

# Binding Theory

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## 1 INTRODUCTION

This chapter discusses the distribution of NPs like the following.<sup>1</sup>

1. **Reflexives** like *herself* and **reciprocals** like *each other* are referentially dependent on another nominal (an **antecedent**).
2. **Pronouns** like *her* lack descriptive content. They can be, but are not necessarily, referentially dependent.
3. **Full NPs (R-expressions** in Chomsky 1981) like *the actress* are typically referentially independent, and descriptively richer than reflexives, reciprocals, or pronouns.

Unsurprisingly, these classes have different distributions. For example, because reflexives and reciprocals require antecedents, (1a–b) are well-formed (with *himself* referentially dependent on *John* and *each other* dependent on *the boys*), but (1c–d) are ungrammatical, either because the potential antecedent is mismatched in  $\phi$ -features (1c), or because there are no potential antecedents (1d).

- (1)
- a. *John* injured *himself*.
  - b. *The boys* injured *each other*.
  - c. \*Susan injured himself.
  - d. \*Himself was injured.

The relation between *John* and *himself* in (1a), or between *the boys* and *each other* in (1b), is one of **anaphora**, or referential dependence. Where possible, I indicate anaphoric relations with italics.

Other distributional restrictions on anaphora are less trivial. For example, in (2a), *John* cannot antecede *himself*, because it is embedded within a larger NP; no anaphoric relation is possible in (2b) because *John* is too remote from *himself* (perhaps because the clause boundary or the subject *Susan* intervenes); while in (2c), *John*, no relation can be established, because *himself* c-commands *John*.<sup>2</sup>

- (2)
- a. \*[[*John*]'s mother] injured *himself*.
  - b. \**John* believed [that Susan injured *himself*].
  - c. (i) \**Himself* injured *John*.  
(ii) \*Susan showed *himself* to *John*.

There are other constraints on anaphoric relations. Assume that *John* denotes some individual *j*. Countless other NPs, in the right circumstances, can denote *j*, including *himself*, *him*, and *that guy*. All the variants in (3a) could mean that Bill injured John, and all those in (3b) could mean that John injured Bill.

- (3) a. Bill injured him/John/that guy.  
b. He/John/That guy injured Bill.

However, to express the proposition *in jure'*(*j*, *j*), we cannot freely choose among these NPs, as (4) shows.

- (4) \**He/John/that guy* injured *him/John/that guy*.

These sentences are well-formed, but they cannot mean what (1a) means, despite the fact that *him*, *he*, *John*, and *that guy* can denote *j*. This is an example of **obviation**: the two NPs in (4) cannot both denote *j*.

The contrast between (1a) and (2) shows that **locality** effects constrain the distribution of reflexives and pronouns. Because of this, binding theory is intertwined with locality theory. Indeed, a major goal of the Extended Standard Theory (Chomsky 1973, 1976; Fiengo 1974; Reinhart 1976) was a unified theory of the locality of movement and binding. The crowning achievement of this period is the binding theory of Chomsky (1981). Chomsky proposed three simple binding principles, which also constrained the distribution of control and movement relations. Almost every nontrivial aspect of this theory has subsequently been challenged, but the *LGB* binding theory remains a landmark. We summarize it in a slightly modified form in Section 2. Following this, Sections 3 and 4 discuss the scope of the binding theory, distinguishing referential dependencies like that of *himself* from “**accidental**” coreference. Next, Section 5 discusses **long-distance anaphors**, which problematize the tripartition suggested above; and Section 6 scrutinizes the claim, implicit in Chomsky (1981), that reflexives and pronouns are in complementary distribution. Section 7 discusses the interaction of movement and binding, focusing on **connectivity** effects, where the binding theory applies to a moved element as if that element were still in its trace position. Finally, Section 8 concludes.

Given the breadth of binding-theoretic research, many key topics cannot be addressed in this chapter. We will adopt a narrowly syntactic focus on binding theory here, and largely ignore the morphology and semantics of pronominals and anaphora. Binding theory, by definition, straddles the syntax–semantics interface, and there is a rich semantic literature on anaphora (see Evans 1980 for foundational work, and Büring 2005: ch.7–11 for a recent introduction). Finally, there will be no discussion here of the acquisition of binding principles, despite its implications for our conception of the binding principles in adult as well as child grammar. See Chien & Wexler (1990); Grodzinsky & Reinhart (1993), and Thornton & Wexler (1999).

## 2 THE GB BINDING THEORY

Our starting point is the **GB Binding Theory**, essentially as in Chomsky (1981).<sup>3</sup> We will approach this theory incrementally, to understand why it has the (quite abstruse) form it does.

The GB Binding Theory inherits from the earliest generative work on anaphora (Lees & Klima 1963) the assumption that reflexives and pronouns are in **complementary distribution**. Still following Lees & Klima, we guarantee this by defining an environment in which reflexives must occur and pronouns are barred.

More precisely, we say that  $X$  **binds**  $Y$  iff  $Y$  is anaphorically related to  $X$  and  $X$  c-commands  $Y$ , and  $Y$  is **free** (within domain  $D$ ) if nothing within  $D$  binds  $Y$ . We then state two **binding principles**:

**A:** Reflexives are bound within a **binding domain**.

**B:** Pronouns are free within a **binding domain**.

Next, we define *binding domain*. (2b) suggests that binding domains might be clauses. This would predict contrasts like (5).

- (5) a. [John adores *himself*/\**him*]  
b. John said that [Susan adores *him*/\**himself*]  
c. [[[John]'s mother] adores *him*/\**himself*]

In (5a), there is a binder within the clause, so Principle A allows *himself* and Principle B forbids *him*. In (5b), the opposite is true: the pronominal is **locally free** (unbound within the clause), so *him* is chosen over *himself*. Finally, in (5c) there is no binder, as the antecedent *John* does not c-command the pronominal, and binding requires c-command. Again, then, *himself* is barred.

However, binding domains are not identical to clauses. Firstly, Exceptionally Case Marked (ECM) subjects with an antecedent in the immediately superordinate clause are realized as reflexives rather than pronouns.

- (6) [Susan believes [*herself*/\**her* to be adorable]]

Only ECM subjects can be thus bound: the subordinate clause remains a binding domain for objects.

- (7) [Susan expects [John to adore *her*/\**herself*]]

ECM subjects are distinguished by being assigned case across a clause boundary. This suggests that NP's binding domain must include its Case-assigner.

Next, consider binding within nominals. We correctly predict that (8) requires a reflexive rather than a pronoun: the smallest clause containing *herself* and a case-assigner is the matrix clause, which also contains the antecedent *Susan*.

- (8) [Susan heard [stories about *herself*/\**her*]]

However, we also predict, incorrectly, that (9) requires a reflexive.<sup>4</sup>

(9) [Susan heard [my stories about *her*/\**herself*]]

The contrast between (8) and (9) is predicted if binding domains can be either TP or NP, but must contain a subject (where possessors are construed as subjects of NP). The contrast then follows: the binding domain is then TP in (8), but NP in (9), as only in (9) does NP contain a subject.

Finally, consider anaphoric elements *within* ECM subjects. Here, we find the same contrast as in (8)–(9).

(10) a. [Susan expects [[stories about *herself*/\**her*] to be flattering]]  
b. [Susan expects [[my stories about *her*/\**herself*] to be flattering]].

However, at present, we predict both of these to require a pronoun: the binding domain in (10b) is *my stories about her(self)*, exactly parallel to (9), while in (10a) it is *stories about her(self) to be flattering*, the minimal TP containing *her(self)*, a case-assigner (*about*), and a subject (*stories about her(self)*). Neither domain contains the binder, *Susan*, so the pronominal is locally free, and must be realized as *her*.

We therefore refine the notion of “subject” pertinent to binding domains. We ignore *stories about her(self)* when calculating the binding domain for *her(self)*, because *her(self)* is part of *stories about her(self)* (Chomsky’s **i-within-i filter**). If we ignore *stories about her(self)*, the local subject in (10a) is *Susan*, in the matrix clause. This derives the contrast in (10): the matrix clause (including *Susan*) is the binding domain for *her(self)* in (10a), but in (10b), the binding domain is just the NP *my stories about her(self)*, excluding *Susan*.

This gives the following characterization of binding domains.<sup>5</sup>

(11) The **binding domain** for *X* is the minimal NP/TP containing:

- (i) *X*;
- (ii) *X*’s case-assigner;
- (iii) A subject which does not contain *X*.

Full NPs, our third nominal class, occur in a proper subset of the environments which allow pronouns. Substituting *Susan* for *her* in (5)–(10) is typically impossible. The sole exception is (5c), where substituting *John* for *him* is marginally acceptable.

(12) ?[[*John*]’s mother] adores *John*].

This is the only example in which neither instance of *John* c-commands the other, so neither NP is bound. This suggests the following.

**C:** Full NPs are globally free.

This completes the GB binding theory, summarized below.

(13) **Binding:**

- a. *X* binds *Y* (within domain *D*) iff *X* c-commands *Y* and *Y* is anaphorically related to *X*.
- b. *Y* is free (within domain *D*) iff there is no *X* within *D* that binds *Y*.

- (14) **Binding Domain:** The binding domain for  $X$  is the minimal NP or TP containing:
- (i)  $X$ ;
  - (ii)  $X$ 's case-assigner;
  - (iii) A subject which does not contain  $X$ .
- (15) **Binding Principles:**
- A:** Reflexives are bound within their binding domain.
  - B:** Pronouns are free within their binding domain.
  - C:** Full NPs are globally free.

This theory uses three binding principles to regulate three NP classes. These classes can be distinguished using two binary features, as in Table 1.

	+anaphoric	–anaphoric
+pronominal	—	pronoun
–pronominal	reflexive	full NP

Table 1: Features of three nominal classes

In fact, Chomsky proposed that each of these feature combinations also corresponds to an empty category, as in Table 2. The same principles that constrain overt nominals then determine the distribution of empty categories.

	+anaphoric	–anaphoric
+pronominal	PRO	<i>pro</i>
–pronominal	A-trace	A'-trace

Table 2: Features of four covert NPs

This implicates binding theory in the locality of movement and control. For example, A-traces, being anaphors, must be bound within their binding domain. Therefore, A-movement cannot cross a subject (a prohibition on **superraising**), because subjects delimit binding domains.

- (16) \**Susan* seems that Bill adores  $t$ .

On this approach, binding principles also constrain the distribution of PRO.<sup>6</sup> PRO is anaphoric *and* pronominal. It is therefore subject to Principles A and B. Therefore, it is both bound and free within its binding domain, a contradiction if PRO has a binding domain. Therefore, PRO cannot have a binding domain. This is known as the **PRO-theorem**, largely responsible in Chomsky (1981) for restricting the distribution of PRO to a subset of nonfinite subject positions.

- (17) **PRO-theorem:** PRO lacks a binding domain.

This is a hugely ambitious and conceptually attractive theory: not just a nuanced statement of the distribution of anaphoric NPs, but also the culmination of the program of situating binding at the heart of a theory of nonlocal dependencies. Ultimately, its merits depend on the reality of the similarities between these syntactic phenomena. We will return to this question in the Conclusion.

### 3 BINDING AND COREFERENCE

Reflexives are **dependent** elements: they need a binder and they know where to find one. Full NPs are free, **independent** elements. Pronouns, though, are more complex. Principle B says that they are locally free. Indeed, they are sometimes globally free. However, they are sometimes locally free but nonlocally bound.

To identify nonlocally bound pronouns, we must first distinguish between two types of anaphoric relation. **Variable binding** (also referred to below as *semantic binding*, to distinguish it from *syntactic binding*, defined in Section 2) occurs when a pronominal is interpreted as a variable, bound by an NP which has scope over it. The NP need not be referential: the clearest cases of variable binding involve **quantifiers** like *no boy* in (18).

- (18) a. *No boy* loves *himself*/\**him*.  
 b. *No boy* thinks that Richard loves *him*/\**himself*.

However, variable binding is structurally constrained because the binder must take scope over the variable. Assume, minimally, that binders cannot take scope across sentence boundaries. This explains the impossibility of variable binding in (19b).

- (19) a. *No boy* [left because *he* felt dejected]  
 b. \**No boy* [left]. *He* felt dejected.

The intersentential relationship between *Susan* and *she* in (20) cannot therefore be one of variable binding.

- (20) *Susan* went to sleep. *She* was exhausted.

We call such nonlocal anaphoric relations **coreference**: the assumption is that *Susan* and *she* refer to the same individual without any mediation from syntactic or semantic structure.

In sum, variable binding and coreference can be doubly dissociated. Variable binding must be local, but can involve nonreferential NPs. Coreference can be nonlocal, but must involve referential NPs.

Within the *LGB* binding theory, it is natural to assume that NPs can bind variables that they c-command at LF. In fact, though, Barker (2012) has argued convincingly that the structural configuration which determines variable binding is more inclusive than c-command. For instance, if *X* c-commands *Y*, then *X* can bind *Y*, but so can [Spec,*X*], [Spec,[Spec,*X*]], and so on.

- (21) a. [[*Every boy*]'s mother] worries about *him*.

- b. [[[*Every cat*]'s owner]'s furniture] is covered with *its* hair.

Although (21) could conceivably be analysed in terms of c-command at LF following local Quantifier Raising of the universal quantifier, other examples from Barker (2012) such as (22), where the quantifier is more deeply embedded in the subject, are not amenable to such an analysis.

- (22) a. [A friend [of *each contestant*]] stood behind *her*.  
 b. [The grade [that [*each student* receives]]] is recorded in *his* file.

We conclude, with Barker, that, although there is surely some structural constraint on variable binding, that constraint is not stated in terms of c-command. We will not attempt to define this more inclusive relation here. Instead, we will simply call it **almost-c-command** (following Hornstein 1995), and enumerate cases of almost-c-command.

- (23) a. **X almost-c-commands Y iff:**  
 (i) X c-commands Y;  
 (ii) X is [Spec,Z], where Z almost-c-commands Y;  
 (iii) Other configurations not discussed here.  
 b. X can **sem-bind** Y only if X almost-c-commands Y.

The dissociation between variable binding and coreference can then be stated as follows: variable binding requires that the binder almost-c-command the variable; coreference requires that both NPs be referential.

VP-ellipsis provides further evidence for this distinction. A pronoun within an elided VP often leads to ambiguity, as in (24).

- (24) John loves his shoes, and Bill does too.

If the first conjunct means that John loves John's shoes, the second conjunct can mean either that Bill loves John's shoes (the **strict** reading) or that Bill, like John, loves his own shoes (the **sloppy** reading). It cannot mean that Bill loves someone else's shoes. If the first conjunct means that John loves someone else's shoes (say, Terry's), the second must mean that Bill loves Terry's shoes too, not his own shoes, and not, say, Martin's. This gives four grammatical readings.<sup>7</sup>

- (25) a. John<sub>i</sub> loves his<sub>i</sub> shoes, and Bill<sub>j</sub> does ⟨love his<sub>i/j/\*k</sub> shoes⟩ too.  
 b. John<sub>i</sub> loves his<sub>j</sub> shoes, and Bill<sub>j</sub> does ⟨love his<sub>\*i/j/\*k</sub> shoes⟩ too.  
 c. John<sub>i</sub> loves his<sub>k</sub> shoes, and Bill<sub>j</sub> does ⟨love his<sub>\*i/\*j/k/\*l</sub> shoes⟩ too.

Suppose that the elided constituent must be semantically identical to the antecedent VP (a **parallelism** condition). This explains (25b–c), where *loves his<sub>j/k</sub> shoes* is interpretively identical in both conjuncts. However, the proposition that John<sub>i</sub> loves his<sub>i</sub> shoes (25a) can be generated in two ways: via binding or coreference. This difference is often represented as in (26).

- (26) a. John<sub>i</sub>[λx.x loves his<sub>i</sub> shoes] (coreference)  
 b. John<sub>i</sub>[λx.x loves x's shoes] (binding)

The second conjunct can then be interpreted in the following ways.

- (27) a. John<sub>i</sub>[λ*x*.*x* loves his<sub>i</sub> shoes] and Bill<sub>j</sub>[λ*x*.*x* loves his<sub>i</sub> shoes] (strict)  
 b. John<sub>i</sub>[λ*x*.*x* loves *x*'s shoes] and Bill<sub>j</sub>[λ*x*.*x* loves *x*'s shoes] (sloppy)

This exhausts the interpretive options: none of the ungrammatical interpretations in (25) can be generated without violating parallelism. The distinction between coreference and binding therefore provides an account of the strict/sloppy ambiguity under VP-ellipsis.

We can similarly explain an ambiguity in the interpretation of pronouns under focus, still following Reinhart (1983). (28) has three distinct interpretations.

- (28) I said that only Popeye should eat his spinach.  
 (i) I said that Popeye should eat Popeye's spinach and no-one else should eat Popeye's spinach.  
 (ii) I said that Popeye should eat Popeye's spinach and for no other individual *x* should *x* eat *x*'s spinach.  
 (iii) I said that Popeye should eat some other individual *y*'s spinach and no-one else should eat *y*'s spinach.

*Should eat his spinach* can be interpreted with *his* coreferential with *Popeye* (i), bound by *Popeye* (ii), or distinct from *Popeye* (iii). Given a standard semantics for *only*, where *only P* is true iff *P* is true and every proposition not entailed by *P* in *P*'s alternative set is false, the three readings for (28) fall out automatically.

We therefore distinguish variable binding (structurally constrained referential dependence) from coreference, where two NPs independently denote the same individual. Variable binding requires almost-c-command, while coreference is constrained by Principles B and C. Table 3 summarizes the properties of different nominal classes.

Class	Binding properties	Referential properties
Reflexives	Locally bound	Nonreferential
Pronouns	{ Locally free May be nonlocally bound }	Referential when free
Referential NPs <sup>8</sup>	Free	Referential
Quantifiers	Free	Nonreferential

Table 3: Properties of noun classes

## 4 OBVIATION

The distinction between binding and coreference forces us to sharpen Principles B and C, the **obviation principles** which prohibit binding in certain configurations. As Reinhart (1983) noted, these principles rule out certain cases of binding, but something must prohibit coreference in the same configurations. For instance, Principle B states



that *John* cannot bind *him* in (29), but we must also ensure that *John* and *him* do not corefer.

(29) \**John* admires *him*.

Relatedly, Principles B and C have several counterexamples, including the following (Grodzinsky & Reinhart 1993; Heim 1998).

(30) Everyone hates Lucifer. Only *he himself* pities *him*.

(31) *He* is *Colonel Weisskopf*

(32) I dreamt that I was Brigitte Bardot and *I* kissed *me*.

In all these examples, an NP's referent is considered from multiple perspectives. In (30), Lucifer is both a focus of hatred and a self-pitier. (31) does not mean that Colonel Weisskopf is himself, but rather reveals the identity of the person under discussion. Finally, (32) distinguishes George-*qua*-Brigitte from George-*qua*-George. Principles B and C are apparently suspended, then, if the two NPs in question refer to the same individual under different **guises**.

We cannot straightforwardly represent these meanings using variable binding. While *John is himself* could be given truth-conditionally identical representations using coreference (33a) or binding (33b), *he is John* can only be represented with coreference (34a): variable binding would render the sentence indistinguishable from *John is himself* (34b).

(33) a.  $j[\lambda x.x = j]$   
b.  $j[\lambda x.x = x]$

(34) a.  $x_1[\lambda x.x = j]$   
b.  $\#x_1/j[\lambda x.x = x]$

Similarly, (30) means that only Lucifer pities Lucifer, not that Lucifer is the only self-pitier. And (32) means that Brigitte Bardot, George's dreamworld counterpart, kissed George-in-the-real-world, not that George kissed George or Brigitte kissed Brigitte. We cannot use binding to represent these meanings, then. This suggests that  $NP_1$  and  $NP_2$  may occur in a configuration violating an obviation binding condition only if the resulting interpretation cannot be represented with  $NP_1$  a variable bound by  $NP_2$  (or *vice versa*).

If this is accurate, a syntactic constraint fails to apply in certain semantically defined circumstances. Reinhart (1983) took this as evidence that obviation was not, in fact, a syntactic phenomenon, but reflects a preference for variable binding over coreference, formulated as follows.

(35) *Rule I: Intrasentential Coreference*  
NP A cannot corefer with NP B if replacing A with C, C a variable A-bound by B, yields an indistinguishable interpretation (Grodzinsky & Reinhart 1993: 79)

Rule I is a transderivational economy principle rather than a strictly syntactic constraint. It mostly has similar effects to Principles B and C. For example, Principle C

blocks (36), because *John* must be free.

- (36) a. \**He* worships *John*.  
b. \**He* thinks Sally worships *John*

Similarly, Principle B blocks (37), because *him* must be locally free.

- (37) \**He* worships *him*.

Rule I also prohibits (36)–(37), because an identical interpretation is available using the appropriate bound form.

- (38) a. *He/John* worships *himself*.  
b. *He* thinks Sally worships *him*

Rule I allows coreference in two cases. One, discussed in Section 3 and also covered by Principles B and C, is where absence of c-command precludes binding.

- (39) [[Problems with *his* visa] mean [that *John* cannot come on tour]].

The other is where the bound interpretation and coreferential interpretation are distinct, as in (30)–(32). If the two interpretations are distinct, Rule I does not choose between them.

This leads to the natural suspicion that Principles B and C are unnecessary. However, it turns out that Rule I cannot replace Principles B and C: Principles B and C are concerned with syntactic binding (and so sensitive to c-command), while Rule I is concerned with semantic binding (and so sensitive to almost-c-command). It appears that we need conditions that are sensitive to both relations.

The evidence for this comes from patterns of variable binding involving **epithets**, a class of referentially dependent full NPs, like *the bastard* in (40).

- (40) I asked *my boss* for a raise, but *the bastard* refused.

The relationship between *my boss* and *the bastard* in (40) must be one of coreference, because the two NPs are not in an appropriate configuration for variable binding. As predicted by Principle C, if *my boss* c-commands the epithet (which, as a full NP, cannot be syntactically bound), *the bastard* cannot be interpreted anaphorically.

- (41) *My boss* said that *he/\*the bastard* can't give me a raise.

The interest comes in cases where a quantified NP binds an epithet. The logic of Rule I implies that it is concerned with the possibility of variable binding, and so is sensitive to almost-c-command rather than c-command. In contrast, Principle C constrains syntactic binding, and so is sensitive to c-command. Because of the discrepancy between c-command and almost-c-command, syntactic binding occurs in fewer configurations than variable binding. Principle C and Rule I therefore jointly make a subtle prediction: an NP cannot bind an epithet which it c-commands, but it can bind an epithet which it almost-c-commands. Rule I alone cannot match this prediction, because it does not distinguish c-command from almost-c-command.

This prediction is accurate (see Haik 1984 for early discussion). (42a) shows that an epithet cannot be bound by a c-commanding NP, while (42b) shows that an epithet *can* be bound by an almost c-commanding NP.

- (42) a. \**Every boy* thinks *the little angel* deserves more pocket money.  
 b. *Every boy's* mother wishes *the little brat* would clean his room.

A syntactic Principle C, sensitive to c-command, must therefore exist independently of Rule I. However, we cannot abandon Rule I: it is our only explanation for (30)–(32). We must therefore keep both principles. Principle C guarantees that a full NP is syntactically free, while Rule I enforces variable binding wherever possible. Similarly, Rule I selects a reflexive over a pronoun whenever binding requires a reflexive, but Principles A and B are still needed to determine the configurations in which reflexives are bound and pronouns are free.

Rule I is therefore logically separate from the binding principles, which determine the distribution of syntactically bound forms. By way of a summary, we state a binding theory compatible with these considerations.

- (43) *X* may **sem-bind** *Y* only if *Y* is interpreted as a variable and *X* almost-c-commands *Y*.

- (44) a. *X* **syn-binds** *Y* iff *X* sem-binds *Y* and *X* c-commands *Y*.  
 b. *Y* is **syn-free** iff nothing **syn-binds** *Y*.

- (45) **Binding Principles:**

**A:** Reflexives are syn-bound within their binding domain.

**B:** Pronouns are syn-free within their binding domain.

**C:** Full NPs are syn-free.

- (46) **Rule I**

A cannot corefer with B if there is a well-formed syntactic representation that yields an indistinguishable interpretation with A replaced by a variable sem-bound by B.

## 5 HOW MANY DISTINCTIONS?

This section discusses two related empirical challenges to the form of the binding principles. Firstly, many pronominals behave like both reflexives and pronouns. For example, English possessive pronouns can be locally bound, as in (47a), or locally free, as in (47b).

- (47) a. [*Bill* loathes [*his* shoes]].  
 b. *Bill* says that [*Rachel* loathes [*his* shoes]].

Under the GB binding theory, this entails that *his* is lexically ambiguous between a reflexive and a pronoun. However, English lacks forms like *himself's*, so it intuitively must use *his*. The challenge, following Safir (2004), is to make sense of this intuition.

A complementary challenge comes from forms which are sensitive to different binding domains, such as **ZICH-forms**, monomorphemic forms deficient in  $\phi$ -features like Dutch *zich*, Norwegian *seg*, and Icelandic *sig* (we concentrate on Dutch here — see Koster 1985; Everaert 1986; Koster & Reuland 1991b; Reinhart & Reuland 1993; Reuland 2001, 2011; Rooryck & Vanden Wyngaerd 2011). Dutch has a reflexive **SELF-form**, *zichzelf*, which mainly behaves like the similarly bimorphemic English *himself*: it can be locally bound (48), but not nonlocally bound (49).<sup>9</sup>

- (48) a. *John* haat *zichzelf*  
 John hates *zichzelf*  
 “John hates himself”  
 b. *John* schoot op *zichzelf*  
 John shot at *zichzelf*  
 “John shot at himself”
- (49) a. \**Mary* liet [Peter op *zichzelf* schieten]  
 Mary let Peter at *zichzelf* shoot  
 “Mary let Peter shoot at herself”  
 b. \**Mary* acht [Peter verliefd op *zichzelf*]  
 Mary considers Peter in love with *zichzelf*  
 “Mary considers Peter to be in love with herself”

Meanwhile, *zich* must be bound, but typically cannot occur where *zichzelf* can, with certain counterexamples discussed in Section 6. Instead, *zich* is used when the reflexive is more remote from its antecedent, for example across nonfinite subordinate clause boundaries, or as the complement of an unselected preposition.

- (50) a. [*Peter* zag [*Mary* naar *zich*(\**zelf*) toe komen]]  
 Peter saw Mary to *zich* to come  
 “Peter saw Mary coming towards him”  
 b. [*John* zag de slang [naast *zich*(\**zelf*)]]  
 John saw the snake near *zich*  
 “John saw the snake near him”

It seems, then, that *zich* is free within a domain, but bound within a larger domain. If the antecedent is outside even this larger domain, both *zich* and *zichzelf* become impossible, and a pronoun *hem/haar* must be used instead.

- (51) *Mieke* zag dat ik \**zich*/\**zichzelf*//*haar* schilderde  
 Mieke saw that I *zich/zichzelf*//her painted  
 “Mieke saw that I painted her” (Everaert 1986: 1)

*Zich*, then, is a “middle-distance” anaphor:<sup>10</sup>

- (52) a. *Zichzelf* is very locally bound (where subjects delimit very local domains).  
 b. *Zich* is locally, but not very locally, bound (where tense delimits local domains).  
 c. *Hem/haar* is locally free.

This suggests that binding domains come in different sizes. In turn, Principles A and B might be families of constraints, where “A-type” constraints insist that an element is bound within a certain domain, and “B-type” constraints insist that an element is free within a certain domain. *Zich* is even simultaneously subject to an A-type constraint within one domain and a B-type constraint within a smaller domain. Following Büring (2005), Principle C is reducible to a B-type constraint: full NPs are free within a domain corresponding to the root clause.

These ideas sparked two typologically-oriented research projects. One concerns the enumeration of binding domains (see Koster & Reuland 1991b), because these domains, together with the conjunction of A-type and B-type constraints, imply a typology of anaphors. The other concerns the relationship between an NP’s form and its binding domain. Morphologically complex *zichzelf*, like morphologically complex *himself* in English, requires local binding, while simplex *zich* requires nonlocal binding. Pica (1985, 1987) suggests that this is no accident: monomorphemic anaphors have larger binding domains than bimorphemic anaphors. It is common to see this, broadly speaking, as a combination of a general prohibition on identity among coarguments (enforcing disjoint reference in *John hates him*), and a notion of *-self* as a “shield,” somehow obviating that general prohibition. See Reuland (2011) for a recent take on this idea.

Moreover, Pica claims, **long-distance reflexives** like *zich* are subject-orientated. (50b) showed that *zich* in the PP *naast zich* is bound within the local tensed clause. In (53), then, either *Jan* or *Peter* could bind *zich* in principle, but only *Jan* is actually available.

- (53) Jan<sub>i</sub> raadde Peter<sub>j</sub> de vrouw naast zich<sub>i/\*j</sub> aan  
 Jan recommended Peter the woman near *zich* PRT  
 Jan recommended the woman near him to Peter (Koster 1987: 329)

It is common, still following Pica (1987), to explain this by positing an association between finite T and *zich*. Subject-orientation then follows from the fact that the subject position is the only A-position locally c-commanding finite T. However, there is no generally accepted explanation of Pica’s generalizations: it is widely accepted that the morphological composition of anaphors largely determines their syntactic and semantic behaviour, but no real consensus as to how this occurs. See Safir (2004); Reuland (2011); Rooryck & Vanden Wyngaerd (2011) for different approaches.

## 6 COMPLEMENTARITY AND NONCOMPLEMENTARITY

Where English has three noun classes, Dutch has five: *zich*, pronouns like *hem* and *haar*, *zichzelf*, a further class of reflexives like *hem/haarzelf* not discussed here, and full NPs. This could lead us to replace Principles A–C with Dutch-friendly Principles A–E. However, this would multiply apparent lexical ambiguities. Sometimes *him* translates as *zich*, and sometimes as *hem*. So *him* would share a class with *zich*, and also with *hem*, making *him* lexically ambiguous.

Instead, it seems natural that *him* has a wider distribution than *hem* or *zich* precisely because English has a tripartition where Dutch has a quinquedistribution. English has just locally bound reflexives, and a class of pronouns which occur elsewhere. Dutch has more forms to cover the same configurations, so some forms have narrower distributions.

This suggests a competition-based analysis, as recently pursued by Safir (2004). We specify constraints like (54), alongside a general **blocking principle**, that we pick the most specific form available.<sup>11</sup>

- (54) a. English reflexives are bound within their Binding Domain.  
 b. Pronouns need not be bound.

The blocking principle then ensures that pronouns are not bound within their Binding Domain: a reflexive could be used there instead, so pronouns are blocked.

This approach generalizes to the more complex Dutch system.

- (55) a. *Zichzelf* is bound within the minimal domain containing a subject.  
 b. *Zich* is bound by a subject within the minimal domain containing tense [blocked by *zichzelf*].  
 c. Pronouns need not be bound [blocked by *zich* and *zichzelf*].

A strength of this approach is that a form's apparently disjunctive behaviour does not imply lexical ambiguity. For example, *his* in (47) can be analysed as an unambiguous pronoun, which can encroach on the locally bound territory of reflexives because English does not have possessive reflexives.

A competition-based theory makes two general predictions. First, provided there is an elsewhere variant, a pronominal form is always available (that is, there is no **ineffability**). Second, pronominal forms are in **complementary distribution**. Unfortunately, both of these predictions have apparent counterexamples. For example, both reflexives and pronominals are possible in **picture-NPs**, discussed already in Jackendoff (1968) (see also Pollard & Sag 1992; Reinhart & Reuland 1993). It is classically assumed that NP-internal subjects delimit a reflexive's binding domain (56b). If, however, an NP does not contain a subject, it can contain a pronoun or a reflexive.<sup>12</sup>

- (56) a. *Sally* saw a picture of *her(self)*.  
 b. *Sally* saw Peter's picture of *her(\*self)*.

Following Huang (1982), such noncomplementarity suggests that the domain in which pronouns are free is smaller than that in which reflexives are bound. This is the basis of an ambitious reworking of the binding theory in Reinhart & Reuland (1993, henceforth *R&R*). *R&R* proposed that binding theory is at heart about the relationship between the reflexivity of a predicate (one argument filling two argument positions) and the marking of a predicate as reflexive. A simplified version of their theory states that a predicate is reflexive-marked (by some reflexive form) iff it is reflexive.

This simplified version predicts complementarity: reflexives would be bound by coarguments, and pronouns would be used elsewhere. The noncomplementarity in *R&R*'s theory comes from their use of two different definitions of *predicate*. A **syn-**

**tactic predicate** contains a head  $P$ , everything Case- or  $\theta$ -marked by  $P$ , and a subject. A **semantic predicate** is a functor and all its arguments in some semantic representation.

On these definitions, a syntactic predicate is typically bigger than a semantic predicate: the arguments in a semantic predicate are typically  $\theta$ -marked, and so included within a syntactic predicate, but a syntactic predicate contains material excluded from semantic predicates, such as ECM subjects (which are case-marked by  $P$  but not semantic arguments of  $P$ ) or material between  $P$  and the locally c-commanding subject. This is the factor deriving noncomplementarity: if Principle B requires that pronouns be free within semantic predicates, and Principle A requires that reflexives be bound within larger syntactic predicates, either form is possible when a dependency is contained within a syntactic predicate but not a semantic predicate.

R&R formulated the Binding Principles as follows.

(57) **Binding Principles (Reinhart & Reuland 1993):**

**A:** A reflexive-marked syntactic predicate is reflexive.

**B:** A reflexive semantic predicate is reflexive-marked.

Reflexive-marking canonically involves use of a reflexive form like *herself*. (58a) is acceptable because the semantic predicate is reflexive, and *herself* provides the reflexive-marking. (58b), though, violates Principle A: *himself* reflexive-marks the subordinate clause, but it is not reflexive.

- (58) a. *Julie adores herself*  
 b. \**John* said that [*Julie adores himself*]

Of course, (59) is both reflexive and reflexive-marked.

- (59) \**Herself* adores *Julie*

R&R rule this out using their Chain Condition, which states that **dependent** elements (SELF-forms, ZICH-forms, and NP-trace) are always bound from an A-position, while **independent** elements (pronouns and full NPs) never are. This separates the parts of the binding theory concerning the general, asymmetric notion of dependency (handled by the Chain Condition) from a symmetrical, binding-specific residue consisting of well-formedness conditions on reflexive predicates (Principles A and B).

As for standard Principle B violations, (60a) is reflexive, but not reflexive-marked, so Principle B rules it out. In (60b), in contrast, *John* and *him* are arguments of different semantic predicates, so Principle B does not require reflexive-marking and the sentence is grammatical.

- (60) a. \**John* adores *him*.  
 b. *John* thinks that [no-one adores *him*].

R&R therefore predict complementarity in the basic cases. However, they also predict noncomplementarity when a pronominal and its antecedent are within the same syntactic predicate but different semantic predicates. When that obtains, neither semantic predicate is reflexive, so Principle B does not require reflexive-marking. However, the

syntactic predicate is reflexive, so Principle A is satisfied if an argument is reflexive-marked.

This configuration can arise because semantic predicates are delimited only by functors, while syntactic predicates, like binding domains in the GB binding theory, must contain other material, in particular subjects. So NP is both a syntactic and semantic predicate in (61b), but in (61a), *Julie* and *her(self)* are arguments of the same syntactic predicate, but not the same semantic predicate. Principle B therefore does not require reflexive-marking (the semantic predicates are nonreflexive), while Principle A is compatible with reflexive-marking (the syntactic predicate is reflexive).<sup>13</sup>

- (61) a. *Julie* adores pictures of *her(self)*  
 b. *Julie* adores [John's pictures of *her(\*self)*]

A second example of noncomplementarity involves *zich* and *zichzelf* in ECM subjects. *Zich* is a dependent element (like *zichzelf*) which does not reflexive-mark a predicate (unlike *zichzelf*). Because *zich* does not reflexive-mark a predicate, it always satisfies Principle A. Its distribution is rather regulated by Principle B for R&R, following similar proposals by Koster (1985) and Everaert (1986).

Because of Principle B, *zich*'s antecedent is typically not within the same semantic predicate: the predicate would be reflexive, but not reflexive-marked, illegitimately.

- (62) \**John* haat *zich*  
 John hates *zich*  
 "John hates himself"

When *zich*'s antecedent is not a semantic coargument, Principle B is satisfied and the sentence is well-formed. This correctly predicts noncomplementarity in Dutch ECM subjects.

- (63) *Max* hoorde *zich(zelf)* zingen  
 Max heard *zich(zelf)* sing  
 "Max heard himself sing"

(63) contains two semantic predicates: *zich(zelf) zingen* and *Max hoorde [zich(zelf) zingen]*. Crucially, *Max* and *zich(zelf)* are not semantic coarguments. Therefore, there is no reflexive semantic predicate, and Principle B is vacuously satisfied. Moreover, the whole sentence is a reflexive syntactic predicate. Therefore, even if the pronominal is reflexive, Principle A is satisfied.<sup>14</sup>

R&R also claim that their theory predicts cases of ineffability, the second challenge to competition-based theories. Lasnik (1989) claimed that neither a reflexive or pronominal object is possible if the referent of that object is properly included in the referent of the antecedent subject.

- (64) \*We voted for me/myself

However, R&R show that this ineffability only holds with distributive predicates. Collective predicates allow pronouns in this configuration.

- (65) We elected me/\*myself



The impossibility of *myself* follows from Principle A: *myself* reflexive-marks the syntactic predicate, but it has no antecedent. As for Principle B, the acceptability of (65) follows along similar lines: so long as *me* is distinct from *we* at the relevant level of representation, the predicate is not reflexive and Principle B is vacuously satisfied. In (64), in contrast, *vote for* is arguably distributive: *we voted for me* iff *I voted for me* and *X voted for me*, for some  $X \neq "I."$  Of these conjuncts, *I voted for me* is reflexive, without reflexive-marking. If Principle B is evaluated at a level which is sensitive to distributivity, then, R&R's theory can capture this contrast.<sup>15</sup>

None of these failures of complementarity fit naturally with a competition-based theory like that of Safir (2004). However, they are not incompatible with such theories if competition is sometimes suspended. For example, the optionality in Dutch ECM subjects (63) could reflect an interpretive difference noted by R&R and many subsequent authors. The *zich*-variant of (66) means that Munchhausen extracted himself from the swamp by pulling on something, while the *zichzelf*-variant means that Munchhausen extracts himself by pulling his own hair.

- (66) *Munchhausen trok zich(zelf) uit het moraa*  
 Munchhausen pulled *zich(zelf)* from the swamp  
 "Munchhausen pulled himself out of the swamp" (Reinhart & Reuland 1993: 710)

This is surely related to the fact that the **statue readings** of Jackendoff (1992) require a *self*-reflexive. (67a) is naturally interpreted in such a way that flesh-and-blood Ringo falls on the waxwork of Ringo, while (67b) is more resistant of an interpretation where the waxwork of Ringo falls on flesh-and-blood Ringo.

- (67) The other day I was strolling through the wax museum with Ringo Starr, and we came upon the statues of the Beatles, and...  
 a. ?... all of a sudden Ringo stumbled and fell on himself.  
 b. \*... all of a sudden I accidentally bumped into the statues, and Ringo toppled over and fell on himself. (Jackendoff 1992: 4–5)

As first discussed by Reuland (2001), Dutch translations of these statue readings, where the reflexive's referent is nonidentical to the full NP's referent, require *zichzelf* rather than *zich*, even in syntactic environments where both forms are normally available. This is useful for competition-based theories like Safir's, because if the two forms mean different things, it may be possible to explain noncomplementarity on the grounds that the two forms are not competing anyway. Likewise, Safir may attempt to account for cases of ineffability ((64)–(65)) if an elsewhere variant is sometimes exceptionally unavailable.

The complementarity debate is therefore central to global binding-theoretic concerns. Safir's theory is very elegant: intricate binding patterns are explained by the interaction of simply specified binding domains, a general blocking principle, and general syntactic and interpretive conditions. R&R's theory, in contrast, is quite inelegant: one condition is stated over syntactic domains, another over semantic domains, and a third condition constrains the form of A-dependencies. Moreover, R&R deploy three principles to capture the distribution of three categories (ZELF-forms, ZICH-forms, and pronouns), and more classes would require more principles.<sup>16</sup> In contrast, Safir's the-

ory generalizes to arbitrarily complex pronominal systems.

Which of these routes is to be preferred is substantially dependent on one's treatment of complementarity. Safir sees it as pervasive, so he built a system to capture it. R&R see it as essentially accidental, as do Rooryck & Vanden Wyngaerd (2011), in their otherwise very different take on binding theory. For R&R, complementarity is widespread because syntactic and semantic predicates tend to align, but noncomplementarity may arise when these domains diverge.

## 7 CONNECTIVITY

In (68), *herself* is bound by a non-c-commanding antecedent, in apparent violation of Principle A.

- (68) a. [Which picture of *herself*] does [*no girl* want to see \_\_\_]?  
b. (She likes her family, but) *herself*, [*Susan* just adores \_\_\_].

This is apparently related to movement of *herself*, either on its own (68b), or as part of a larger NP (68a): (68) would be unremarkable if *herself* were interpreted in its base position. Cases where movement does not affect binding relations are known as **reconstruction** or **connectivity** effects. The predominant theory of connectivity is currently Chomsky's (1993) Copy Theory. On that theory, movement phenomena arise when multiple copies of the same constituent are merged, and connectivity effects arise when the copy that is interpreted is not the last to be merged.

Here, we discuss binding data like (68) and their implications for theories of connectivity in general, with a view to evaluating the empirical basis of those theories. Of course, one's theory of connectivity depends on one's theory of binding. (68) is surprising under the standard GB binding theory, but the foregoing has demonstrated a number of independent problems with that theory. We must therefore ask whether (68) is really indicative of connectivity.

Similar concerns extend to (69).

- (69) Which picture of *himself* does [*John* think \_\_\_ [*Mary* likes \_\_\_]]

If *himself* were bound in its base position, *Mary* would be the only local potential antecedent, so (69) should be ungrammatical. Instead, *himself* seems to be locally bound by *John* in the intermediate trace position.

Sentences like (69) therefore assumed a deal of theoretical significance, because they apparently demonstrated binding into intermediate trace positions. However, this conclusion is called into question by the independent existence of a class of cases, known following Pollard & Sag (1992) as **exempt anaphora**, where a reflexive appears without a locally c-commanding antecedent. Two environments which tolerate exempt anaphora are coordinate structures (70a) and unselected PPs (70b) — many researchers, including Pollard & Sag, also include *picture*-NPs like (61a).

- (70) a. *Max* boasted that the queen invited [*Lucie* and *him(self)*] for a drink (Reinhart & Reuland 1993: 670)

- b. *Lucie* counted five tourists in the room [apart from *her(self)*]. (Reinhart & Reuland 1993: 661)

Without aiming to construct a theory of why exempt anaphora exist, or their distribution of interpretation,<sup>17</sup> the immediate worry is that, if the reflexives in (70) are interpreted *in situ* without a locally c-commanding antecedent, maybe the same holds for the reflexive in (69), and so that example is not in fact indicative of interpretation of a moved element in an intermediate trace position.

This alternative is supported by the fact that such binding configurations are acceptable even at *wh*-island boundaries, where no intermediate trace site is typically assumed.<sup>18</sup>

- (71) a. Which picture of *himself* did [*John* ask [whether Mary liked \_\_ ]]?  
 b. Which picture of *himself* is [*John* wondering [what Mary should say about \_\_ ]]?

Moreover, as Buring (2005) points out, in German, which lacks exempt anaphors, an A'-moved reflexive must be interpreted in its base position. (72) is therefore acceptable, while (73) is not, as the reflexive would have to be interpreted in its surface position to be bound by *Hans*.

- (72) *Wieviele Gedichte über sich* wird Schulze noch schreiben?!  
 How many poems about *zich* will Schulze still write  
 "How many more poems about himself is Schulze going to write?!" (Buring 2005: 247)
- (73) \**Hans* fragte welche Bilder von *sich* ich gesehen hatte  
 Hans asked which pictures of *zich* I seen had  
 "Hans asked which pictures of him(self) I had seen" (Buring 2005: 255)

We conclude, with Buring, that Principle A connectivity is real, but must target a constituent's base position. Apparent counterexamples are actually exempt anaphors.

Specificational pseudoclefts illustrate further surprising properties of connectivity.

- (74) a. [[What<sub>*i*</sub> *John* likes *t<sub>i</sub>*] is *himself*]  
 b. \*[[What<sub>*i*</sub> *John* likes *t<sub>i</sub>*] is *him*]  
 c. \*[[What<sub>*i*</sub> *he* likes *t<sub>i</sub>*] is *John*]

Neither NP c-commands the other in (74), but if the postcopular NP were interpreted in the trace position, the judgements would follow automatically. This suggests a connectivity effect.

In fact, (74b–c) suggest not only that Principle B and C connectivity *exists*, but that it is *obligatory* (see also Lebeaux 2009). If it were optional, we would predict (74b–c) to be grammatical, provided connectivity was not established. We will return to this shortly.

Higgins (1973) claimed that pseudocleft connectivity demonstrated that connectivity is independent of movement. Movement targets c-commanding positions, but the postcopular NP in (74) does not c-command the trace. Moreover, the trace is bound by A'-moved *what*. The postcopular NP therefore cannot have moved from the trace

position.

To handle this on the standard GB approach, we must recreate something with the form of *John likes himself* from (74a), *John likes him* from (74b), and *he likes John* from (74c). There are several ways of doing this: we could associate the postcopular NP with the gap position, either at LF (Bošković 1997), or at a post-LF representation (Heycock & Kroch 1999). Alternatively, we could treat (74) as derived by ellipsis from colloquial sentences like (75) (Ross 1972; Schlenker 2003).

- (75) a. [[What John likes \_\_] is [*John likes himself*]]  
b. \*[[What John likes \_\_] is [*John likes him*]]  
c. \*[[What he likes \_\_] is [*he likes John*]]

The binding principles would then be evaluated within the (possibly elided) postcopular material.

Reinhart & Reuland's binding theory handles (74b–c) more straightforwardly. For R&R, Principle B operates over semantic predicates, regardless of the syntactic realization of those predicates. If all of the examples in (74) contain a semantic predicate like  $(\lambda x.like(x,x))(j)$ , then they are all reflexive. Principle B requires that that predicate be reflexive-marked. Only (74a) satisfies that requirement.

The grammaticality of (74a) is *not* directly predicted by that theory, though: *John* and *himself* are not syntactic coarguments, so we have reflexive-marking without reflexivity, in violation of R&R's Principle A. Some account of Principle A connectivity is still needed, then.

Unifying the insights from German and from specificational pseudoclefts, we could generalize that binding connectivity effects arise when a moved XP is interpreted in a  $\theta$ -position with which it is associated. Reflexives within a moved XP are bound in XP's  $\theta$ -position or are interpreted as exempt anaphors; pronouns must be locally free in XP's  $\theta$ -position; and full NPs must be free in XP's  $\theta$ -position.

This generalization is surprising on standard formulations of the copy theory, which tie connectivity effects to movement rather than to  $\theta$ -positions. However, possible support for the copy theory comes from the distribution of Principle C effects in A'-movement constructions, discussed by Lebeaux (1988). For many speakers, (76) is ungrammatical, as predicted.<sup>19</sup>

- (76) \*[[Which picture of *John*] does [*he like* \_\_ ]]?

A more nuanced pattern emerges, though, with (77).

- (77) a. \*[Whose claim [that *John* is nice]] did *he* believe \_\_ ?  
b. [Which story [that *John* wrote]] did *he* like \_\_ ? (Lebeaux 1988: 103)

Early discussions like van Riemsdijk & Williams (1981) assumed that such distinctions were gradient, related to depth of embedding of *John* within the *wh*-phrase. However, Lebeaux proposed a discrete distinction, which we will call **Lebeaux's generalization**: if NP is A'-moved, Principle C connectivity effects obtain within complements of the moved N (77a), but not within adjuncts adjoined to NP (77b). This distinction reduces to the projection principle: complements must be merged in base positions, but

unselected adjuncts can be merged after movement, obviating the connectivity effect. Copy-theoretically, the distinction is as follows.

- (78) a. \*[Whose claim that *John* is nice] did [*he* believe [whose claim that *John* is nice]]  
 b. [Which story that *John* wrote] did [*he* like [which story]]

Only in (78a) is an instance of *John* c-commanded by *he*, so only (78a) violates Principle C. This is potentially a major argument in favour of copy theory: it provides a natural account of Lebeaux’s generalization, relying only on independently motivated principles like the Projection Principle.

However, we briefly explore here an alternative, based on Kuno (1997). Lebeaux’s argument–adjunct distinction is independently predicted in a proper subset of A’-movement cases. Rule I, which requires the use of bound forms wherever possible, dictates that examples like (79) are possible iff corresponding examples like (80) are impossible.

- (79) a. ?\*Which pictures of *John* did *he* destroy \_\_ ?  
 b. Which pictures near *John* did *he* destroy \_\_ ? (Lebeaux 1988: 103)
- (80) a. Which pictures of *himself* did *John* destroy \_\_ ?  
 b. \*Which pictures near *himself* did *John* destroy \_\_ ?

This explains the apparent adjunct–complement distinction in (79), without reference to connectivity.<sup>20</sup> However, this explanation cannot extend to (77), as nominative reflexives are universally ungrammatical.

- (81) a. \*Whose claim that *himself* is nice did *John* believe \_\_ ?  
 b. \*Which story that *himself* wrote did *John* like \_\_ ?

If the contrast in (77) is robust and general, then, it supports Lebeaux’s generalization. However, these data are in fact highly variable. Kuno writes that most speakers find (82) unacceptable “only under the interpretation whereby *which claim that John was asleep* is paraphraseable as ‘which of the claims that John made to the effect that he was asleep’. To those speakers, the sentence is acceptable if other people’s claims that John was asleep are under discussion” (p.16).

- (82) \*Which claim that *John* was asleep was *he* willing to discuss? (Chomsky 1993, Chomsky’s judgement)

Kuno attributes this effect to his **Logophoric NP Constraint** (see also Büring 2005), which predicts Principle C connectivity effects in configurations like (82) only if the CP describes the feelings, thoughts, or speech of *John* or communicated to *John*.

This approach splits Lebeaux’s generalization in two. One part follows Lebeaux’s predictions, but with independent justification. The other part replaces Lebeaux’s argument–adjunct distinction with an orthogonal distinction related to logophoricity. Although Lebeaux’s generalization seems too variable to form the basis of a solid argument about the architecture of the grammar, this alternative has received little critical attention, and effects related to logophoricity are poorly understood.

As a matter of priority, the empirical facts must be determined. At least four different factors have been claimed to influence Principle C connectivity: depth of embedding (van Riemsdijk & Williams 1981), the argument–adjunct distinction (Lebeaux 1988), competition with reflexive forms (Kuno 1997 as reinterpreted above), and logophoricity (Kuno 1997). Given that Lebeaux’s generalization directly supports Chomsky’s fine-grained copy-theoretic proposals, it is vital to current syntactic theory that the impact of these multiple factors be assessed systematically. However, this has not yet been carried out, to my knowledge.

## 8 SUMMARY, AND FUTURE DIRECTIONS

After fifty years of binding-theoretic research, and over thirty years after Chomsky (1981), we are still far from a definitive binding theory. However, progress has been substantial. The initial phase of binding-theoretic research, leading to *LGB* and Reinhart (1983), was characterized by discovery of fundamental distinctions in English anaphora like that between binding and coreference, and increasingly subtle statements of the locality constraints on binding. Three major subsequent developments have occurred: the empirical base has broadened to include extensive data from Romance, Germanic, East Asian languages, and beyond, which have demonstrated that Chomsky’s tripartition of nominals is insufficient. In parallel, nontrivial exceptions have been discovered to the complementarity implicit in the classical Principles A and B. Finally, connectivity effects have increasingly occupied researchers.

These trends have pulled researchers in different directions. A competition-based theory like Safir (2004) has the virtue of scalability: the general principle requiring the use of the most dependent available form applies regardless of how many anaphors a language has. However, complementarity inheres in the architecture of such a theory, and apparent exceptions to complementarity certainly exist.

In contrast, Reinhart & Reuland (1993) and subsequent research is designed to accommodate noncomplementarity, because their Principles A and B are stated over different domains. Competition in Reinhart’s binding theory is extrinsic to the binding principles, in a separate, interpretation-sensitive principle (Rule I, Grodzinsky & Reinhart 1993).

Just as this theory is strong where Safir’s appears weakest, this theory lacks Safir’s main strength. The ratio of nominal classes to regulatory principles in R&R’s theory is 1:1. There is therefore no reason to expect this theory to handle anaphors with other distributions, especially elsewhere-type distributions, as neatly as Safir’s.

This suggests a critical question for future binding-theoretic research:

- What is the status of exceptions to complementarity among the nominal classes? When is a binding theory based on competition and complementarity appropriate?

A second question concerns connectivity effects. As we have seen, it is hard to spot a genuine connectivity effect, given the uncertainty about the basic nature of the binding theory. However, the distribution of genuine connectivity effects is vital, not just to the

construction of more accurate theories of binding, but also of the architecture of the grammar, as demonstrated by Lebeaux (1988) and Chomsky (1993). We therefore ask:

- What constitutes a genuine connectivity effect? Where do we find them, and what do they imply about theories of the syntax–semantics interface?

This brings us back to the extraordinary scope of Chomsky’s (1981) binding theory, intended not just as a theory of the distribution of anaphors, but as a major constraint on nonlocal dependencies. That project has been largely abandoned. Within Chomskyan theories in particular, the distinction of four empty categories (NP-trace, *wh*-trace, PRO, and *pro*) has collapsed. The two traces are no longer construed as primitives within the copy theory (but see Neeleman & van de Koot 2002), while it is now common to distinguish reflexive-like obligatory control PRO, from pronominal PRO in non-obligatory control constructions (Hornstein 1999).

Of the original four empty categories, then, only *pro* remains more or less unscathed. Moreover, despite attempts to unify the locality of movement and binding (Chomsky 1986; Rizzi 1990b; Cinque 1990), a residual distinction between the two classes always remained, weakening the original basis for the unification of binding and movement.

And yet the underlying idea remains compelling, and attempts to conflate aspects of movement and binding remain widespread. For example, subject-oriented anaphors have been analysed in terms of movement to T combined with a requirement that the antecedent locally *c*-command the anaphor (Pica 1987); and locality of NP-movement has been analysed using a lexicalized NP-trace that behaves like a null reflexive (Williams 1994; Neeleman & van de Koot 2002). This suggests a third major question.

- How similar are binding and movement? How should any similarities be captured?

Such questions are daunting, but that is why research in this area retains its vitality. Indeed, it is remarkable that we began with the modest aim of describing the distribution of forms like *herself* and *her*, and progressed via a series of increasingly rich theories to a point, 50 years later, where those questions directly inform fundamental theories of the architecture of the grammar.

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## FURTHER READING

- Büring (2005) is an excellent textbook-length introduction to the syntax and semantics of binding, with copious references to core primary literature.
- Book-length comprehensive treatments of the binding theory are currently appearing at a rate of roughly one per year — the ideas summarized here are developed much further in Safir (2004); Reuland (2011); and Rooryck & Vanden Wyngaerd (2011). These works also all develop theories of the relationship between the morphological form and syntactic behaviour of pronominals.
- Although this chapter has aimed to highlight issues in the syntax of binding, the semantics of binding is equally interesting. Büring (2005) is again an excellent starting point, with papers such as Evans (1980); Sells (1987); Jackendoff (1992); and Holmberg (2010) providing an indication of the wealth of empirical challenges in this area.

## NOTES

Thanks to Dan Siddiqi and Françoise Moreau-Johnson for comments on an earlier draft.

<sup>1</sup>I use the term *reflexive* rather than Chomsky's (1981) term *anaphor*, because *anaphor* is also used to describe any referentially dependent constituent. However, I adopt Chomsky's restricted sense of *pronoun*, and reserve the term *pronominal* as a general term for overt nominals other than full NPs.

<sup>2</sup>We largely ignore reciprocals from now on. As the reader can verify, the distribution of *each other* is largely identical to that of *himself*. However, complex semantic issues arise with reciprocals, (see Dalrymple et al. 1998): *The delegates greeted each other* typically means that each delegate greeted all the other delegates, while *the chairs are stacked on top of each other* typically means that each table is either on top of, or underneath, some other table. These semantic subtleties are beyond the scope of this chapter.

<sup>3</sup>The major difference between what follows and Chomsky (1981) is that we assume Reinhart's (1976) definition of c-command: *A c-commands B* iff *A* does not dominate *B* and *A*'s mother dominates *B*. Chomsky used a more inclusive relation sometimes called *m-command* instead. I believe the theory presented here is the normal understanding of the GB binding theory, m-command having fallen by the wayside.

<sup>4</sup>How degraded (9) is is a matter of debate, being addressed by experimental research (see Kaiser et al. 2009 and references therein).

<sup>5</sup>(11) incorrectly predicts that (i) is acceptable, with the matrix clause as a binding domain.

(i) \**Susan* thinks that *herself* is adorable.

This led Chomsky to state that finite agreement is a subject distinct from *herself* for the determination of binding domains (see also Rizzi 1990a). Finite clauses are then always binding domains.

<sup>6</sup>The other two empty categories, *A'*-trace and *pro*, are beyond the scope of this chapter.

<sup>7</sup>I represent multiple anaphoric relations with coindexation. This does not imply a commitment to an indexing-based treatment of anaphora.

<sup>8</sup>We define **referential NPs** as nonquantified full NPs. With minor exceptions, any full NP is a referential NP or a quantifier.

<sup>9</sup>All Dutch examples are from Koster (1985) unless otherwise stated.

<sup>10</sup>This approach, based on variation in the size of locality domains, was pioneered by Koster (1985, 1987) and Koster & Reuland (1991a), and endorsed by Büring (2005). The text ignores locally bound uses of *zich* occurring as an argument of an inherently reflexive predicate (e.g. *Jan schaamt zich* “Jan is ashamed of himself”). See Reinhart & Reuland (1993) and much subsequent work for discussion.

<sup>11</sup>“Most specific” can be understood, following Reinhart (1983), as “compatible with the narrowest range of structural binding configurations,” the idea being that this would leave the hearer less work to identify the intended antecedent. If we assume, along the lines of Reuland (2011), that discourse-based coreference relations are less deterministic than variable-binding relations, which in turn are less deterministic than syntactically mediated binding relations, then the preference for binding over coreference described by Rule I becomes a special case of this more general preference for tightly constrained binding relations.

<sup>12</sup>Picture-NPs feature prominently in the literature on **backwards binding**, in which a reflexive c-commands its antecedent (see (i)).

- (i) [Pictures of *him(self)*] frighten *John*.

It is assumed, following Belletti & Rizzi (1988), that the possibility of backwards binding is related to the thematic role of the subject NP: (ii) is only acceptable if the subject is interpreted nonagentively, while (iii) is typically taken to be ungrammatical.

- (ii) [Clones of *himself*] (\*deliberately) frighten *John*.  
(iii) \*[Clones of *himself*] fear *John*.

This means that backwards binding can be assimilated to the discussion of connectivity effects in Section 7 below, if we assume, with Belletti & Rizzi, that the *frighten*-construction is a form of unaccusative, in which *John* c-commands the  $\theta$ -position of *clones of himself*.

<sup>13</sup>These predictions are actually only partially verified. Although the reflexive in (61b) is dispreferred in comparison to that in (61a), Kaiser et al. (2009) demonstrate that it is considered online as an antecedent.

<sup>14</sup>In fact, *zichzelf* in (63) is a syntactic argument of both *hoorde* and *zingen*, being Case-marked by *hoorde* and  $\theta$ -marked by *zingen*. *Zichzelf zingen* in (63) is therefore a reflexive-marked but nonreflexive syntactic predicate, in apparent violation of Principle A. This led R&R to postulate head-raising of *zingen* to *hoorde*, creating one big syntactic predicate. However, this in turn overgenerates, predicting that (i) is acceptable: the whole sentence is a reflexive, and reflexive-marked, syntactic predicate.

- (i) *John* heard Susan criticize *himself*.

See further discussion in Reuland (2011).

<sup>15</sup>In fact, many people find *We voted for me* acceptable. The more specific prediction of R&R's approach is that *We voted for me* should be as acceptable as *I voted for me*. This seems to conform better to the empirical facts. A full discussion would take us too far into the semantics of anaphora, but it appears that *I voted for me* is acceptable only if it involves reference to the speaker under two different guises, similar to *I kissed me* in the Brigitte Bardot example (32). Thanks to Lyra Magloughlin for discussion of this and related issues.

<sup>16</sup>This concern disappears if attempts, like that of Reuland (2011), to ground many of these principles in lexical properties of the anaphors in question should prove successful.

<sup>17</sup>To my knowledge, no comprehensive theory of exempt anaphors currently exists. However, their interpretation is standardly related to notions of point of view (e.g. Kuno 1987), and there is a tantalizing similarity between the domains which allow exempt anaphora and islands for *wh*-movement.

<sup>18</sup>The examples in (71) are slightly degraded because of Subjacency violations, but no more than any other Subjacency violation.

<sup>19</sup>Judgements in this passage are as reported in the literature. There is substantial variability in judgements in this area, to which we return briefly below.

<sup>20</sup>In the interests of academic hygiene, note that Kuno does not mention competition. This passage is a reformulation of Kuno's analysis in the light of Reinhart and Safir's insights.