An overview of binding principles

Eric Reuland (Oct. 2005)
Utrecht institute of Linguistics OTS

1. Introduction

Natural language embodies a systematic mapping between form and interpretation. Forms can be realized in an external physical medium, interpretations are ultimately changes in the state of certain internal subsystems of the human mind. A schematic representation of the 'language system' is given in (1). In line with the usage in Chomsky (1995), C_{HL} stands for the *Computational system of Human Language*. The terms *PF-interface* (Phonetic Form) and *C-I-interface* (Conceptual-Intentional) stand for the interfaces with the sound (or gesture) system and the interpretation system respectively. These systems are taken to be embedded in what we may broadly call the *human cognitive system* (HCS), better known as the human *mind*.

(1)

Sensori-motor system -dedicated	← C_{HL} → +dedicated	Interpretation system (IS) -dedicated
PF-Interface		C-I- Interface

Thus, C_{HL} is the computational system connecting the form and interpretation systems. There are crucial facts about language that challenge a simplistic view of the relation between the C-I and PF interfaces. Consider the phenomenon of displacement (Chomsky 1995 and subsequent work) with (2) as one of the canonical examples. In a nutshell, the computation of the interpretation of an expression often (or perhaps always) has to relate parts of the expression that in the PF-representation are far apart:

(2) What did you think that Mary fixed?

The presence of *what* in initial position signals that (2) is a question, with, as one of the possible answers *the car*. But it is specifically the direct object of *fix* that is questioned. This position has to stay empty, witness the ill-formedness of **What did you think that Mary fixed the bike*. So *what* both signals a question and occupies the direct object position of *fix*. This dual role of *what* is captured by a notation in which *what* occurs both in the initial position and in the object position of *fix*, as in (3):[1]

(3) What did you think that Mary fixed (what)?

Dislocation instantiates the much broader phenomenon of *interpretive dependency*: One element depends for its interpretation on another as illustrated in (4):

(4) (a) *Donkey anaphora*
Every man who owns *a donkey* beats *it*.
(b) *Scopal dependencies*
Three men lifted *a* table.

[1] Note that the phenomenon as such is independent of the particular notation. It is immaterial whether one works with copies, traces, etc. These all serve to accommodate the same basic fact, namely that constituents may serve a dual, or even multiple role.

So, in (4a) *it* depends for its interpretation on *a donkey*, with the actual interpretation a bit more complex than this statement suggests, since the dependency is limited to donkeys owned by donkey owners. In the relevant reading of (4b) the number of tables lifted is not just one, but three. Another type of dependency is found in ellipsis, as illustrated in (5):

(5) John said that he loved his cat and Peter did too

Here, what Peter did is say that he loved his cat, not that he hated his dog.

Prima facie, not all of these dependencies are of the same sort, and ultimately one would like to find out what unites them. The main topic of this overview is a subclass of interpretive dependencies, namely those dependencies that have come to be known as *Argument binding*, henceforth *A-binding*. The main issues will be outlined below.

2. The canonical theory of A-binding

Natural language allows different expressions to receive identical values in some actual or virtual world. To take a venerable example, in the world as we know it, English *morning star* and *evening star* both have the planet Venus as their value. That is, both *refer* to Venus. Such expressions are *co-referential*. Co-reference may hold on the basis of an empirical fact, as in the Venus case, but also speakers' intentions may suffice to establish co-reference. A pronominal such as *he* can be used to refer to any object that is linguistically classified as masculine and singular, as in *John's mother thought he was guilty*. Here, *he* may refer to John but also to some other masculine individual. One may therefore note that co-reference is not encoded in the language.

Co-reference is not the only way in which the interpretation of two elements can be related. *No one* in *no one believes he is guilty* does not refer to an individual, hence *a fortiori*, *he* cannot refer to that individual. Under the most salient reading *he* does, nevertheless, depend on *no one* for its interpretation. In this case the dependency is linguistically encoded, and is called *binding*.

The difference between binding and co-reference is further illustrated by the contrasts between the following mini-texts (as discussed in Heim 1982). Although co-reference is possible across sentences, as in (6a), where *John* and *he* can be independently used to refer to the same individual, *everyone* and *no one* in (6b) are not referential; hence, an interpretive dependency between *he* and these expressions cannot be established through co-reference. Binding, the other option, is not available cross-sententially. Hence the sequel in (6b) is not felicitous. That there is nothing wrong with *he* being *bound* by a quantificational expression is shown by (7).

(6) a. *John* has a gun. Will *he* shoot?
b. *Everyone*/*No* one has a gun. *Will *he* shoot?

(7) a. *John* was convinced that *he* would be welcome
b. *Everyone*/*No one* was convinced that *he* would be welcome

Binding is thus an interpretive dependency that is linguistically encoded by means available within sentence grammar. Not only is it the case that some elements can be bound, other elements must be bound. As any traditional grammar of Latin notes, certain elements (*se*, *sibi*, etc.) must have an antecedent. Similar facts are duly observed in traditional grammars of Dutch, English, etc. for elements such as *himself*, *zichzelf* 'himself', *zich* 'himself ', etc.

2.1 The nature of binding

Over the last decades many ideas have been developed about the linguistic mechanisms involved in encoding of binding. A recurrent idea is that at least at some level binding reflects a logical operator-variable relation. For instance, Reinhart (2000) presents a definition of binding in which essentially binding is seen as the procedure of closing a property. For instance, adjectives such as *green* represent a property, informally, *green (x)*. It applies to objects that are green. An expression *the tree is green* does not stand for a property, but stands for a complete sentence, since an argument for *green* has been added, namely *the tree*. Conversely, we can take a sentence as a starting point and turn it into a property by omitting one of its arguments. For instance we can turn *John fed Bill's cat* into a property, by taking out Bill, yielding *John fed –'s cat*, or *John fed x's cat*.

Logical syntax binding: Binding is the procedure of closing a property

(8) ***A-binding***
α A-binds β iff α is the sister of an expression that represents a property. [2]

This is the general definition of binding I will be adopting. The way it captures binding in contrast with co-reference is illustrated by the two readings of (9a), given in (9b) and (9c):

(9) a. John fed his cat and Peter too
b. John (x fed y's cat)) and Peter (x fed y's cat)) too (y can be valued as any male individual, including John)
c. John (x fed x's cat)) and Peter (x fed x's cat))

In (9b) the property that is ascribed both John and Peter is that of feeding a certain individual's cat (Mr. X), who happens to be John. In (9c) the property ascribed to both John and Peter is that of feeding his own cat.

Thus, in order for binding to obtain at all, it is necessary that the dependent element can be translated as a variable in a representation which is often referred to as *logical syntax* (see Reinhart 2000). But, as is well-known, binding relations are subject to further constraints, which cannot be explained on the basis of their logical properties alone. The canonical approach to these constraints will be briefly reviewed below.

2.2. The binding theory of Chomsky (1981)

In Chomsky (1981)'s binding theory (henceforth the canonical binding theory, CBT), the theory of A(rgument)-binding describes the interpretive dependencies between phrases in *argument positions*, or *A-positions*, briefly *arguments*. A-positions are taken to be the positions in which a lexical item assigns a semantic role (*agent*, *patient*, *beneficiary*, etc.) to an expression, or in which the latter's Case is determined (nominative, accusative, etc.)[3]

Arguments are classified as R-expressions, pronominals, or anaphors. This classification is based on two designated features: [+/- anaphoric] and [+/-pronominal]. *Binding theory* is concerned with relations of anaphors, pronominals, and R-expressions to possible antecedents (Chomsky 1981:6). *R-expressions* are referentially independent in the

[2] Note for semanticists and logicians, a lambda notation would have been proper here, but for the sake of simplicity I resorted go the notation chosen. Note for everybody else, a so-called lambda operator (λ) is used in a formal notation for this operation. So the notation λx *(green(x))* reflects that *green* is a propert. Similarly, λx *(John fed x's cat)* reflects that we created an expression with one open position from the corresponding sentence.
[3] Pre-theoretically, these are the positions associated with grammatical functions, such as subject, object, etc. I will refrain from discussing issues in current theories of Case assignment or Case checking.

sense that they cannot be bound,[4] *pronouns* may, but need not be bound, and *anaphors* cannot be interpreted independently, hence they must be bound.[5]

If *a* binds *b*, it is said that *a* is the *antecedent* of *b*. Binding theory typically captures the fact that *himself* in (10a) cannot be bound by *Max*, although that construal would be quite plausible, but must be bound by *the king*. *Him* in (10b) on the other hand cannot be bound by *the king*, although Max's shock may make that plausible (and kings do occasionally appoint themselves as commanders-in chief), but it can be bound by *Max*, or refer to some other person.

(10) a. Max boasted that the king had appointed himself as commander-in-chief.
b. Max was shocked that the king appointed him as commander-in-chief

Since potential binding relations cannot be read off from the expressions involved they must be annotated in the linguistic representations. Therefore, Chomsky (1980, 1981) and much of the subsequent literature uses a system of *indexing*. Each argument is assigned a certain integer as its index. If two arguments are assigned the same integer they are co-indexed. In practice one uses subscripts such as *i*, *j*, *k*, etc. as variable indices. If *a* and *b* are co-indexed this is indicated by an identical subscript. Thus, in an expression (a_i .... b_i) *a* and *b* are co-indexed. In (11a) the coindexing represents the inadmissible interpretation of (10a), and (11b) the admissible interpretation of (10b):

(11) a. *Max_i boasted that the king had appointed himself_i as commander-in-chief.
b. Max_i was shocked that the king appointed him_i as commander-in-chief

Since indices are nothing more than linguistic markers in the structure it is still possible for two expressions to be assigned the same object in some outside world if they are not co-indexed (*morning star* and *evening star* are not necessarily co-indexed). Binding without co-indexing is not possible, though. In order for *a* and *b* to be co-indexed (12) must be satisfied:

(12) *a* and *b* are non-distinct in features for person, number and gender

Non-distinctness, rather than identity of features is required for co-indexing, since in many languages one anaphoric element is compatible with masculine or feminine, singular or plural antecedents. This property is illustrated by, for instance, Dutch *zich* and Icelandic *sig*, which can have antecedents of any gender or number. On the other hand, both are specified as 3rd person, and cannot have 1st or 2nd person antecedents. In other languages (for instance Slavic languages like Russian) a person specification is lacking as well, and we find one anaphoric form for all persons.

Whereas the use of indices as descriptive devices is generally accepted, their precise status in the grammar has been the subject of considerable debate.[6] It has become an

[4] This does not imply that they cannot be used anaphorically, or that for some an anaphoric use cannot be strongly preferred, as in the case of epithets.
[5] In part of the literature the term *anaphor* is used for any expression that refers back to an individual previously mentioned. So, under that use *the idiot* in *George decided to attack. The idiot thought he could fool everyone* is an anaphor. Here I will follow the standard usage and reserve the term *anaphor* for 'specialized' anaphors. So, *the idiot* "is" not an anaphor, although it "is used" here as anaphoric to George.
[6] Roughly, the issue is whether indices directly reflect the referential properties of nominal expressions, or are annotations of the structure that can only be interpreted when they express binding relations.

important theoretical issue whether they can be eliminated from the grammar, and their effects reduced to more basic properties of the grammatical system.[7]

In order for binding to be possible the binder must *c-command* the element to be bound. A widely adopted definition is given in (13) (see Reinhart 1983 for discussion).

(13) *a* c-commands *b* if and only if *a* does not contain *b* and the first branching node do minating *a* also dominates *b*.

For current purposes the simple formulation in (14) will do:

(14) *a* c-commands *b* iff *a* is a sister to γ containing *b*
More schematically: [a [$_{\gamma}$ …. b….]]

Binding by a non c-commanding antecedent is impossible as illustrated by the fact that *John* in (15) cannot bind *himself*:

(15) *John$_i$'s mother loves himself$_i$.

Putting both conditions together yields (16) as the standard condition on binding:

(16) *a* binds *b* iff *a* and *b* are co-indexed and *a* c-commands *b*

As already illustrated in (10) and (11). anaphors and pronominals impose specific locality conditions on their binders. A binder of an anaphor may not be 'too far away', the binding of a pronominal may not be 'too nearby'. One of the recurrent themes in binding theory if how precisely these locality conditions are to be captured. (17) presents the binding conditions proposed in Chomsky (1981):

(17) Binding Conditions
(A) An anaphor is bound in its governing category
(B) A pronominal is free in its governing category
(C) An R-expression is free

This formulation of the binding conditions expresses that bound pronominals and anaphors are in complementary distribution. Although binding theory has subsequently undergone considerable revision, the conditions as formulated here still constitute a surprisingly good first approximation. These definitions express locality by the notion of a 'governing category', as in (18). In the case of anaphors, the basic intuition is that they do not allow a binder that is beyond the nearest subject.

(18) γ is a governing category for α if and only if γ is the minimal category containing α, a governor of α, and a SUBJECT *(accessible to α)*

A governor of α, in this framework is an element assigning a semantic role or Case to α.

(19) illustrates the paradigm cases that are captured by (18). Binding is indicated by italics; [$_{GC-\alpha}$ stands for the *governing category* of α.

[7] See, for instance, Pollard and Sag (1994), Chomsky (1995), Reinhart (2000), Reuland (2001), and with a different perspective, Kayne 2001, and Hornstein 2001.

(19) a. *John* expected [$_{\text{GC-himself/him}}$ the queen to invite *him*/**himself* for a drink]
b. [$_{\text{GC-himself/him}}$ *John* expected [$_{\text{IP}}$ *himself* /**him* to be able to invite the queen]]
c. **He* expected [$_{\text{GC-John}}$ the queen to invite *John* for a drink]

Ignoring , for the moment, the italicized condition, (19a,b) exemplify what is known as the *Specified Subject Condition* (SSC): the governing category of α is the domain of the subject nearest to α. For *him*/*himself* this subject is *the queen* in (19a) and *John* in (19b). Binding of *him* by *John* in (19a) satisfies condition B, binding of *himself* by *John* does not satisfy condition A. In (19b) it is the other way round. In (19c) he is outside the governing category of John. But since an R-expression must be free in the whole sentence, the construal in (19c) is nevertheless illicit.

Unlike what is seen in infinitives, a finite clause comes out as the governing category for its subject. In Chomsky (1981) this is captured by assuming that the finite inflection, which is a carrier of nominal features (agreeing for person, number) also counts as a subject for the computation of the governing category. The notion SUBJECT (in capitals) thus generalizes over the DP in canonical subject position and the Agreement on the tensed verb/auxiliary.[8]

As noted earlier, arguments can be dislocated, ending up in a non-A-position (by topicalization, question formation, etc.), as in (20-22). Here, *t* indicates their canonical position.

(20) *Him*, I never believed the baron to have pulled out *t*
(21) *Which man* did he think *t* fell off the bridge
(22) *Himself*, the driver pulled *t* out immediately

---

[8] Under certain conditions, an anaphor can be appropriately bound by an antecedent that is outside the finite clause containing the anaphor. This is illustrated in (20):

(20) *The boys* were afraid [that [pictures of *themselves*] would be on sale]

This 'domain extension' is captured by the italicized condition in (18). In order to count for the computation of the governing category of an anaphor, a SUBJECT must be accessible to the anaphor. Accessibility is defined in (21):

(21) α is accessible to ß if and only if ß is in the c-command domain of α, and assignment to ß of the index of α would not violate the *i-within-i condition*

i-within-i condition
[$_{\gamma}$ ... δ ...], where γ and δ bear the same index

In the case of (20), coindexing *[pictures of themselves]* and *would* by "subject-verb" agreement (irrespective of the fact that the auxiliary *would* does not carry overt agreement in English), and subsequently coindexing *themselves* and *would* by the "test indexing" of (21), yields the indexing configuration of (15).

(22) *The boys* were afraid [that [$_{\gamma}$ pictures of *themselves*$_{\text{i}}$]$_{\text{i}}$ would$_{\text{i}}$ be on sale]]

This configuration violates (21), hence is marked illicit, and therefore *would* does not count as an accessible SUBJECT for *himself*. Hence, γ is not a governing category for *himself*, which may therefore look for an antecedent in the next higher clause. As is extensively discussed in section 2, the configuration in (22) is not the only case where an anaphor may be unexpectedly bound by a more distant antecedent. This is one of the reasons for exploring alternatives to the CBT.

The rules of A-binding apply to dislocated elements in their canonical position (for complex phrases this is an approximation; for the moment such complications can be disregarded).

In the light of subsequent developments in the field the conditions as formulated here still constitute a surprisingly good first approximation.

3. Binding and Coreference

As we saw in the discussion of ellipsis in (9), a pronominal can either be co-referential with an antecedent or be bound by it. Thus, there is a potential ambiguity when the antecedent is referential (if the antecedent is not referential no ambiguity can arise). The ambiguity surfaces in the distinction between the two interpretations of (9), repeated here as (23):

(23) a. John fed his cat and Peter too
b. John (λx (x fed y's cat)) and Peter(λx (x fed y's cat)) too (y can be valued as any male individual, including John)
c. John (λx (x fed x's cat)) and Peter(λx (x fed x's cat))

Readings as in (23c) are also called *sloppy readings*, readings as in (23b) *strict readings*.

Condition B only governs binding relations. Hence, *John* and *him* in *John saw him* could in principle also be assigned identical values directly, resulting in *co-reference*. Evans (1980) showed that this is indeed possible, witness text fragments such as *We all know what's wrong with Oscar. Everyone hates him. Even Oscar hates him*. This argues for a principle which regulates between binding and co-reference (Reinhart (1983), Wexler and Chien (1985), Chien and Wexler (1991), Grodzinsky and Reinhart (1993)). Such a principle is Reinhart's Rule I:

(24) Rule I: NP A cannot co-refer with NP B if replacing A with C, C a variable A-bound by B, yields an indistinguishable interpretation.

In the last sentence, *Oscar hates him*, of the above text fragment, under coreference Oscar is ascribed the property of *Oscar*-hatred: (*x hates him* & him=Oscar). With binding Oscar would be assigned the property *(x hates x) = self*-hatred. *Oscar*-hatred and *self*-hatred are different properties. Rule I thus allows assigning an interpretation on the basis of co-reference, bypassing binding (which would yield an interpretation that is independently ruled out by condition B as a possible interpretation for this sentence), which is the only interpretation for which this fragment is felicitous. In *John saw him* the two interpretations are indistinguishable, hence the bound-variable option must be used, regardless of the fact that binding condition B rules it out.

Applying (24) requires comparing two different derivations. The processing difficulties this entails have been proposed to explain the fact that children master condition B at a substantially later age than condition A (the "delayed condition B effect").

4. Binding and Reflexivity

Languages often have a richer anaphora system than modern English. Presenting an overview of what is currently known would lead beyond the scope of this note. Discussion will be limited to a few issues.

Many languages have a 3-way distinction between pronominals, simplex anaphors and complex anaphors, instead of the 2-way distinction found in English. There are several variants of 3-way systems, depending on whether a language has clitics, uses verbal affixes in the anaphora system, etc. Furthermore, some languages admit bound pronominals in environments where the canonical binding theory only allows anaphors.

A characteristic subclass of binding configurations is one in which an element binds an argument of the same predicate, such as a subject binding a direct object. In such cases the predicate is reflexive (a predicate is defined as reflexive iff two of its arguments are co-indexed (Reinhart and Reuland (1993)). In general, reflexivity must be licensed by a special marking. The precise mechanisms may vary. A predicate can be marked as reflexive by its intrinsic lexical properties. A reflexive interpretation of a predicate that is not intrinsically reflexive may be licensed by a reflexivizing operator, i.e. an extrinsic reflexive marker. This is the case if one of the arguments of the predicate is a SELF-anaphor, i.e., an element such as English *self*, or Dutch *zelf*. These two mechanisms are reflected in the reflexivity condition:

(25) A reflexive predicate is reflexive-marked

(25) covers differences between lexical classes of verbs, differences between the binding of direct objects and prepositional objects, and also differences between the binding of direct objects and the subjects of embedded predications (infinitives with exceptional case marking and small clauses). In Dutch, for instance, the verb *schamen* 'to be ashamed' is an intrinsically reflexive predicate (its two argument positions cannot have different values). Such a predicate requires the simplex anaphor *zich* in Dutch. Non-reflexive predicates such as *bewonderen* 'admire' require the complex anaphor *zichzelf*, as in *George$_i$ bewondert zichzelf$_i$/*zich$_i$* 'George admires himself'. If the anaphor and its antecedent are not co-arguments, as in *Jan$_i$ voelde zich$_i$ wegglijden* 'John felt himself slide away', where the anaphor is a small clause subject, a complex anaphor is not required. In Dutch sentences with locative of directional PPs, the simplex anaphor is, again, allowed. Here, a pronominal is possible as well (*Jan$_i$ zag een slang achter zich$_i$/hem$_i$* 'John saw a snake behind him'). *Zichzelf* is infelicitous.

Cross-linguistically, licensing may also involve clitics, pronoun doubling, body-parts, verbal affixes, etc., with varying further syntactic and semantic effects, which it would carry us too far to discuss here.

Scandinavian languages have a 4-way system. Anaphor selection has a similar sensitivity to predicate structure as in Dutch, but complex anaphors come in two types: pronominal-SELF and SE-SELF; SE-SELF is required if the antecedent is a subject, pronominal-SELF if it is not. Moreover, these languages have a possessive anaphor, in addition to a possessive pronoun. The possessive anaphor must be selected if the antecedent is a subject.

Whether the element used to license reflexivity violates some principle if it does not reflexivize a predicate may vary. In many (perhaps most) languages the situation in (26) obtains:

(26) A reflexive-marked syntactic predicate is reflexive
A syntactic predicate is reflexive-marked if one of its arguments is SELF-anaphor.

In English, certain environments exempt a SELF-anaphor from the reflexivizing requirement. Compare the well-formed (27b) with the ill-formed (27a). In (27b) the SELF-anaphor is not a syntactic argument of *invite*. It is properly contained in *Lucie and himself*, which is. In (27a) *himself* fully occupies the direct object position of the verb.

(27) a. **Max* boasted that the queen invited *himself* for a drink
b. *Max* boasted that the queen invited Lucie and *himself* for a drink.

In some other languages, for instance Malayalam, the licensing anaphor does not need to be locally bound at all (Jayaseelan (1997)). In a sentence such as *raaman$_i$ t̲an-ne$_i$ *(t̲anne) sneehikun̲nu* 'Raman SE-acc self loves= Raman loves himself' the presence of *tan-ne* is obligatory in order to license local binding, as indicated by the notation **(*. This shows that it must be an anaphor on current accounts. Yet, *t̲an-ne t̲anne* need not have an antecedent in the same clause. In *raaman$_i$ wicaariccu [penkuttikal t̲an-ne$_i$ t̲anne sneehikkun̲nu en̲n@]* 'Raman thought [girls SE-acc self love Comp]= Raman thought that the girls loved him(self)', the anaphor is in the downstairs clause, but it is bound by the upstairs *raaman*.

5. Local binding of pronominals

The condition on reflexivity partially overlaps with the canonical condition B. Hence its effect should be factored out.

Binding in Frisian (spoken in a northern province of The Netherlands) shows that the canonical condition B indeed has two components. Frisian has a 2-way distinction. It is like the Dutch system, but where Dutch has *zich*, Frisian has *him*, which is the standard pronominal. It has a complex anaphor <pronominal>-*sels*, where Dutch has *zichzelf*. If the predicate is non-reflexive, as with a predicate such as *bewûnderje* 'admire', the anaphor *himsels* is required. In cases like *Jan skammet him* 'John is ashamed of himself' the pronominal *him* occurs in violation of the canonical condition B (see Everaert (1986)). This indicates that one component of the canonical condition B is a condition on reflexivity given in (25), the other is a syntactic property that shows cross-linguistic variation. Reinhart and Reuland (1993) relate this to conditions on movement. In case of movement to an Argument position, the position to which an argument moves, is always marked for a feature which is lacking in the position from which it moves (for instance, Case in passives). A moved element and its trace (or copy) are said to form a *chain*. In all such cases the head of the resulting chain is specified for a feature that is lacking in position it moved from (the *tail*). It may well be the case that such an asymmetry in feature composition is involved in all cases of syntactic linking. Local binding, that is binding within a governing category, must then obey this general condition on A-chains. Hence, a locally bound element must be under-specified for grammatical features. It is sufficient if an element is only under-specified for one feature. Elements may vary as to which feature is under-specified. This also accounts for cross-linguistic variation. Establishing the nature of the under-specification may require an in-depth analysis of a grammatical system.

Dutch *zich* is under-specified for number and gender. Frisian *him* has been found to be under-specified for Case. The local binding of pronominals which obtains in a number of German dialects is also related to the Case system (Keller (1961)). The system of Old English resembles that of Frisian in allowing locally bound pronominals (Van Gelderen (2000)). It is still under debate whether local binding of pronominals is entirely free in Old English.

Local binding is also sensitive to other grammatical properties of the element to be bound. In many languages (including all Romance and Germanic languages except English), 1st and 2nd person pronominals can be locally bound if condition (15) is met (as in French *Je me lave* 'I wash myself' or German *Du sahst dich im Spiegel* 'You saw yourself in the mirror', see Burzio (1991) for an earlier discussion). As argued by Benvéniste (1966), 1st and 2nd person pronouns are not grammatically, but lexically marked for number (*we* is not a plurality of *I*'s). If so, these pronominals are grammatically underspecified. This may be sufficient to explain the fact that they can be locally bound, despite being true pronominals in all other respects.

Because of such facts, the fundamental dichotomy between anaphors and pronominals presupposed by the canonical binding theory requires closer scrutiny. Whether an element can, or must be locally bound is determined by its intrinsic grammatical properties together

with properties of its grammatical environment. This requires more finely grained analyses than currently available for most languages. It also requires reassessing the properties of anaphoric systems, such as those of Japanese or Chinese, that prima facie are difficult to fit into the format of the canonical binding conditions, see also the next section.

6. Long-distance anaphora

Many languages allow anaphoric elements with an antecedent beyond their governing category as defined in (18), or without a linguistically expressed antecedent at all. Icelandic has come to be cited as a classical case (see, for instance, Thraínsson (1979, 1991)), but there is also long-distance anaphora in English (see Reinhart and Reuland (1993) for an overview and references). It is often claimed is that long-distance anaphors are mono-morphemic and subject oriented (that is, require a subject as their antecedent), but this is certainly too rough a characterization, although for some subclasses such a correlation does hold.

Icelandic *sig* requires an antecedent within an indicative clause, but if *sig* is in an infinitival clause its antecedent may be outside it. The same holds for the other Scandinavian languages for the cognate forms of *sig*. Also *sig* in a subjunctive clause may have a long-distance antecedent. Yet, there are differences between subjunctives and infinitives. If the antecedency relation crosses a subjunctive, binding is not required: the antecedent need not c-command the anaphor, and the existence of a discourse antecedent which is not linguistically expressed may actually suffice:

(28) Skoðun Jóns$_i$ er [að þú hafir svikið sig$_i$].... (Thráinsson (1991)
opinion John's is that you have betrayed self

(29) María var alltaf svo andstyggileg. þegar Olafur$_j$ kaemi segði hún sér$_{i/*j}$ áreidanlega að fara ... (Thráinsson 1991)
Mary was always so nasty. When Olaf would come, she would certainly tell himself [the person whose thoughts are being presented - not Olaf] to leave [NB. (15) could not begin a story]

In cases like (28) and (29) one, obviously, cannot speak of subject orientation. In all other cases the c-command condition is strictly enforced in Icelandic, and subject orientation holds as well.

Many languages admit anaphor binding which violates the SSC (see (8)). For instance, Russian allows binding across infinitival boundaries, Dutch allows binding only across perception verb complements. Yet, in all these cases c-command must be respected.

There is evidence that *sig* in the subjunctive domain behaves like a pronominal instead of an anaphor, and that in (28) it is coreferential with *Jón* rather than bound by it (Thráinsson 1991). Such pronominal use of an anaphoric form is often called *logophoric*.

The term *logophor* has been introduced by Hagège (1974) to characterize a paradigm of specialized pronominal elements in languages of the Niger-Congo group. Clements generalizes this term to all elements with these characteristics, which has since become a leading idea in the analysis of logophoricity (Clements (1975: 171-172):

(i) logophoric pronouns are restricted to *reportive contexts* transmitting the words or thought of an individual or individuals other than the speaker narrator;
(ii) the antecedent does not occur in the same reportive context as the logophoric pronoun;
(iii) the antecedent designates the individual or individuals whose words or thoughts are transmitted in the reported context in which the logophoric pronoun occurs.

Conditions (i) and (iii) are not structural, but involve the discourse status of the antecedent. If these conditions are not met sentences with logophoric elements are infelicitous. In the Icelandic examples give above these conditions are met, since in (28) *Jón* holds the opinion expressed, in (29) *ser* refers to the person whose thoughts are being presented.

It should be noted, that the situation is more complex than the above quote indicates. In some languages logophoricity is restricted to verbs of saying, excluding thoughts, there may be special logophoric forms with respect to the adressee instead of the speaker. Also, *logophoricity* and *pronominal use of anaphors* are, strictly speaking, independent properties. For instance, in most subdialects of Mandarin the anaphor *ziji* has logophoric properties, but it must be c-commanded by its antecedent. In contrast, Malay *dirinya* behaves as a pronominal, but has no logophoric conditions on it (see Cole, Hermon, Huang (2000) for discussion). For more discussion the reader is referred to the literature cited.

Also English allows a logophoric use of *himself* (note that, *himself* cannot be qualified as mono-morphemic). Its sensitivity to the discourse status of the antecedent is illustrated by the contrast in (30). (30a) is presented from John's perspective, (30b) from Mary's. The former is felicitous, the latter is not.

(30) a. John$_i$ was going to get even with Mary. That picture of himself$_i$ in the paper would really annoy her, as would the other stunts he had planned

b. *Mary was quite taken aback by the publicity John$_i$ was receiving. That picture of himself$_i$ in the paper had really annoyed her, and there was not much she could do about it (Pollard & Sag 1992)

For more discussion of logophoricity the reader is referred to Sells (1987), Koopman and Sportiche (1989) and the extensive literature on Icelandic (see also Koster and Reuland (1991) and Reuland & Sigurjónsdóttir (1997) for overviews, further references and a systematic comparison of relevant cases).

Well-known further cases of elements that vary between a bound and a referential, logophoric, use are Japanese *zibun* and Chinese *ziji.* Extensive discussion of the so-called *blocking effect* in long-distance binding can be found in Cole, Hermon, Sung (1990) and Huang and Tang (1991). In a structure *NP$_1$ ..... [NP$_2$ ...Anaphor ...]* where the two NPs are separated by a clause boundary, the anaphor can be bound by either NP1 or NP2 provided both carry the same person feature. However if the downstairs subject NP$_2$ is 1st or 2nd person the anaphor cannot be bound by a 3rd person NP$_1$. This blocking effect correlates with the absence of verbal agreement (see Cole, Hermon, Huang (2000) for further discussion). See the works cited for further references.

It is an important result of the investigations reported that a systematic distinction exists between true long-distance binding, and a logophoric use. A language may very well allow long-distance binding without admitting a logophoric use of anaphors. Conversely, if a language allows the logophoric use of anaphors, it need not necessarily allow long-distance binding. The characterization of long-distance anaphors as subject-orientated and mono-morphemic appears to be best motivated for cases of true long-distance binding.

7. References

Benveniste, Emile. 1966. *Problèmes de linguistique générale*. Paris: Gallimard.

Burzio, Luigi. 1991. The Morphological Basis of Anaphora. *Journal of Linguistics* 27.1, 1-60.

Chien Y.-C. and K. Wexler (1990) Children's Knowledge of Locality Conditions in Binding as Evidence for the Modularity of Syntax and Pragmatics, *Language Acquisition* 1, 225 295.

Chomsky, Noam. 1980. On Binding. *Linguistic Inquiry* 11, 1-46

Chomsky, Noam. 1981. *Lectures on Government and Binding*. Dordrecht: Foris
Chomsky, Noam. 1986. *Knowledge of Language: Its Nature, Origin and Use*. New York: Praeger
Chomsky, Noam. 1995. *The Minimalist Program*. Cambridge, Mass.: MIT Press
Clements, George Nicholas. 1975. The Logophoric Pronoun in Ewe: Its Role in Discourse. *Journal of West African Languages,* 10:141-177.
Cole, Peter, Gabriella Hermon and L.-M. Sung. 1990. Principles and Parameters of Long Distance Reflexives. *Linguistic Inquiry* 21, 1-23
Cole, Peter, Gabriella Hermon and C.-T. James Huang. 2001. *Long distance reflexives*. Syntax and Semantics 33. San Diego: Academic Press
Evans, Gareth. 1980. Pronouns. *Linguistic Inquiry* 11.2: 337-362
Everaert, Martin. 1986. *The Syntax of Reflexivization*. Dordrecht: Foris
Everaert, Martin. 1991. Contextual Determination of the Anaphor/Pronominal Distinction. In *Long-distance anaphora*, ed. Jan Koster and Eric Reuland,77-118. Cambridge: Cambridge University Press
Fiengo, Robert, and Robert May. 1994. *Indices and Identity*. Cambridge, Mass.: MIT Press.
Gelderen, Elly van. 2000. A History of English Reflexive Pronouns: Person, *Self*, and Interpretability. Amsterdam: Benjamins
Grodzinsky, Yosef, and Tanya Reinhart. 1993. The Innateness of Binding and Coreference. *Linguistic Inquiry* 24: 69-101.
Hagège, Claude. 1974. Les Pronoms Logophoriques. *Bulletin de la Société de Linguistique de Paris* 69, 287-310
Heim, Irene. 1982. *The Semantics of Definite and Indefinite Noun Phrases*. Doctoral dissertation, University of Massachusetts Amherst.
Hellan, Lars. 1988. *Anaphora in Norwegian and the Theory of Grammar*. Dordrecht: Foris
Hornstein, Norbert. 2001. Move! A Minimalist Theory of Construal. Oxford: Blackwell.
Huang, C.T. James. 1982. Logical relations in Chinese and the theory of grammar. PhD dissertation. MIT
Huang, C.-T. James, and C.-C. Jane Tang. 1991. The local nature of the long-distance reflexive in Chinese. In *Long-distance anaphora*, ed. Jan Koster and Eric Reuland, 263-282. Cambridge: Cambridge University Press.
Jayaseelan, K.A. 1997. Anaphors as Pronouns. *Studia Linguistica* 51.2: 186-234
Kandel, Eric, James Schwartz, and Thomas Jessell. 2000. Principles of Neural Science. New York: McGraw-Hill
Kayne, Richard. S. 2002. Pronouns and their antecedents. In *Derivation and explanation in the Minimalist Program,* ed. Sam D. Epstein and T. Daniel Seely, 133-166. New York: Blackwell.
Keller, R.E. 1961. *German Dialects: Phonology and Morphology*. Manchester: Manchester University Press
Koopman, Hilda and Dominique Sportiche.1989. Pronouns, Logical Variables and Logophoricity in Abe. *Linguistic Inquiry* 20, 555-589
Koster, Jan, and Eric Reuland (eds.) 1991. *Long-Distance Anaphora*. Cambridge: Cambridge University Press
Lasnik, Howard. 1989. Essays on Anaphora. Dordrecht: Kluwer
Pollard, Carl and Ivan Sag. 1992. Anaphors in English and the scope of the Binding theory. *Linguistic Inquiry* 23: 261-305
Pollard, Carl, and Ivan Sag. 1994. *Head Driven Phrase Structure Grammar*. Stanford and Chicago: CSLI Publications and University of Chicago Press.
Reinhart, Tanya. 1983. *Anaphora and Semantic Interpretation*. London: Croom Helm.
Reinhart, Tanya. 2000. Strategies of Anaphora Resolution. In *Interface Strategies*, ed. Hans

Bennis, Martin Everaert, Eric Reuland, 295-324. Amsterdam: Royal Netherlands Academy of Arts and Sciences
Reinhart, Tanya. 2002. The Theta System: an Overview. *Theoretical Linguistics* 28: 229-290.
Reinhart, Tanya and Eric Reuland. 1991. Anaphors and Logophors: An Argument Structure Perspective. In *Long Distance Anaphora*, ed. Jan Koster and Eric Reuland, 283-321. Cambridge: Cambridge University Press
Reinhart, Tanya and Eric Reuland. 1993. Reflexivity. *Linguistic Inquiry* 24: 657-720
Reuland, Eric. 2001. Primitives of Binding. *Linguistic Inquiry* 32.3, 439-492
Reuland, Eric and Tanya Reinhart. 1995. Pronouns, Anaphors and Case. In *Studies in Comparative Germanic Syntax*, ed. Hubert Haider, Susan Olsen and Sten Vikner, 241 269. Dordrecht: Kluwer.
Reuland, Eric, and Sigrídur Sigurjónsdóttir. 1997. Long Distance 'Binding' in Icelandic: Syntax or Discourse? In *Atomism and Binding*, ed. Hans Bennis, Pierre Pica and Johan Rooryck, 323-340. Dordrecht: Foris
Thráinsson, Höskuldur. 1979. *On Complementation in Icelandic*. New York: Garland
Thráinsson, Höskuldur. 1991. Long Distance Reflexives and the Typology of NPs. In *Long-Distance Anaphora*, ed. Jan Koster and Eric Reuland, 49-75. Cambridge: Cambridge University Press
Wexler, Kenneth and Yu-Chin Chien. 1985. The development of lexical anaphors and pronouns. In *Papers and reports on child language development* 24. Stanford University, Stanford, Calif.