Binding Theory describes can be illustrated with the sentence in (1).

- (1) Sally said that she likes cars.

This sentence has two meanings that depend on how *she* is semantically interpreted. On one meaning, *she* refers to the same individual that *Sally* does. On this interpretation, we say that *she* is "coreferent" with *Sally*. On the other interpretation, *she* refers to some female individual that isn't Sally. On this interpretation we say that *she* and *Sally* are "disjoint in reference."

One way of expressing these two meanings is to add to our syntactic representation of DPs something that encodes what they refer to. The standard device used for this function is something called an "index." Indices are integers that are appended to DPs. When two DPs have the same index, then they are given a coreferent interpretation. And when two DPs have different indices, they are given the disjoint referent interpretation. So the two meanings that (1) has can be paired with the representations in (2).

- (2) a. Sally₁ said that she₁ likes cars.
b. Sally₁ said that she₂ likes cars.

(2a) gets the coreferent interpretation, and (2b) gets the disjoint interpretation.

The Binding Theory controls how these indices are distributed on DPs and, in this way, expresses when DPs can corefer and when they cannot. When two DPs can have the same index, and when they cannot, depends on two things. It depends on what kinds of DPs are involved, and it depends on how the two DPs are configured relative to each other in the sentence. To see the dependency the Binding Theory has on the kinds of DPs involved, consider (3).

- (3) The woman said that Sally likes cars.

This sentence is not ambiguous in the same kind of way that (1) is. In fact, though there are slight, subtle, differences in how *the woman* and *Sally* can be semantically interpreted, the most salient interpretation is one in which there are two different women one of which is named *Sally*. The two DPs *the woman* and *Sally* are only disjoint in reference. Only the representation in (4a) is grammatical.

Sometimes lower case roman letters are used.

There is nothing meaningful about the particular numerical integer that is used to represent an index. All that matters is whether two indices use the same integer, or different ones. So, the representation Sally₂ said that she₂ likes cars is equivalent to (2a); and Sally₂ said that she₃₄ likes cars is equivalent to (2b).

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- (4) a. The woman₁ said that Sally₂ likes cars.
b. * The woman₁ said that Sally₁ likes cars.

The class of DPs that show a disjoint reference effect in these situations are called “r-expressions,” or, sometimes, “referring expressions.” Most DPs are r-expressions.

Now, it isn’t that r-expressions cannot corefer with other DPs. We’ve already seen in (1) that a name can corefer with a pronoun that follows it, and this is true for other r-expressions as well.

- (5) a. The woman₁ said that she₁ likes cars.
b. A woman₁ said that she₁ likes cars.

But it’s also the case that r-expressions can sometimes corefer with DPs that precede them. Some examples are in (6).

- (6) a. Jane₁’s mother likes Jane₁.
b. After she₁ left school, the phonologist₁ got a lousy job.
c. A book about her₁ arrived at Jane’s home.
d. He showed her₁ toes to the baby₁.

R-expressions, then, are not required to be disjoint with every other DP. They can corefer with some.

In the mid 1970’s, Tanya Reinhart took a stab at characterizing the conditions under which an r-expression could and could not corefer with another DP. Her proposal is very simple, and correctly covers the majority of cases. It’s now the standard approach.

Her proposal is (8).

- (7) The DPs that r-expressions cannot corefer with are those that c-command them.
(8) Let α and β be nodes in a phrase marker.
 α c-commands β if and only if:
a. every phrase that contains α contains β too, and
b. α does not dominate β .

A slightly easier definition of c-command is (9).

- (9) α c-commands β if and only if β is dominated by α ’s sister.

By “sisters” is meant terms that have a common mother. (10) is a more formal definition.

- (10) α and β are sisters if every phrase that contains α contains β , and every phrase that contains β contains α .

We can now express the disjoint reference effect that r-expressions invoke with (11).

Reinhart’s initial proposal shows up in her dissertation: Reinhart (1976), and is built upon leading ideas in Klima (1964). A more polished version of her proposal is found in Reinhart (1983).

We should understand “dominates” to be reflexive in this definition. That is, α contains β if α dominates β , and $\alpha \neq \beta$. (Things don’t contain themselves.)

We should understand “contains” to not be reflexive in this definition. That is, α contains β if α dominates β , and $\alpha \neq \beta$. (Things don’t contain themselves.)

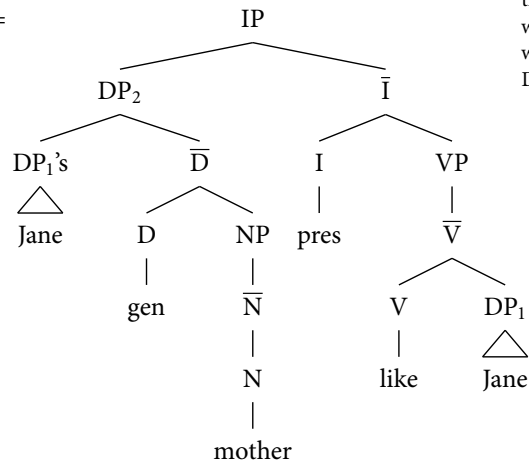
(11) Principle C

An r-expression cannot be coindexed with a DP that c-commands it.

This is known as “Principle C,” which is the name that Noam Chomsky gave to it in Chomsky (1981).

Let’s look at a few examples to see how this works. Consider first (6a).

(6a) $Jane_{s_1}$ mother likes $Jane_{s_1}$. =

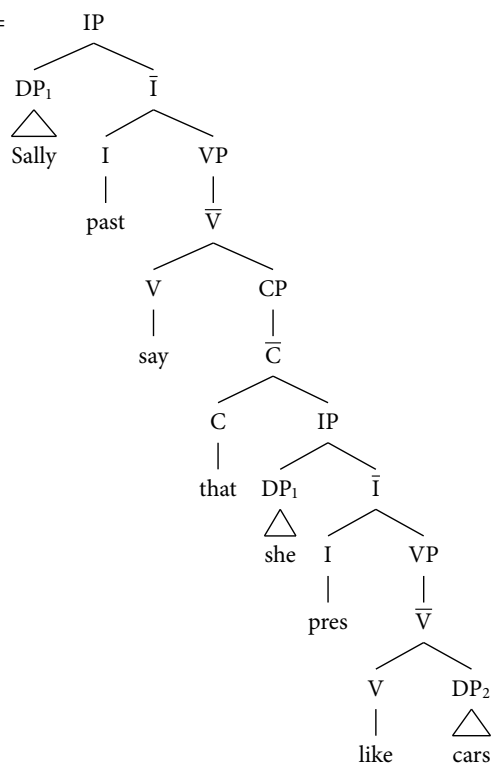


Note that referential indices are on DPs, not the heads of those DPs, or anything else within them. In judging Principle C, then, we look at what things are c-commanded by DPs.

Principle C is satisfied here. The lower DP containing *Jane* is coindexed with the higher DP containing *Jane*, but the first *Jane* doesn't c-command the second *Jane*, so that is allowed. The first *Jane* doesn't c-command the second because the sister to the first *Jane* is *mother*, and this doesn't contain the second *Jane*.

Let's review (2a) next.

(2a) $Sally_1$ said that she_1 likes cars. =

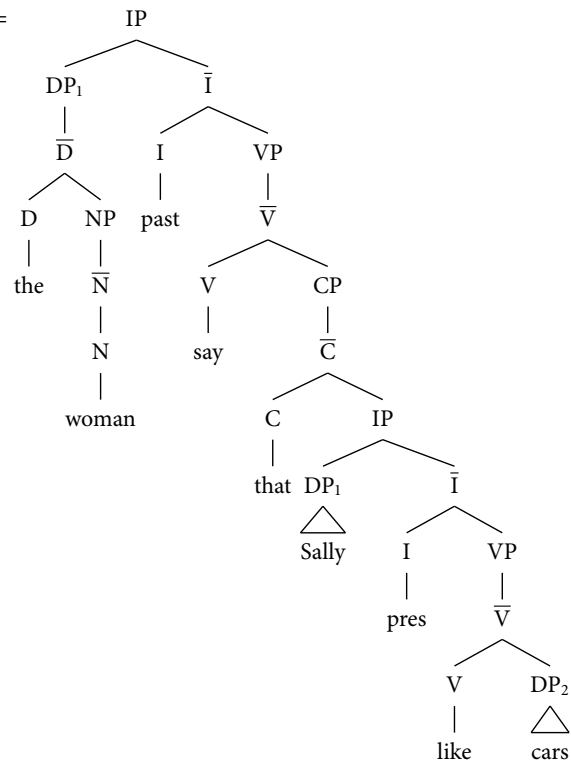


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Here too, *Sally* can be coindexed with *she* because *she* does not c-command *Sally*. The sister to *she* is [_I *pres likes cars*], and this doesn't contain *Sally*.

Finally, let's consider (4a).

(4a) * The woman₁ said that Sally₁ likes cars. =



In this example, just as in (2a), *the woman* satisfies Principle C. But here, *Sally* does not. Because *Sally* is c-commanded by *the woman*, Principle C prevents them from being coindexed.

the woman c-commands *Sally*, because *Sally* is in the sister to *the woman*.

Disjoint reference effects also obtain for pronouns. This can be seen in (12).

- (12) a. * Jane₁ likes her₁.
b. * The man₂ likes him₂.

This disjoint reference effect is also sensitive to c-command, as can be seen by comparing (12) with (13).

- (13) a. Jane₁'s mother likes her₁.
b. A story about the man₂ annoyed him₂.

The pronouns in (13) are not c-commanded by the terms they are coindexed with, but they are c-commanded by the terms they are coindexed with in (12). This is responsible for the difference in the grammaticality of these examples.

But, as we have seen in (2a), a pronoun can sometimes be coindexed with a term that c-commands it.

(2a) Sally₁ said that she₁ likes cars.

So, unlike r-expressions, pronouns can sometimes corefer even with DPs that c-command them.

The difference between pronouns and r-expressions seems to do with the distance between the two coindexed DPs. For r-expressions, it doesn't matter how far apart the two are: if an r-expression is c-commanded by the thing it is coindexed with, then the result is ungrammatical. But for pronouns, the distance does matter. Pronouns can be coindexed with c-commanding DPs only if those c-commanding DPs aren't nearby. We say about those DPs that are nearby that they are in the pronoun's "Binding Domain." So a way of formulating the disjoint reference effect for pronouns is with (14). This condition is known as "Principle B," which is, again, the name Chomsky gave to it in Chomsky (1981).

(14) Principle B

A pronoun cannot be coindexed with a c-commanding DP that is in its Binding Domain.

Defining "binding domain" is not trivial. As a rough first approximation, we can do with (15).

(15) The binding domain for α is the smallest IP containing α .

If (15) were correct, Principle B would say that pronouns cannot be coindexed with c-commanding terms that are in the same IP that the pronoun is in.

There is a special class of pronouns, known as "reflexives," that have the opposite property we've seen r-expressions and pronouns to have. Reflexives must be coreferent with another DP. This is illustrated by the examples in (16).

- (16) a. John₁ adores himself₁.
 b. * John₁ adores himself₂.
 c. Sally₁ talked to herself₁.
 d. * Sally₁ talked to herself₂.

The reflexives are *himself* and *herself*. These terms must be understood to corefer with the subjects of the sentences they are in. Only the sentences in which they are coindexed with the subjects are grammatical.

It turns out that c-command plays a role in determining what a reflexive must corefer with. Only those DPs that c-command a reflexive are DPs that the reflexive can be coindexed with. So, the examples in (17) are ungrammatical for this reason.

- (17) a. * John₁'s mother adores himself₁.
 b. * A story about John₁ pleased himself₁.
 c. * I told herself₁ that she₁ likes apples.

The reflexive is coindexed with a DP in each of these examples, but because that DP doesn't c-command the reflexive, its coreference requirement doesn't seem to be satisfied.

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Reflexives are also sensitive to how close they are to the thing they are coindexed with. In this respect they are like pronouns. This can be seen by considering the examples in (18).

- (18) a. * John₁ said that I adore himself₁.
b. * Sally₁ thought that he talked to herself₁.

The reflexive pronouns in these examples are coindexed with something that c-commands them, and yet the results are not grammatical. These examples would be fine, though, if the things the reflexives are coindexed with were closer, as they are in (19).

- (19) a. I said that John₁ adores himself₁.
b. He thought that Sally₁ talked to herself₁.

We could formulate the rule that reflexives obey with (20).

This condition comes from Chomsky (1981) as well, and that is where it's gotten its name.

(20) Principle A

A reflexive pronoun must be coindexed with a DP in its binding domain that c-commands it.

Just as for Principle B, the definition of binding domain is not trivial. We can get pretty far by using the same definition of binding domain used for Principle B in (15).

Just like reflexive pronouns is the so-called “reciprocal” *each other*. This term too must be coreferent with some other DP, as (21) indicates.

- (21) a. The students₁ like each other₁.
b. * The students₁ like each other₂.

What it means for a reciprocal to be coreferent with another DP differs a little bit from what it means for a reflexive to be coreferent with another DP. In the coreferent reflexive in (22), for instance, the coreference relation means, semantically, that the group referred to by *the students* is the same group that is referred to by *themselves*.

- (22) The students₁ like themselves₁.

But in (21a), there is more to the meaning of coreference. Just as in (22), in (21a), the group referred to by *the students* is also referred to by *each other*. But unlike with the reflexive in (22), the reciprocal refers to the individuals in that group in a very particular way: it says something about each of the individuals in that group. We won't work out this detail. I think we can safely assume it comes from the meaning that *each other* brings to the table. The fact that the groups referred to by coindexed DPs are the same is all that will matter for us.

The reciprocal obeys Principle A in just the same way that reflexive pronouns do. The DP that a reciprocal is coindexed with must c-command that reciprocal, as the contrast in (23) indicates.

- (23) a. The children₁ adore each other₁.
 b. * The children₁'s teacher adores each other₁.

And the DP that a reciprocal is coindexed with must be close to the reciprocal as well, as the contrast in (24) indicates.

- (24) a. He said that the students₁ talked to each other₁.
 b. * The students₁ said that he talked to each other₁.

So we should restate Principle A so that it includes reciprocals in its scope.

- (25) Reflexive pronouns and reciprocals must be coindexed with a DP in their binding domain that c-commands them.

Here is a summary of the Binding Theory, as we have so far developed it.

- (26) The Binding Theory
- a. Principle A
 Reflexive pronouns and reciprocals must be coindexed with a DP in their binding domain that c-commands them.
 - b. Principle B
 A pronoun must not be coindexed with a DP in its binding domain that c-commands it.
 - c. Principle C
 An r-expression must not be coindexed with a DP that c-commands it.
- (27) α 's binding domain is the smallest IP containing α .

In all three of these principles, the notion of being coindexed with a c-commanding DP is involved. This notion plays a role in several other places in syntax, and so it is given a name. When one thing c-commands another, and they are coindexed, we say that the first "binds" the second.

- (28) α binds β if and only if α c-commands β and they are coindexed. β is bound if and only if there is some α that binds β .

A more compact formulation of the Binding Theory uses this term:

- (29) The Binding Theory
- a. Principle A
 Reflexive pronouns and reciprocals must be bound by something in their binding domain.
 - b. Principle B
 A pronoun must not be bound by something in its binding domain.
 - c. Principle C
 An r-expression must not be bound.

Binding Domain

Let's now take a closer look at how to define the "Binding Domain" that Principles A and B make reference to. For ease of reference, I will from now use the term *anaphor* whenever I am referring to a reflexive pronoun or a reciprocal.

In the examples we've looked at so far, the Binding Domain could be defined as the smallest IP containing the term to which Principle A or B refers to. This is consistent, for example, with the cases in (30).

- (30) a. The boys₁ said that [_{IP} Sarah will visit them₁].
 b. * The boys₁ said that [_{IP} Sarah will visit each other₁].
 c. The boys₁ believe [_{IP} Sarah to like them₁].
 d. * The boys₁ believe [_{IP} Sarah to like each other₁].
 e. * The boys₁ like them₁.
 f. The boys₁ like each other₁.

This description also works for many cases in which the pronoun or anaphor is a complement of something other than a verb, as in (31).

- (31) a. Complement of Preposition:
 i. The boys₁ said that [_{IP} Sarah lives near them₁].
 ii. * The boys₁ said that [_{IP} Sarah lives near each other₁].
 iii. The boys₁ believe [_{IP} Sarah to live near them₁].
 iv. * The boys₁ believe [_{IP} Sarah to live near each other₁].
 v. * The boys₁ live near them₁.
 vi. The boys₁ live near each other₁.
 b. part of an Adjective's complement
 i. The boys₁ said that [_{IP} Sarah is happy with them₁].
 ii. * The boys₁ said that [_{IP} Sarah is happy with each other₁].
 iii. The boys₁ believe [_{IP} Sarah to be happy with them₁].
 iv. * The boys₁ believe [_{IP} Sarah to be happy with each other₁].
 v. * The boys₁ is happy with them₁.
 vi. The boys₁ is happy with each other₁.
 c. part of a Noun's complement
 i. The boys₁ said that [_{IP} Sarah read books about them₁].
 ii. * The boys₁ said that [_{IP} Sarah read books about each other₁].
 iii. The boys₁ believe [_{IP} Sarah to read books about them₁].
 iv. * The boys₁ believe [_{IP} Sarah to read books about each other₁].
 v. ?? The boys₁ read books about them₁.
 vi. The boys₁ read books about each other₁.

There are some examples, however, in which Principle B does not seem to operate in the expected way when the pronoun is part of a complement to a noun, and indeed, there seems to be disagreement in the literature about the status of (31c-v). Some cases where I find no Principle B effect although one is expected are (32).

- (32) a. ? The boys₁ rebutted rumors about them₁.
 b. The boys₁ listened to stories about them₁.
 c. The boys₁ were sent the reports about them₁.

If pronouns must be disjoint in reference with c-commanding DPs that lie within the smallest IP containing that pronoun, then all the examples in (32) should be ungrammatical. The smallest IP containing *them* also contains *The boys* in each of these examples, and *the boys* c-commands *them*. Yet, it seems that they can corefer.

On the other hand, there are some examples of this sort in which I do find a Principle B effect. (33) are some.

- (33) a. * The boys₁ made up stories about them₁.
 b. * The boys₁ wrote a book about them₁.
 c. * The boys₁ described problems with them₁.

What makes these cases different appears to have something to do with subtle semantic differences in them. I'll return to describe one idea about what those differences are, but to a large extent, it isn't understood why some of these examples are good and others bad. Let's simply set these examples aside in designing a definition of binding domain.

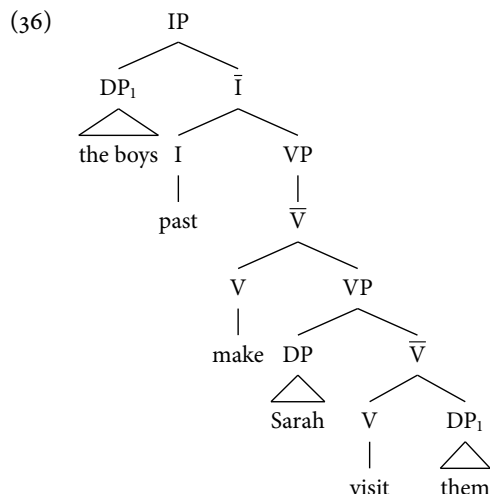
In all the other examples we've considered, then, a definition of binding domain like that in (34) works.

- (34) The Binding Domain for α is the smallest IP containing α .

But this won't do for many examples. In some cases, it appears that a binding domain can be something other than an IP. For instance, small clauses appear to constitute a binding domain, as the examples in (35) indicate.

- (35) a. The boys₁ made [_{VP} Sarah visit them₁].
 b. * The boys₁ made [_{VP} Sarah visit each other₁].
 c. The boys₁ believe [_{AP} Sarah happy with them₁].
 d. * The boys₁ believe [_{AP} Sarah happy with each other₁].

Remember that small clauses are phrases that have a subject argument in their Specifier position. The parse for (35a), for instance, is (36).



The smallest IP containing *them* in (36) is the root node, and so we should expect that the binding domain for *them* should include *the boys*. But that would wrongly predict a Principle B violation here. What we'd like to do is make the small clause the pronoun's binding domain.

There are other cases where it appears that a binding domain isn't an IP. The examples in (37) are some.

- (37)
- a. The girls₁ believe [_{IP} each other₁ to be unhappy].
 - b. * The girls₁ believe [_{IP} them₁ to be unhappy].
 - c. The girls₁ prefer [_{CP} for [_{IP} each other₁ to be happy]].
 - d. * The girls₁ prefer [_{CP} for [_{IP} them₁ to be happy]].

What makes the cases in (37) different from the examples in which the IP does constitute a binding domain is where the anaphor or pronoun is within that IP. When the anaphor or pronoun is in the Specifier of the IP, the IP does not constitute a binding domain. When the anaphor or pronoun is somewhere more deeply embedded within the IP, then the IP does constitute a binding domain. Indeed, the same thing can be demonstrated for small clauses. (35) illustrates that when a VP or AP small clause contains an anaphor or pronoun within it, then that small clause is a binding domain. But when the anaphor or pronoun is in the Specifier of the AP or VP that constitutes a small clause, then, as (38) illustrates, that small clause is no longer a binding domain.

- (38)
- a. * The boys₁ made [_{VP} them₁ visit Sarah].
 - b. The boys₁ made [_{VP} each other₁ visit Sarah].
 - c. * The boys₁ believe [_{AP} them₁ happy with Sarah].
 - d. The boys₁ believe [_{AP} each other₁ happy with Sarah].

Putting this all together, we could reframe our definition of binding domain as (39).

- (39) A binding domain for α is the smallest IP, AP or VP that contains α and something different from α in its Specifier position.

Maybe the definition of binding domain doesn't even need to make reference to the category of the phrases. Perhaps all that matters is whether the phrase has something in Specifier position. So far as we've seen, the phrases that have something in Specifier position are binding domains and the phrases that don't, aren't. Perhaps we could simplify (39), then, to (40).

- (40) A binding domain for α is the smallest phrase that contains α and something different from α in its Specifier position.

This formulation of binding domain predicts that phrases that can optionally have something in their Specifier position should be binding domains when they do, and not be binding domains when they don't. DPs are the sorts of phrases that can either have Specifiers or not have Specifiers, depending on whether or not they are headed by the genitive Case assigning determiner *gen*. So DPs would be one place where we could test this prediction. As we've already seen, though, the behavior of DPs as binding domains is already somewhat mysterious. We'll have to somehow control for those mysteries in creating test examples.

The place where we encountered the mysteriousness of DPs was with respect to how Principle B behaved. We found that in some examples a DP behaves like a binding domain for a pronoun it contains, and in other cases it doesn't. There are no similar mysteries, however, in the case of Principle A. An anaphor within a DP can be bound by something outside that DP.

- (41) a. The girls₁ like [_{DP} the pictures of each other₁].
 b. The girls₁ watched [_{DP} the movies about each other₁].
 c. The girls₁ read [_{DP} several stories about each other₁].
 d. The girls₁ recalled [_{DP} arguments with each other₁].

In none of these examples, then, is the DP containing *each other* a binding domain. In each case, therefore, *each other* may be bound by *the girls*, which lies outside that DP. Compare this situation to what happens in (42).

- (42) a. * The girls₁ like [_{DP} his pictures of each other₁].
 b. * The girls₁ watched [_{DP} my movies about each other₁].
 c. * The girls₁ read [_{DP} your several stories about each other₁].
 d. * The girls₁ recalled [_{DP} her arguments with each other₁].

The presence of a genitive DP within the DP containing the anaphor makes all the difference. Now the DP containing the anaphor is a binding domain, and as a consequence *the girls* cannot grammatically bind *each other*. So this confirms the prediction that it is the presence of something in a Specifier position that makes a binding domain.

We can observe the same effect in cases where it is a pronoun within a DP that we are using to determine where the binding domain is. Consider the examples in which it appears that a DP does not constitute a binding domain for a pronoun it contains. I've repeated those here.

- (33) a. * The boys₁ made up [_{DP} stories about them₁].
 b. * The boys₁ wrote [_{DP} a book about them₁].
 c. * The boys₁ described [_{DP} problems with them₁].

At least I find that the pronoun *them* in these examples is not naturally understood to corefer with *the boys*, and this indicates that the binding domain for Principle B is the entire sentence in these examples. If, however, the object DP has something in its Specifier position, then coreference between the pronoun *them* and *the boys* becomes possible:

- (43) a. The boys₁ made up [_{DP} my stories about them₁].
 b. The boys₁ wrote [_{DP} my book about them₁].
 c. The boys₁ described [_{DP} our problems with them₁].

The examples in (43a) and (43b) are quite odd semantically since they require that the boys be making up my stories (in the case of (43a)) and writing my book (in the case of (43b)), and it's not easy to conceive of a situation in which that makes sense. But putting the oddness of these sentences to the side, there is nothing wrong with their ability to convey coreference between *the boys* and *them*. This means that *the boys* is not in the binding domain for *them*. Apparently, putting something in the Specifier position of the object DPs in (43) has made those DPs the binding domain. Once again, this confirms the hypothesis that what makes a phrase a binding domain is the presence of something in its Specifier position.

Incidentally, the oddness of (43a) and (43b) might be a clue as to the mysterious variability of DPs as binding domains. That mysteriousness has to do with whether or not a pronoun contained within a DP takes the DP as a binding domain or not. The examples in (33) are ones in which the DP does not seem to constitute a binding domain. By contrast, the ones in (32), repeated here, are examples in which the DP does seem to constitute a binding domain.

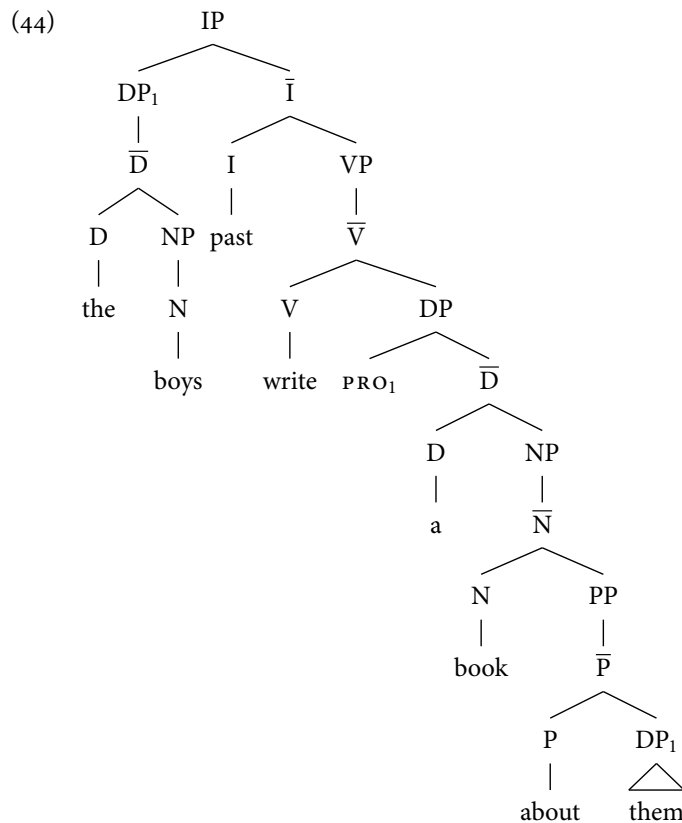
- (32) a. ? The boys₁ rebutted [_{DP} rumors about them₁].
 b. The boys₁ listened to [_{DP} stories about them₁].
 c. The boys₁ were sent [_{DP} the reports about them₁].

One observation about what might make these cases different concerns who “owns” the things referred to by the object DPs. In (32), the rumors that the boys are rebutting, the stories that the boys are listening to and the reports that the boys are sending could be rumors, stories and reports that belong to anyone. These sentences don't indicate who the rumors, stories or reports belong to. If they had possessives in them, of course, they would. In *The boys rebutted my rumors about them*, for example, it is made explicit that the rumors are mine. By contrast, in (33), repeated here again, the possessor of the object DP is somehow expressed.

- (33) a. * The boys₁ made up [_{DP} stories about them₁].
 b. * The boys₁ wrote [_{DP} a book about them₁].
 c. * The boys₁ described [_{DP} problems with them₁].

Because of the meaning of the verbs *make up* and *wrote*, it's understood that the stories referred to in (33a) and the book referred to in (33b) belong to the boys. That's why it's odd to indicate otherwise with the possessives in (43a) and (43b). It is less strongly implied in (33c) that the boys own the problems being described, but it is nonetheless the default interpretation. Without explicit indication otherwise, I think we interpret (33c) to indicate that the boys are describing their problems. One idea about how to capture this fact about (33) is to give these cases a representation like (44).

This idea can be found in Chomsky (1986).



In the Specifier of the object DP is a silent pronoun, *PRO*. Imagine that this *PRO* gets the “possessor” meaning that overt DPs which reside in this position do. In these examples, *PRO* is forced to corefer with the subject of the verb that selects the DP, and in (44) that means *PRO* corefers with *the boys*. This gives us a way of expressing why it is, then, that the understood owner of the object DP in (33b), and perhaps the other examples of (33), is the boys. This also gives an account for the disjoint reference effect between *them* and *the boys* in these examples. The binding domain for *them* in (44) is the DP that is the object of *wrote*: this is the smallest phrase that contains *them* and

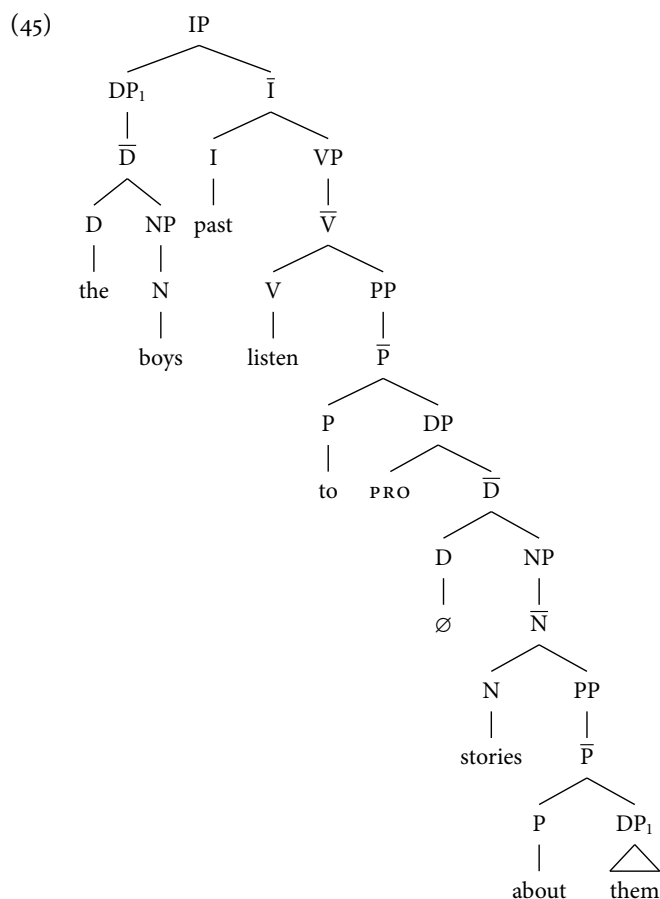
This would mean, then, that the possessor meaning does not come from the genitive *s* that heads DPs with genitive Case-marked Specifier positions. This meaning must come from something else in the DP. The determiner *gen* heading DPs with genitive Case-marked Specifier positions must simply be something that assigns the genitive Case to the Specifier position. Note that because *PRO* does not need Case, it is able to stand in the Specifier positions of DPs that are not headed by *gen*.

also something in Specifier position. Because *PRO* c-commands *them*, and is inside this binding domain, Principle B will require that *them* and *PRO* not corefer. Because *PRO* corefers with *the boys*, this will mean that *them* can also not corefer with *the boys*.

If DPs can have hidden *PRO* possessors in them in the way that (44) indicates, then they could be hidden in many DPs. Perhaps they could even be in the object DPs of (32), which we concluded constitute binding domains.

- (32) a. ? The boys₁ rebutted [_{DP} rumors about them₁].
 b. The boys₁ listened to [_{DP} stories about them₁].
 c. The boys₁ were sent [_{DP} the reports about them₁].

But maybe in these cases, the hidden *PRO* could be allowed to refer to something other than the nearby subject. Maybe *PRO* could mean something close to *one*. Imagine, then, that (32b), for example, has the representation in (45).



The binding domain for *them* in this representation is the DP containing it, since this is the smallest phrase containing something in Specifier position, namely, *PRO*. Because *the boys* is not within this DP, and is not coindexed with *PRO*, *them* can corefer with the *the boys* without violating Principle B.

In any case, whatever the solution to the mysteries surrounding DPs as binding domains turns out to be, we can see that there is some evidence from how they behave for the idea that what makes a phrase a binding domain is the presence of something in Specifier position. So let us adopt this view of how binding domains are defined. The definition of binding domain in (40) captures most of the cases, and is very close to one of the standard definitions used in the literature. It is the definition we will use in this class. But it does fail in several cases. One of those is (46).

(46) Sally₁ likes [_{DP} her₁ parents].

This example is exactly like (47), except that the binding domain is for the pronoun *her* instead of the anaphor *each other*.

(47) They₁ like [each other's₁ friends].

What we expect is that the binding domain will be the same in (46) as it is for (47): it shouldn't be the complement DP, but should instead be the root IP. That's because the smallest phrase that has something in its Specifier position that isn't the term whose binding domain we're trying to find (the pronoun or the anaphor) is IP. In (46), that means that Principle B should prevent *her* from being coindexed with *Sally*, since *Sally* is within the root IP and c-commands *her*. But that's not correct: (46) has a very natural interpretation in which *Sally* and *her* corefer.

One idea about how to treat this problem involves the observation that there are no reflexive pronouns in English that bear the genitive Case. That is, there are no English examples like those in (48).

- (48) a. * They like theirself hats.
 b. * They like themselves's hats.
 c. * We like ourselves's hats.
 d. * She likes herself's hats.
 e. * He likes hisself hats.

This type of solution can be found in Chomsky (1981) and, in a slightly more sophisticated form, in Reinhart (1983).

There just isn't a genitive form for the reflexive pronoun in English, and, as a consequence, there is no way of expressing what these sentences would express. Perhaps (46) is grammatical because it is the only way of expressing what (48) would mean. One way of capturing that idea would be to imagine that the missing genitive forms of the reflexive pronouns look exactly like the genitive forms of the non-reflexive pronouns. In other words, perhaps *her* is ambiguous between being a simple personal pronoun and being a reflexive pronoun. This would explain the absence of genitive reflexive pronouns (they are there after all, it's just that they don't look like reflexives), and it would explain the grammaticality of (46) as well: the *her* in (46) is a reflexive and is therefore able to corefer with *Sally* because that is what Principle A allows (and requires). Let's adopt this solution to the problem in (46).

Another problem for the definition of binding domain in (40) can be seen in (59).

- (49) * They₁ said that [_{IP} each other₁ left].

The embedded IP in (59) is not a binding domain for *each other* because the thing in that IP's Specifier position is *each other* itself. In (59), just as in (47), the binding domain for *each other* should be the root IP. But in (59), unlike (47), this doesn't seem to be the case. At any rate, *they* cannot bind *each other* in (59).

At present, there is no account for (59) that involves manipulating the definition of binding domain. Instead, the accounts in the literature¹ aim at an explanation for the fact that in many IndoEuropean languages, anaphors in nominative Case-marked positions are ungrammatical. In IndoEuropean languages, nominative Case-marked DPs participate in what's called "agreement" with a nearby finite verb. In English, for instance, present tensed verbs have a different form depending on what the person and number of the nearby nominative DP is. Different verbs show these differences to varying degrees; the verb *be* has a particularly rich paradigm. As (50) indicates, the form of the verb *be* varies depending on the person and number of the nominative Case-marked subject.

¹ See Woolford (1999).

- (50) a. I am happy.
b. She is happy.
c. They are happy.

As a cross-linguistic tendency, anaphors don't like to participate in agreement relationships. It may be that the ungrammaticality of (59) is a reflex of this trend, and has nothing to do with where its antecedent is. Let us assume that this is the case.

This leaves us with one last problem. That problem can be seen by comparing (51a) with (51b).

- (51) a. Sally₁ believes that [_{IP} she₁ is talented].
b. * Sally₁ believes [_{IP} her₁ to be talented].

The ungrammaticality of (51b) follows from our present definition of binding domain. The binding domain of *her* is not the complement IP, since the Specifier this IP contains does not c-command *her* (it is *her*). As a consequence, the binding domain for *her* is the root IP, and Principle B requires that *Sally* and *her* not corefer. All of this also holds for (51a). In (51b), however, this is the right outcome, but in (51a) it is not. We want the binding domain for *she* in (51a) to be the embedded IP: that would cause Principle B to correctly allow *she* and *Sally* to be coreferent.

We might imagine solving this problem in much the same way that we did the problem posed by (46). In that case, like this one, there was something that looked like a pronoun in a position that should have caused its binding

domain to be too large: it was in the Specifier of DP position. We adopted the view, though, that despite appearances, the term we thought was a pronoun was actually a reflexive. The situation is similar here. The pronoun in (51a) is in a position that we know a reflexive pronoun is not permitted. Indeed, just as there are no genitive Case-marked reflexives in English, there are also no nominative Case-marked reflexives in English. There is no way to express what (51a) expresses:

- (52) * Sally_i believes that [_{IP} sheself_i is talented].

In the cases involving genitive Case, we speculated that the forms we associate with genitive pronouns could ambiguously be reflexives. This explained the absence of genitive reflexives at the same time that it explained why these genitive forms could be bound by something in their binding domain. We can't do the same thing here because that would run afoul of the ban against anaphors in nominative Case-marked positions. That is, if we decided that the nominative form *she* could actually be a reflexive, and that is what it is in (51a), then we would require that reflexives, and therefore anaphors, could be in nominative Case_m-marked positions. If we do that, we would lose our account of the ungrammaticality of (59).

I don't know what to do about the grammaticality of (51a). If we are to work from the idea that what makes (51a) possible is that the bound pronoun is sitting in a position that a bound reflexive cannot be, then what we need is a theory that makes the bindability of a pronoun depend on the availability of a bound reflexive in the same position. That is a different kind of theory than we have in front of us. Tanya Reinhart has developed such a theory in Reinhart (1983). It has its own problems, however, and requires reworking some of the cases we've looked at. Instead of pursuing that direction, I will simply leave (51a) unaccounted for. Let us rely on the descriptive observation in (53), and hope that an explanation for it will emerge.

- (53) The binding domain for a nominative Case-marked pronoun is the smallest finite clause containing that pronoun.

Remaining Problems

Here, then, is the Binding Theory that we have developed.

- (54) If the referential indices on two DPs are the same, then those DPs are interpreted as referring to the same individual(s). If the referential indices on two DPs are different, then those DPs are interpreted as referring to different individuals.
- (55) α binds β if and only if α c-commands β and they are coindexed. β is bound if and only if there is some α that binds β .
- (56) α c-commands β if and only if β is dominated by α 's sister.

(57) The Binding Theory

a. Principle A

Reflexive pronouns and reciprocals must be bound by something in their binding domain.

b. Principle B

A pronoun must not be bound by something in its binding domain.

c. Principle C

An r-expression must not be bound.

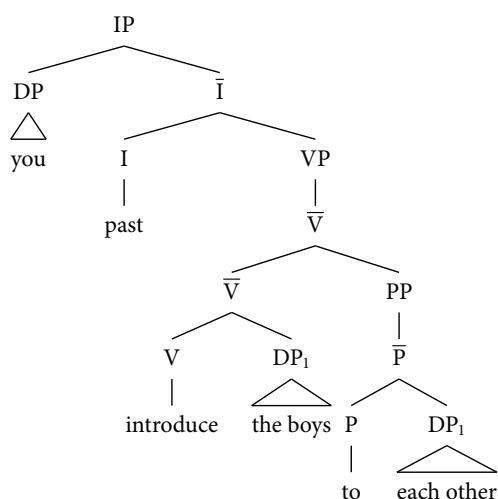
(58) α 's binding domain is the smallest phrase containing something that isn't α in its Specifier position.

(59) Anaphors cannot be in an agreement relation.

(60) The binding domain for a nominative Case-marked pronoun is the smallest finite IP that contains that pronoun.

There are examples which seem to indicate that the definition of c-command is wrong. In (61), for instance, the first object seems to c-command the second object since the anaphor in this example meets the requirements of Principle A.

(61) You introduced the boys₁ to each other₁.



Clearly, *each other* is not dominated by the sister of *the boys*, and so *the boys* does not c-command *each other*. This should be a Principle A violation, then: the anaphor *each other* is not bound.

Similarly, there should be no Principle C violation in (62a), and no Principle B violation in (62b).

(62) a. * You introduced her₁ to Sally₁.

b. * You introduced Sally₁ to her₁.

These examples have a parse parallel to that given for (61). The first argument does not c-command the second argument. In these examples, this means that we should expect that an r-expression or pronoun in the second argument should be able to corefer with the first argument, and that isn't the case.

All these examples, then, indicate that the first argument in these kinds of cases is in a position that binds a DP in the second argument, and this contradicts our definition of c-command. These sorts of counter-examples are under intensive investigation, and there are solutions which seem to be emerging. Those solutions do not change the definition of c-command, interestingly, but redraw how these cases are parsed. We have not gotten far enough to look at those solutions, unfortunately.

Instead, we can use modify c-command so that it will make these cases work.

- (63) α c-commands β if and only if
- a. every XP containing α contains β , and
 - b. α does not dominate β .

According to (63), then, the first complement in (61) c-commands the second complement, and Principles A, B, and C work correctly.

Most of the time, our original definition of c-command will work. Sometimes you might need to revert to (63) (and (63) will work for most of those cases that the original definition works for).

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