1 The ABC of Binding Theory

1.1 Preliminaries

1.1.1 Reference, coreference, and indexing

What is Binding Theory (BT) about? To a first approximation, BT restricts the distribution of NPs (or DPs, if you prefer) that have the same *referent* (starting with chapter 4, we will add non-referential NPs to the picture, which will be ignored until then). We will indicate sameness of reference, *coreference* for short, by *coindexing*; that is, coreferent NPs carry the same *index*, for which we use integers throughout. Thus in (1.1), the NP *the baroness* and the NP *she* are coindexed, which signals that they are coreferent, which in turn means that they have the same referent – they refer to the same person or thing – namely the actual baroness in flesh and blood:

(1.1) After $[_{NP}$ the baroness$]_1$ had visited the lord, $[_{NP}$ she$]_1$ left the house.

Note that on this understanding, BT is relevant for nominal categories only, and only for the maximal projections, i.e. NPs.[1] As a convention we assume that two NPs corefer if *and only if* (iff) they are coindexed. Contra-indexing (or lack of an index on either NP) indicates non-coreference. This is illustrated in (1.2):

(1.2) (a) After $[_{NP}$ the baroness$]_2$ had visited the lord, she$_2$ left the house. (she=the baroness)
(b) After $[_{NP}$ the baroness$]_1$ had visited the lord, $[_{NP}$ she$]_2$ left the house. (she≠the baroness)

It should be noted that the actual choice of integer is irrelevant; (1.1) expresses the same *coreference pattern* as (1.2a) (as would any sentence in which both occurrences of the index are replaced by the *same* integer). An NP marked 1 is in no sense prior, higher, or superior to one marked 2. All that matters is which NPs have the same index, and which do not.

[1] The latter aspect I consider a genuine fact about Binding Theory. On the view pursued here, indexing on non-maximal projections (e.g. signalling specifier-head agreement or head-movement dependencies), simply is not subject to Binding Theory and should be kept separate from it. As for the former aspects, though there are sentential and adverbial (i.e. PP-) anaphora, little work on their distribution has been done, and we will ignore them here (see e.g. Hegarty *et al*. [2001] and the references therein).

In traditional grammars, the NP *the baroness* in (1.1) is referred to as the *antecedent* of the pronoun *she*. We adopt the following:

(1.3) Definition: Antecedent
A is the *antecedent* of B iff (if and only if) (i) A precedes B, and (ii) A and B corefer

By our convention, an NP will be coindexed with its antecedent (if it has one). This holds for coreferring NPs within a single sentence, and across sentences. The latter, however, are usually not the subject to Binding Conditions of the sort discussed here.[2]

1.1.2 The basic data

Restricting our attention to singular NPs for the time being, two NPs in a given sentence will show one of three logically possible coreference relations (Reinhart, 1983a: 29):

(1.4)
(a) *obligatory coreference:* Zelda bores herself.
(b) *obligatory non-coreference:* She adores Zelda's teachers.
(c) *optional coreference:* Zelda adores her teachers.

Given what was said before, grammatical representations for these will look like in (1.5):

(1.5)
(a) Zelda_1 bores herself_1.
(b) She_8 adores Zelda_{15}'s teachers.
(c) Zelda_4 adores her_4 teachers. *or*
Zelda_4 adores her_7 teachers.

Ungrammatical representations for (1.4a) and (1.4b) are given in (1.6):

(1.6)
(a) $*\text{Zelda}_1$ bores herself_2.
(b) $*\text{She}_8$ adores Zelda_8's teachers.

It will be convenient to summarize patterns as in (1.5) and (1.6) as shown in (1.7), whose logic should be transparent:

(1.7)
(a) Zelda_1 bores $\text{herself}_{1/*2}$.
(b) She_8 adores $\text{Zelda}_{15/*8}$'s teachers.
(c) Zelda_4 adores $\text{her}_{4/7}$ teachers.

The key insight captured in BT is that the (un)availability of coreference between two NPs crucially depends on two factors:

[2] See e.g. Grosz *et al*. (1995); Gundel *et al*. (1993); Walker *et al*. (1998) and the references therein for some discussion of trans-sentential anaphora.

- the morphological shape of the NPs
- the structural relation between the NPs

This is not meant to exclude the possibility of additional factors that influence coreference options (which will be discussed especially in chapters 3 and 11). First, however, we will introduce the relevant NP-types of English and then, in turn, explore and characterize the syntactic configurations in which they require, allow, or disallow coreference.

1.1.3 Three types of NPs

Virtually all approaches to BT in English distinguish three types of NPs by (mostly) morphosyntactic criteria. These are illustrated in (1.8a–1.8c):

(1.8)
(a) reflexives and reciprocals ('anaphors'):
himself, herself, itself, themselves, myself, yourself, ourselves, yourselves
each other, one another
(b) non-reflexive pronouns ('pronominals'):
he, she, it, him, her, I, us, you, me, his, your, my, our
(c) full NPs including names ('r-expressions'):
the baroness, Peter, this, a disinherited Russian countess . . .

In parentheses I have given the terms for these categories as used in the influential work of Chomsky (e.g. 1981) and his school: anaphor, pronominal, and r-expression (with *r* reminiscent of 'referential'). For the first two, a cautionary remark is in order, because they unfortunately provide potential for confusion: traditionally the term *anaphor* (often with the plural *anaphors* rather than *anaphora*) is used for any NP, reflexive or not, that has an antecedent. Likewise, the term *pronominal* invites confusion with the traditional notion of *pronoun*, which applies to reflexive and non-reflexive pronouns alike. We will thus stick to the terms 'reflexive/reciprocal', 'non-reflexive pronoun', and 'full NP' in the remainder of this book.

We will now motivate this tripartition, starting with reflexives versus the rest (reciprocals, being necessarily plural, will not be discussed until chapter 10). Consider the sentences in (1.9):

(1.9)
(a) That it rains bothers Peter.
(b) That it rains bothers her/him.
(c) ∗That it rains bothers himself/herself.

All these sentences contain but one referential NP (the expletive *it* is of no interest to BT, since it lacks a referent – and perhaps semantic content in general). We can thus omit the indexing for expository convenience, given that no coreference is involved. We simply observe that reflexives cannot occur in this configuration, while both non-reflexive pronouns and full NPs can.

Table 1.1 *Distribution of the three NP-types*

configuration	ex.	reflexive	non-reflexive	full NP
no antecedent	(1.9)	*	ok	ok
non-local antecedent	(1.11)	*	ok	*
local antecedent	(1.10)	ok	*	*

Inversely, only reflexives, but neither non-reflexives nor full NPs, are permitted in (1.10):

(1.10) (a) *Peter$_3$ watches Peter$_3$ in the mirror.
(b) *Peter$_3$ watches him$_3$ in the mirror.
(c) Peter$_3$ watches himself$_3$ in the mirror.

(Note that the two occurrences of *Peter* in [1.10a] are coindexed, indicating that we speak about the same Peter. The sentence is presumably acceptable if I point at a different Peter upon using the names, just as [1.10b] is of course grammatical if the pronoun is not coindexed with the name.)

Let us finally turn to the difference between non-reflexive pronouns and the rest, illustrated by way of the sentences in (1.11):

(1.11) (a) *Carla$_4$ thinks that I hate Carla$_4$.
(b) Carla$_4$ thinks that I hate her$_4$.
(c) *Carla$_4$ thinks that I hate herself$_4$.

Here, reflexives pattern with full NPs, and in contradistinction to non-reflexive pronouns. Note that the difference between (1.10) and (1.11) is not the absence versus presence of an antecedent (there is one in each), but seems to be one of syntactic *locality*: the antecedent NP is within the same clause as the anaphor in (1.10), but in a higher clause in (1.11). We summarize these (preliminary) results in table 1.1. What is clear from this table is that at least this three-way distinction needs to be recognized to distinguish correctly the coreference options of NPs in English. Notice also that reflexive and non-reflexive pronouns seem to be in complementary distribution. We will now characterize the conditions for coreference for the three types of NPs in turn.

1.2 Binding

1.2.1 Reflexive and non-reflexive pronouns

We observed above that reflexive pronouns require an antecedent, and an antecedent within their local clause at that. This is illustrated in more detail in (1.12):

(1.12) (a) ∗That it rains bothers himself/herself. (no antecedent)
(b) ∗Carla$_4$ thinks that I hate herself$_4$. (non-local antecedent)
(c) Peter$_2$ watches himself$_2$ in the mirror. (local antecedent)

Turning now to non-reflexive pronouns, recall that they can occur with or without a sentence-internal antecedent, cf. (1.13), as long as the antecedent is not in the same local clause, cf. (1.13c):

(1.13) (a) That it rains bothers him/her. (no antecedent)
(b) Carla$_4$ thinks that I hate her$_4$. (non-local antecedent)
(c) ∗Peter$_3$ watches him$_3$ in the mirror. (local antecedent)

Based on these data we formulate our first version of the *Binding Conditions*:

(1.14) Binding Conditions (preliminary)
(A) A reflexive pronoun must have an antecedent within its local clause.
(B) A non-reflexive pronoun must not have an antecedent within its local clause.

(1.15) Ancillary definition:
α is within ϕ's *local clause* if α and ϕ are dominated by the same set of clausal nodes (S, $\bar{\text{S}}$, IP, CP, TP, AgrP . . .)

Exercise 1.1

In the following sentences, Φ designates an NP with the index given. For each sentence, determine by intuition what Φ can/must be (there may be more than one option in some cases). Then give the local clause and the antecedent for Φ and demonstrate that the Binding Conditions in (1.14) are met (example: Φ_3 in (1.16a) must be *himself*, its local clause is the matrix S/IP, and its antecedent is *Peter*, which is, correctly, in the same local clause):

(1.16) (a) Peter$_3$ watches Φ_3 in the mirror.
(b) Masha$_5$ believes that the swamp elks admire Φ_5.
(c) Masha$_5$ believes that [the swamp elks]$_{16}$ admire Φ_{16}.
(d) Masha$_5$ introduced Φ_5 to the swamp elks.
(e) Hermann$_8$ tried to be nice, and Gallia quite liked Φ_8. Now Φ_8 and Gallia go out to see a mud wrestling show.
(f) Masha$_5$ mentioned a swamp elk that was important to Φ_5.
(g) Φ_1's manager takes care of Cecilia$_1$'s business.
(h) Φ_1 takes care of Cecilia$_1$'s business.

1.2.2 Binding and binder

Before going on, we need to refine our previous treatment in one small but significant way. To see why, consider (1.17):

(1.17) (a) Carlotta$_{11}$'s dog accompanies her$_{11/6}$ to kindergarten.
(b) ∗Carlotta$_{11}$'s dog accompanies herself$_{11/6}$ to kindergarten.

The judgments in (1.17) are the reverse of what the Binding Conditions lead us to expect: *Carlotta* is clearly in the same local clause as *her*/*herself*, yet we

have to choose a non-reflexive pronoun to express coreference. This is in marked contrast to our earlier example (1.10), repeated here, which led to the formulation of the Binding Conditions above:

(1.18) Peter$_3$ watches himself$_3$/*him$_3$ in the mirror.

One difference is that *Peter* and *himself* in (1.18) are *clausemates*, whereas *Carlotta* and *her(self)* in (1.17) are not – *Carlotta* is the possessor to the subject, but only the subject and *her(self)* are clausemates. We can flesh out the notion 'clausemate' in various ways, e.g. as 'be arguments to the same predicate' (here: *watch*), or 'be immediate constituents of the same clause,' with subtly different results, as we will discuss immediately in sections 1.2.4 and 1.3.

Postponing a precise definition of clausemate, let us say that only an antecedent which is a clausemate to an NP can be a *binder* for that NP:

(1.19) Binding (preliminary): NP$_1$ binds NP$_2$ if and only if (iff)
(a) NP$_1$ and NP$_2$ are coindexed
(b) NP$_1$ precedes NP$_2$
(c) NP$_1$ and NP$_2$ are clausemates.
Then NP$_1$ is the *binder* of NP$_2$, and NP$_2$ is *bound* (by NP$_1$)

(1.19a) and (1.19b) are the same as in the definition of antecedent in (1.3) above, but clause (1.19c) is added. A binder, then, is simply an antecedent that is a clausemate of the bindee. We now replace the notion of 'have an antecedent' with the notion of 'be bound' in the Binding Conditions:

(1.20) Binding Conditions (still preliminary)
(A) A reflexive pronoun must have a binder within its local clause.
(B) A non-reflexive pronoun must not have a binder within its local clause.

In (1.18), repeated in (1.21a) below, *Peter* qualifies as a binder with respect to the pronoun in the object position of *watch* – it is coindexed with it, precedes it, and, being the subject of *watch*, is a clausemate. Hence Binding Condition A licenses a reflexive in object position, and Binding Condition B prohibits a non-reflexive. All's well:

(1.21) (a) Peter$_3$ watches himself$_3$/*him$_3$ in the mirror.
(b) Carlotta$_{11}$'s dog accompanies her$_{11}$/*herself$_{11}$ to kindergarten.

In the formerly problematic example (1.17), repeated in (1.21b) above, *Carlotta* is not a binder to the pronoun in the object position of *accompany* (though it is an antecedent); it is coindexed with it, and precedes it, but, being a modifier to *dog* rather than an argument to *accompany*, it fails on the clausemate condition in the definition of binder (1.19c). Binding Condition A thus prohibits a reflexive, and Binding Condition B allows a non-reflexive.

1.2.3 Full NPs

Turning now to full NPs, we observed that they cannot occur with a sentence internal antecedent at all, regardless of whether the antecedent occurs within the same local clause or not. The relevant data are repeated here:

(1.22) (a) That it rains bothers Peter. (no antecedent)
(b) ∗Carla$_4$/she$_4$ thinks that I hate Carla$_4$. (non-local antecedent)
(c) ∗Peter$_3$/he$_4$ watches Peter$_3$ in the mirror. (local antecedent)

The question that comes up is whether full NPs are allergic to antecedents, or just binders. To decide that question we have to look again at a case in which an NP antecedes a full NP without actually binding it, for example (1.23):

(1.23) (a) Her$_{11}$ dog accompanies Carlotta$_{11}$ to kindergarten.
(b) ?Carlotta's$_{11}$ dog accompanies Carlotta$_{11}$ to kindergarten.
(c) Carlotta's$_{11}$ dog accompanies the little darling$_{11}$ to kindergarten.

The pronoun in (1.23a) antecedes the full NP with no loss in acceptability. And even another full NP can, as in (1.23b), which is slightly degraded due to the repetition of the name, but head and shoulders above (1.22b); and (1.23c), which features an *epithet*, i.e. a definite NP which is coreferential with, though different in descriptive content from, its antecedent, is impeccable.

We conclude that, just as in the principles governing the coreference options of pronouns, the principle responsible for full NPs must make reference to the notion of binding, rather than antecedence:

(1.24) Binding Condition C: A full NP must not be bound.

I should like to point out here that the judgments in (1.23), while widely accepted, are not uncontroversial. Generally, name–name cases (*Peter*$_3$ . . . *Peter*$_3$) seem more acceptable than pronoun–name cases (*he*$_3$ . . . *Peter*$_3$) and for many speakers approach the degree of acceptibilty found in examples like (1.23b) (cf. e.g. Bach and Partee [1980], note 11, Evans (1980):356 a.o.). This can be seen as a phenomenon outside of grammar (after all, in the double name cases, the coreferential reading is the only way to interpret the sentence at all, while in the pronoun–name cases, there is a host of grammatical non-coreferent readings) or as a fact about BT proper, suggesting that Binding Condition C should only ban full NPs from being bound by a *pronoun* (Bach and Partee, 1980; Keenan, 1974); for further discussion see also Bresnan (2000), Lasnik (1986), as well as chapter 6. We will, for the time being, assume these cases to be unequivocally bad.

1.2.4 C-command

Before closing, we need to generalize the notion of binding slightly. As it stands, Binding Condition C does not exclude (1.22b), repeated here:

(1.25) ∗Carla$_4$/she$_4$ thinks that I hate Carla$_4$.

The reason is that (the first occurrence of) *Carla*/*she* in (1.25) doesn't *bind* the second in the technical sense defined in (1.19), because they are not clausemates:

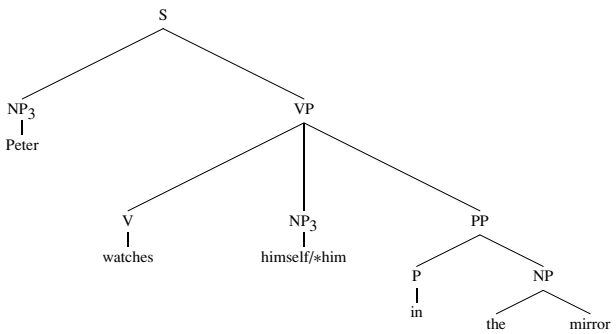
They are not immediate constituents of the same clause, nor are they arguments to the same verb (*think* versus *hate*). We therefore replace the notion of clausemate by a more general, asymmetric, notion, that of *c(onstituent)-command* (Reinhart, 1976):

(1.26) Node A *c-commands* node B in a phrase marker iff
(a) neither dominates the other, and
(b) every (branching) node that dominates A also dominates B[3]

(1.27) Binding (revised, still preliminary): NP_1 binds NP_2 iff
(a) NP_1 and NP_2 are coindexed
(b) NP_1 precedes NP_2
(c) NP_1 c-commands NP_2
Then NP_1 is the *binder* of NP_2, and NP_2 is *bound* (by NP_1).

Let us first verify how these new definitions subsume the old ones. Take (1.21a), repeated here; a phrase structure tree for this sentence will have the essential constituency shown in (1.28):

(1.28) $Peter_3$ watches $himself_3/*him_3$ in the mirror.

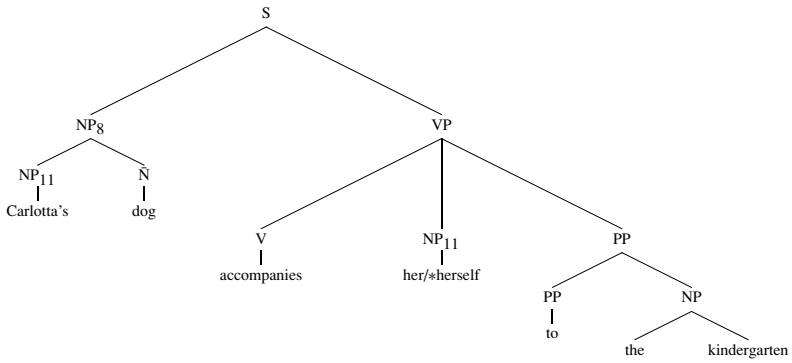


The only (branching) node dominating $[_{NP}Peter]_3$ is S, which means that $[_{NP}Peter]_3$ c-commands VP and everything dominated by VP, including $[_{NP}himself/him]_3$. Thus $[_{NP}Peter]_3$ is a binder for $[_{NP}himself/him]_3$, and, given that it is in the same local clause, it is correctly predicted that the latter has to be a reflexive, rather than a full NP or a non-reflexive pronoun.

Contrast this with (1.21b) repeated here along with a simple tree diagram:

(1.29) $Carlotta_{11}$'s dog accompanies $her_{11}/*herself_{11}$ to the kindergarten.

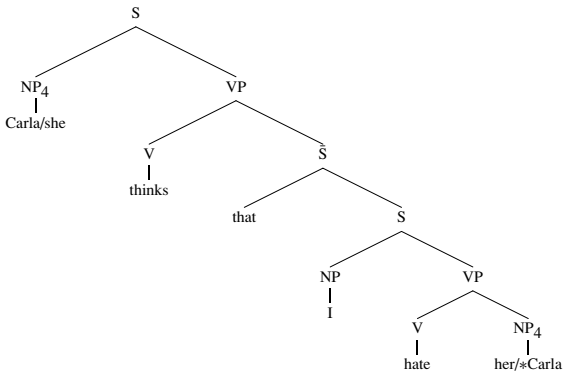
[3] Definitions in the literature usually include the qualification 'branching', even though as Barker and Pullum (1990) and Pullum (1986) note, this is rarely argued for, nor required, by the data in any obvious way. The cases discussed in this book provide no exceptions to that; indeed the notion of semantic binding to be introduced in chapter 4 directly embodies Pullum's stricter and arguably more natural notion of IDV-command, according to which a constituent's c-command domain simply consists of its sister constituent(s).



Here, NP_{11}, *Carlotta*, does not c-command VP or anything therein: nodes dominating NP_{11} are NP_8 and S, which means that NP_{11} merely c-commands the $\bar{N}$ *dog*; VP, and the pronominal NP_{11} within it, though dominated by S, are not dominated by NP_8, which means they are not dominated by *every* branching node dominating NP_{11}, *Carlotta*, as is required for binding due to (1.26b). Accordingly, $[_{NP}$ *her(self)*$]_{11}$ is not bound by $[_{NP}$ *Carlotta* $]_{11}$ by the new definition of binding, especially (1.27c), so that the Binding Conditions correctly predict a non-reflexive (or a name) in that position.

Crucially, the new definition of binding is 'downward unlimited', because an NP that c-commands a node A also c-commands every node dominated by A. This is the key to handling the Binding Condition C cases. Consider again (1.22b), repeated here:

(1.30) ∗Carla$_4$/she$_4$ thinks that I hate Carla$_4$.



Similar to (1.21a), the matrix subject NP_4, *Carla*, c-commands the matrix VP, *and everything dominated by the matrix VP*, including the object NP_4. Since the subject NP_4 is also coindexed with the object NP_4 and precedes it, it qualifies as a binder. Binding Condition C then excludes a name as the object NP_4, while Binding Condition B allows a non-reflexive pronoun in that position.

This completes our introduction to the ABC of Binding Theory for English. It should be stressed that the Binding Conditions as stated above are no longer

about the traditional, intuitive concept of antecedence, but about a more abstract concept, binding. Binding Theory, so construed, is then a theory only about a subset of anaphoric relations, excluding non-c-command anaphora, both across and within sentences. This embodies a strong and non-obvious hypothesis, namely that c-command, or some other command notion (more about which in section 1.3), is of utmost significance for BT, and that, accordingly, the data fall into two broad natural classes – binding versus non-c-command anaphora. We will continue to reflect upon the validity of these hypotheses in the course of this book.

On the other hand, if Binding Conditions are indeed based on the notion of c-command, they can serve as a probe into the phrase structure of a sentence: if an NP blocks the occurrence of a coindexed pronoun or full NP', NP must c-command NP'. Binding Condition C in particular will be useful in this regard, since it applies across clause boundaries. It has been suggested for example, that the pairs in (1.31) and (1.32) show that object clauses, but not temporal adverbial clauses, are c-commanded by the object, while both are c-commanded by the subject:

(1.31) (a) ∗The dog told him$_1$ [that the horse$_1$ would fall].
(b) The dog hit him$_1$ [while the horse$_1$ ate lunch].

(1.32) (a) ∗She$_8$'ll talk to me [when Sheila$_8$ gets back from lunch].
(b) I'll talk to Sheila$_8$ [when she$_8$ gets back from lunch].

While this method can be useful, it should be applied with care, for at least two reasons: first, as pointed out in section 1.2.3 above, the unacceptability of bound full NPs is itself not uncontroversial, and judgments seem to vary between speakers, but also in response to prosodic, stylistic, and discourse-pragmatic factors (see e.g. Carden and Dieterich [1981]; and Gerken and Bever [1986] for experimental results). Second, subordinated clauses are often found in displaced positions (e.g. through topicalizaton or extraposition), or at least could be for all we know, so that our conclusions from such examples rely in turn on our conclusions about the interaction of Binding Conditions with displacement (more on which in chapter 12). We will suggest that the phenomenon of *semantic binding*, to be introduced in chapter 4, may provide a more reliable diagnostic for c-command. Since we are presently concerned with demarcating conditions on binding themselves (rather than presupposing them to figure out constituency), we will for the most part ignore constructions whose constituent structure is itself subject to debate.

1.2.5 Taking stock

It will be useful to separate several parts or components of the theory, as these will be subject to criticism, revision, or modification later, independent of each other: