

The Irreducible Syntax of Variable Binding

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Abstract: The absence of a c-command requirement with quantificational binding (Barker 2012) is part of a larger cluster of properties that differentiates quantificational bound variables (Q-VARIABLES) from anaphoric bound variables (A-VARIABLES). A-VARIABLES are irreducibly syntactic: they must be c-commanded, they prohibit split antecedents, are locally bound, and are only construed as sloppy. Q-VARIABLES are legislated by the discourse grammar: they need not be c-commanded, allow split antecedents, are not locally bound, and can be construed as strict or sloppy. Our proposal also has consequences for the syntax of quantificational operators, binderless sloppy readings, Weak Crossover, and fake indexicals.

Keywords: c-command, quantification, bound variable anaphora, antecedence, locality, indexical

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1. Introduction

In this journal, Chris Barker (2012) advocates that quantificational binding of variables is purely a matter of scope, and more specifically that bound variable anaphora does not require the quantificational antecedent to c-command the pronoun it is construed with. Barker’s arguments are persuasive and compelling, and we provide additional support for his view that quantificational binding, in the strict sense, does not require c-command. However, we also show that the absence of a c-command requirement with quantificational binding is part of a larger cluster of properties that differentiates quantificational binding from anaphoric binding. In particular, we argue that Barker’s observations, taken together with the data set we present here, lead to the following conclusions.

- (i) Anaphoric variables (A-VARIABLES) contrast with quantificational variables (Q-VARIABLES) along a number of dimensions, including c-command, split antecedence, locality, indexicality, and “sloppiness” (§2).
- (ii) A-VARIABLES are irreducibly syntactic (§3): *Recursive Merge* forces c-command and subject-orientation; *Last Resort* prohibits split antecedents; *phase theory* forces local binding; *Agree* blocks fake indexicals and forces sloppy contruals.

- (iii) Q-VARIABLES are legislated by discourse representation (§4), which takes as input already formed phrase markers and enriches them via the addition of indices. Such enrichment, of which indexation is a special case, is (predictably) not structurally constrained. Consequently, Q-VARIABLES need not be c-commanded or subject-oriented, permit split antecedents, can be non-locally bound, can be fake indexicals, and can be strict or sloppy.
- (iv) Distinguishing A-VARIABLES from Q-VARIABLES makes the right cut for other areas of the grammar (§6), including quantificational operators, binderless sloppy readings, Weak Crossover, and fake indexicals.

2. Contrasts Between Quantificational Binding and Anaphoric Binding

We establish that human languages exploit two types of binding, which we label *quantificational binding* and *anaphoric binding*. Both types of binding involve a relation between a quantificational antecedent and a pronoun that is interpreted as a variable, but they are subject to different structural constraints. In particular, A-BINDING, but not Q-BINDING, is associated with the following cluster of properties.

- (i) the variable is c-commanded by an antecedent;¹
- (ii) the variable needs a unique antecedent;
- (iii) the variable is constrained by locality and obeys island constraints;
- (iv) the variable induces sloppy readings in ellipsis.

In what follows, we consider these diagnostics in turn. The take-home message is that Q-VARIABLES and A-VARIABLES pattern differently. This is of theoretical interest because it

means that the grammar must have a way of coding the difference between Q-VARIABLES and A-VARIABLES.

2.1 A-VARIABLES must be c-commanded by their antecedent

The distinction that we draw between A-BINDING and Q-BINDING is, as far as we can determine, blurred by the vast majority of workers in syntax and semantics. Barker (2012) comes close to making this distinction in that he argues that quantificational binding is not subject to a c-command requirement. In restricting his claim to quantificational binding, it is implicit that other types of binding (i.e., what we here refer to as anaphoric binding) might behave in different ways — though Barker doesn't discuss this any further. In this section, we provide empirical justification for distinguishing A-BINDING from Q-BINDING, and consequently for distinguishing A-VARIABLES from Q-VARIABLES. The data that we consider — binding from a specifier, binding out of a PP, binding across sentence boundaries, and long-distance binding — confirm that there is a distinction between A-VARIABLES and Q-VARIABLES. While A-BINDING is restricted to contexts of c-command, Q-BINDING is not.

2.1.1 A-VARIABLES do not permit binding from a specifier position

In English, a quantified pre-nominal genitive can bind out of the DP in which it is a specifier (Kayne, 1994), as in (1)a. Adopting May's (1985) conceptualization of adjunction according to which it does not create a new phrase that would dominate the adjunct, Kayne (1994) argues that specifiers are adjuncts. Since c-command relies on dominance, in Kayne's analysis adjuncts c-command out of the projections to which they are adjoined, and so the QP — *every dissident* in (1)a — can bind a variable out of a

specifier position because it c-commands the variable. However, such an analysis does not account for the fact that, while Q-BINDING is possible out of a DP from a specifier, A-BINDING is not. This can be seen from the fact that a reflexive pronoun cannot be bound by a DP in specifier position (1)b. Consistent with Barker (2012), we take this to indicate that whatever mechanism accounts for the possibility of Q-BINDING — and in particular binding from a specifier position — c-command is not at play. That anaphoric dependencies are resolved differently than quantificational ones is further confirmed by the fact that an R-expression can be anaphorically related to a pronominal specifier, as in (1)c; this is only possible if the pronoun in Spec,DP does not c-command the R-expression. (We eschew indices (for reasons discussed below relative to the principle of *inclusiveness*) and so indicate binding by underlining the antecedent and double-underlining the dependent element.)

- (1) a. [[_{DP} Every dissident [_D 's] lawyer]]] visited her.
 b. *[[_{DP} Emily [_D 's] father]]] visited herself.
 c. [[_{DP} Her [_D ∅] father]]] loves Emily.

The inability of A-BINDING to occur from a specifier position is robust. For example, the Icelandic anaphor *sig* can function as an anaphor or logophor, but when its antecedent is a DP specifier that fails to c-command it, it can only be a logophor, as evidenced by its obligatorily strict reading under ellipsis (Thráinsson, 1991):

- (2) *Skoðun Jóns er [að þú hafir svikið sig] og það er skoðun Péturs líka.*
 opinion John's is that you have betrayed self and that is opinion Peter's too
 'John's opinion is that you have betrayed him and that is Peter's opinion too.'

- ≠ (i) '...and it is Peter's opinion that you have betrayed Peter' (*SLOPPY)
 = (ii) '...and it is Peter's opinion that you have betrayed John' (STRICT)
 (Thráinsson 1991 (32))

Thus, binding from a specifier position indicates that while Q-BINDING does not require c-command, A-BINDING does.

2.1.2 A-VARIABLES do not permit binding out of PP

As observed by van Riemsdijk & Williams (1986), the first PP within a VP can bind an anaphor within a second PP, (3)a. But this is impossible if the first PP is fronted, (3)b. However, if the antecedent is quantificational, fronting does not perturb binding, (4). Again, we see the same pattern: A-BINDING requires c-command, Q-BINDING does not.

- (3) a. *The career counselor talked to the interns about themselves.*
 b. **To the interns the career counselor talked about themselves.*
 (4) a. *The career counselor talked to every student about his situation.*
 b. *To every student the career counselor talked about his situation.*

2.1.3. Anaphoric variables don't permit binding across sentence boundaries

A corollary of the claim that Q-BINDING does not require c-command is that it allows quantifiers to bind variables across sentence boundaries. The literature on Q-BINDING delivers a mixed verdict on whether such binding is permitted. Based on examples such as (5)a, the standard view is that binding across sentences is impossible; this accords with dynamic semantics (Groenendijk & Stokhof, 1991), where universal quantifiers such as *every* are static, and so restricted to binding variables within their own sentences. However, (5)b indicates that Q-BINDING across sentences is sometimes possible.

- (5) a. Every man walks in the park. *He whistles. (Elbourne 2005:25, (57))
 b. Every player chooses a pawn. He puts it on square one.² (Partee)

Hence, the data is inconclusive, and whatever stand one takes on what the unmarked situation is, one must account for the problematic data. In the next section, we argue that ellipsis resolution indicates that Q-BINDING across sentences, such as in (5)b, is the norm.³ Note that A-BINDING across sentence boundaries is impossible, (6)a. As for long-distance binding of an anaphor in an embedded clause, as in (6)b, this is possible for many English speakers.

- (6) a. *They want something. For each other to be elected.
 b. % They very much want for each other to be elected.

2.1.4. A-VARIABLES are restricted in the positions of their binders

Non-local A-BINDING is restricted to subjects or experiencers (Koster & Reuland, 1991). For example, Mandarin *ziji*, if it is long-distance bound, can only be bound by a subject or experiencer DP. Thus, in (7), either the embedded or matrix subject (*Wangwuk*, *Zhangsan*) is a potential antecedent for *ziji*, but the matrix object (*Lisi*) is not. And in (8), the experiencer DP (*Lisi*) is a potential antecedent for *ziji*.

- (7) a. *Zhangsan gaosu Lisi Wangwuk bu xihuan ziji*
 b. *Zhangsan gaosu Lisi Wangwuk bu xihuan ziji*
 c. **Zhangsan gaosu Lisi Wangwuk bu xihuan ziji*
 Zhangsan told Lisi Wangwu not like self
 ‘Zhangsan told Lisi that Wangwu does not like him/himself.’
 (adapted from (Cole, Hermon, & Huang, 2005) (62))

- (8) [*Ziji de xiaohai mei de jiang de xialxi*] shi *Lisi* hen nanguo.
 self’s DE child not get prize DE news make Lisi very sad.
 ‘The news that his own child did not get a prize made Lisi sad.’
 (Huang & Tang (1991), (8))

A word is in order about the disjunction “subject or experiencer”. While subjects are defined configurationally, thematic roles such as “experiencer” are not, hence the latter do not comfortably fit into our conception of syntax. Interestingly, this requires that reflexives with experiencer antecedents should not be definable in syntactic terms. We maintain, following a long tradition, that such reflexives are logophors (Clements, 1975; Reinhart & Reuland, 1993), whose referent is the entity whose point of view is being taken. (We take this matter up in Appendix I.)

The restriction on long-distance anaphora to subjects is generally taken to reflect a c-command restriction (Cole et al., 2005). But with quantificational antecedents, long-distance binding is not restricted in this way. This can be seen in (9), where the Q-VARIABLE *him* can be bound by either the matrix object, as in (9)a, or the matrix subject, as in (9)b.

- (9) a. *Emily told [every student] that the examiner would pass him.*
 b. *[Every student] told Emily that the examiner would pass him.*

In sum, A-BINDING and Q-BINDING fail to track together: while A-BINDING obeys c-command, Q-BINDING does not. We now discuss other differences between the two types of variables: namely split antecedence, locality, and fake indexicals. Barker fails to

notice this larger cluster of properties that distinguish A-VARIABLES and Q-VARIABLES, and so his account is insufficiently general.

2.2 A-BINDING doesn't permit split antecedence

A-BINDING does not allow split antecedence (Koster, 1984), (10). However, the prohibition against split antecedence is not observed when the two antecedents are quantificational (Rullmann, 2003, 2004; Sudo, 2012), (11). The tolerance of quantificational antecedents to split binding is yet another indication that the grammar treats Q-VARIABLES and A-VARIABLES differently.

- (10) a. *Lewis talked to Emily about themselves.
 ≠ 'Lewis told Emily about himself and her'
- b. *These guys told those guys about themselves.
 ≠ 'These guys told those guys about these and those guys'
- (11) a. Each of the students told each of the professors that their meeting was fun.
 (Sudo 2012, (3))
- b. Every woman told every man that they should leave.

2.3 A-BINDING is constrained by locality

A-BINDING, even when it is long-distance, is not truly unbounded. For example, Icelandic *sig* occurs in non-factive CP complements of saying or thinking, (12) but does not occur in factive CP complements of knowing, (13). The sensitivity of long-distance anaphors to the factive/non-factive contrast is robust cross-linguistically (Koster & Reuland, 1991). In contrast, pronouns that are interpreted as Q-VARIABLES can be separated from the binding

quantifiers by an unlimited distance, even syntactic islands such as complex NPs (14)a and factive islands (14)b.⁴

- (12) a. Jón sagði [að ég hefði svikið hann]
 b. Jón sagði [að ég hefði svikið sig]
 John said that 1SG had betrayed 3SG
 'John said that I had betrayed him' (based on Thráinsson 1991, (18))
- (13) a. Jón veit [að þú hefur svikið hann]
 b. *Jón veit [að þú hefur svikið sig]
 John knows that 2SG betrayed 3SG
 'John knows that you have betrayed him.' (based on Thráinsson 1991, (20))
- (14) a. Every woman believes that the man [who loves her] is a prince.
 b. Every woman told every man that people knew [that she should leave].

2.4 Anaphoric variables can't be fake indexicals

1st and 2nd person pronouns can be interpreted as bound variables under certain conditions (Kratzer 2009); these are called fake indexicals. Examples from English are given for 1st and 2nd person in (15), with the pronoun of interest bolded. Unlike Q-VARIABLES, 1st and 2nd person A-VARIABLES variables cannot function as fake indexicals, (16) (We provide an analysis of fake indexicals in the next section.)

- (15) a. I am the only parent who takes care of **my** children.
 = 'I am the only parent who takes care of his/her children'
- b. You are the only parent who takes care of **your** children.
 = 'You are the only parent who takes care of his/her children'

- (16) a. *Lucy loves her children, but Fred doesn't (love his children).*
 b. **Lucy loves my children, but Fred doesn't (love *my children).*

2.5 Anaphoric variables induce sloppy readings

Q-VARIABLES can correspond to strict readings (Sell 1986): in (17), the pronoun in the first conjunct is a bound variable relative to the quantifier, but is interpreted strictly, so the referent of the elided pronoun is construed as a definite description. In contrast, as shown in (18), an A-VARIABLE is always interpreted sloppily.⁵

- (17) *With each new hit, the lead actress thinks that she is the next Garbo, and the director does __ too.*
 = ‘...and the director thinks that the lead actress is the next Garbo’
- (18) a. *Lucy and Fred like each other, and we do __ too.*
 = (i) ‘Lucy & Fred like each other and we like each other too’ (SLOPPY)
 ≠ (ii) ‘Lucy & Fred like each other, and we like Lucy & Fred too’ (*STRICT)
- b. *Jón rakaði sig og Pétur gerði það líka.*
 John shave 3sg and Peter do so too
 ‘John shaved himself, and Peter did too’
 = (i) ‘John shaved John, and Peter shaved Peter.’ (SLOPPY)
 ≠ (ii) ‘John shaved John, and Peter shaved John.’ (*STRICT)
 [Icelandic (Thráinsson 1991, 31a)]

2.6 Summary: diagnosing the two types of variables

We have established that there are two types of variables: Q-VARIABLES (which have a quantificational antecedent) and A-VARIABLES (which have a non-quantificational

antecedent). As summarized in Table 1, the two types of variables behave differently. First, Q-VARIABLES need not be c-commanded by their antecedent, but A-VARIABLES must be. Second, Q-VARIABLES permit split antecedence, while A-VARIABLES prohibit it. Third, Q-VARIABLES are not constrained by locality, but A-VARIABLES are. Fourth, Q-VARIABLES can be fake indexicals, but A-VARIABLES cannot be. Finally, A-VARIABLES are always interpreted sloppily, while Q-VARIABLES are not.

DIAGNOSTIC	ANAPHORIC	QUANTIFICATIONAL
	VARIABLE	VARIABLE
§2.1 need not be c-commanded by antecedent	✗	✓
§2.1.1 permits binding out of specifier position	✗	✓
§2.1.2 permits binding out of PP	✗	✓
§2.1.3 permits binding across sentence boundaries	✗	✓
§2.1.4 position of binder is unrestricted	✗	✓
§2.2 permits split antecedence	✗	✓
§2.3 unconstrained by locality	✗	✓
§2.4 allows fake indexicals	✗	✓
§2.5 always interpreted sloppily	✓	✗

Table 1: Diagnostics that distinguish anaphoric and quantificational variables

The moral is clear. Barker (2012) concentrated on one dimension of Q-BINDING, namely the c-command relation. But A-VARIABLES and Q-VARIABLES differ across several dimensions. Any account of variable binding should characterize all of the properties, and ideally, should propose a model from which those properties follow. Of course,

discovering one property is an advance, for which we are much indebted to Barker, but it is not the end of the story.

3. The Distinction Between Syntax and Discourse Representation

We claim that the grammar is organized along the following lines:

(19) NARROW SYNTAX → DISCOURSE REPRESENTATION

This conception of grammar is not original. Its roots can be traced to Williams (1977), who is the first, to our knowledge, to characterize this distinction. After laying out the conceptually necessary properties of the narrow syntax (§3.1), we show that there are main syntactic sources of grammatical dependencies such as anaphoric variable-binding: one is Move; the other is Agree. We show how A-VARIABLES arise via copy-movement, why this is untenable as a general solution, and then we show how variables arise via Agree. We then argue that, independent of the mechanism adopted, the irreducibly syntactic nature of A-VARIABLES indicates that they are constrained by the syntax.

3.1 What syntax does: recursive Merge

In the current conception of syntax, its domain is the recursive construction of phrase-markers in a bottom-up fashion from lexical items, which are bundles of features that may be valued and unvalued. The guiding principles of syntax include *Inclusiveness*, the principle of *Full Interpretation*, and *Last Resort*:

- (20) a. INCLUSIVENESS: The computation includes only features that are present at the outset; no features may be added. (Chomsky, 1995a)
- b. FULL INTERPRETATION: All features are interpreted.
- c. LAST RESORT: Move occurs only if it must.

Inclusiveness, by restricting elements of grammatical computation to those present at the outset, bans such devices as bar levels, indices, insertion of expletives, and so on. Closest to our concerns is the use of indices, given their centrality to binding. The question becomes: which features, which are present at the outset, can mimic the use of indices? In principle, two mechanisms are available: MOVE or AGREE.

3.1 How co-indexation can be derived by copy-movement

One way of creating a referential dependency is via MOVE; this is possible in light of the notion of *occurrence* (Chomsky, 1995a). Once drawn from the lexicon, elements form a numeration, in which each element appears together with an index indicating how many times it has been accessed from the lexicon. Hence, a sentence such as (21)a has the numeration in (21)b:

- (21) a. *The tall woman saw the short woman.*
- b. { *the*[2], *tall*[1], *see*[1], *short*[2], *woman*[2], *PAST*[1] }

Each time a lexical item is merged into the phrase-marker, the integer that is associated with it is reduced by 1. The numeration can produce the effect of contra-indexing without introducing indices into the computation, and once we deduce c-command, also derive Condition C. We return to this below.

It is possible to derive reflexive pronouns via copying. Consider (22)a, which contains a reflexive pronoun (i.e., an A-VARIABLE): no lexical items are identical, and so there are no integers greater than [1]. Given this, the question becomes, how is co-indexing captured or represented? One view of reflexives, due to Hornstein (2001), views movement of the antecedent as crucially involved. Accordingly, we suggest that the

numeration is as in (22)b.

- (22) a. Lucy saw herself
 b. { PAST[1], see[1], Lucy[1], -self[1]}

The derivation proceeds as follows: *Lucy* merges with *-self* (23)a, and then *Lucy-self* merges with V (23)b. The verb *see*, being transitive, assigns an external theta-role: this is satisfied by re-merging *Lucy*, (23)c. T merges with VP (23)d, and *Lucy* re-merges with T' to check Nominative case, (23)e. Movement is copying plus deletion, so *Lucy* is copied twice: once to Spec,VP, and once to Spec,TP. The highest copy is spelled-out, the lower copy (in Spec,VP) is deleted at LF. The *in-situ* DP, presumably for morphological reasons to serve as a base for affixal *-self*, is spelled out as a pronoun (Baltin, 2014a).

- (23) a. MERGE <D, N> [DP [D *Lucy*] [N *-self*]]
 b. MERGE <V, DP> [V' [V *see*] [DP *Lucy -self*]]
 c. MERGE <DP, V'> [VP [DP *Lucy*] [V' *see Lucy -self*]]
 d. MERGE <T, VP> [T' [T PAST] [VP *Lucy see Lucy-self*]]
 e. MERGE <DP, T'> [TP [DP *Lucy*] [T' PAST ~~Lucy~~ *see Lucy-self*]]
 f. SPELL-OUT *Lucy saw herself*.

As argued by Lee (2003), the copy analysis gets empirical support from San

Lucas Quiavini Zapotec, where reflexives are realized as copies:

- (24) *R-yu'la`a`a`z* *Gye'eihlly* *Gye'eihlly*
 HAB-like Mike Mike
 'Mike likes himself'; lit. 'Mike likes Mike' (Lee 2003, (1))

Lasnik (1991), in a study of Thai and Vietnamese, characterize copy-anaphora languages as lacking Condition C. However, Lee refutes this analysis for Zapotec (and Thai), by showing that the lower copy behaves as a bound variable. In (25), the interpretation of the elided VP is sloppy, an asymmetry that would not be explained by taking the lower instance of the DP to be an independent occurrence.

- (25) *B-gwi`ih* *Gye'eihlly* *lohoh* *Gye'eihlly* *ze`cy cahgza`Li`eb*.
 PERF-look Mike at Mike likewise Felipe
 'Mike looked at himself, and Felipe did too.' (Lee 2003, (19))
 = (i) '...and Felipe looked at himself too' (SLOPPY)
 ≠ (ii) '...and Felipe looked at Mike too' (*STRICT)

Copy-anaphora establishes that, in principle, co-indexation can at least sometimes be derived via copy movement. But things are not so simple.

3.3 Why co-indexation can't be reduced to copy-movement

We must ask how the grammar comes to recognize the forms that it does as co-indexed.

We can begin to get the answer by considering how copy-movement interacts with the numeration. The numeration only contains the initial lexical items that merge into the structure, and the integers reflect the number of times that the lexicon is accessed for a particular lexical item. Copies, on the other hand, are not in the numeration: rather, their status as copies is manifested by virtue of the fact that they bear the same integer as the lexical item initially accessed. This accounts for the intuition that a trace is obligatorily co-indexed with its antecedent. If all cases of co-indexing reduce to copies, we can successfully recast co-indexing as a movement dependency. Appealing as this is, we are

nevertheless hesitant to implicate movement in all cases of co-indexing, for two reasons:

- (i) binding dependencies have been posited, particularly in long-distance anaphora, where movement is implausible, because the dependencies cross islands, out of which garden-variety movement cannot occur,⁶
- (ii) A-dependencies are restricted in ways that movement is not.

To illustrate the second point, as discussed by Baltin (1995), expletive *there* does not control PRO (26), but expletive *it* does (27).

- (26) a. *A riot was too likely ___ for **there** to be a reasoned debate.*
 b. ****There** was too likely ___ to be a riot [**PRO** to be a reasoned debate].*
- (27) a. *Lucy was too likely ___ to win for [**it** to be obvious that she would resign].*
 b. ***It** was too likely that Lucy would win [**PRO** to be obvious that she would resign].*

Furthermore, in the copy-raising construction, which following Baltin (2014b) we take to involve Binding Theory (explaining why the lower copy is realized as a pronoun), expletive *there* does not convert to a pronoun.

- (28) a. *It looks like **there**'s gonna be a riot.*
 b. *There looks like **there**'s gonna be a riot.*
 c. **There looks like **it**'s gonna be a riot.*

McCloskey (1991) takes *there* to be ϕ -defective, while *it* is ϕ -complete: *it* has a full complement of ϕ -features (Person, Number, and Gender), but *there* only has a Person feature. McCloskey shows this by the agreement patterns with plural associates, showing that *there* triggers plural agreement while *it* remains constant with 3rd person singular.

- (29) a. *There's five people in the room.*
 b. *There **are** five people in the room.*
- (30) a. *It's amazing the things Lucy knows.*
 b. **It **are** amazing the things Lucy knows.*
 (cf. *The things Lucy knows **are** amazing.*)

Nevertheless, both expletives undergo other types of A-movement, such as passive (31), and subject-to-subject raising (32).

- (31) a. ***There** was believed to be a good reason.*
 b. ***It** was believed to be obvious that Fred would win.*
- (32) a. ***There** seems to be a good reason.*
 b. ***It** seems to be obvious that Fred will win.*

Chomsky (1995b) takes the property of being ϕ -complete to be a necessary condition for participation in anaphoric processes. In spite of Hornstein's (1999) movement analysis of PRO, we find ourselves in agreement with Landau (2003) and others who view control as distinct from movement. Notably, obligatory and non-obligatory control or PRO contrast in the same manner as A-BINDING and Q-BINDING. As shown in (33), the construal of obligatorily controlled PRO has all of the hallmarks of the syntactic dependencies with which we are concerned: PRO must have an antecedent, it must be c-commanded by its antecedent (E. S. Williams, 1980), the antecedent must be local, split antecedents are prohibited, and only sloppy readings are possible with ellipsis.

- (33) OBLIGATORY CONTROL OF PRO
- a. **It was expected **PRO** to promote herself.*

- b. **[Lady Gaga's fans] expect PRO to promote herself*.
 c. **Lady Gaga's entourage expects [PRO to promote herself]*.
 d. **Lucy told Anna [PRO to meet each other for lunch]*.
 e. *Lucy expects [PRO] to win, and Anna does __ too*.
 = (i) '...and Anna expects Anna to win (SLOPPY)
 ≠ (ii) '...and Anna expects Lucy to win (*STRICT)
 (adapted from Hornstein 1999:73)

In contrast, as shown in (34), when PRO is not obligatorily controlled, it lacks all of these properties: it need not have an antecedent, it need not be c-commanded by its antecedent, the antecedent need not be local, split antecedents are allowed, and both strict and sloppy readings are possible with ellipsis.

(34) NON-OBLIGATORY CONTROL OF PRO

- a. *It was believed that [PRO promoting oneself was important]*.
 b. *Lady Gaga's entourage believes that [PRO keeping her performances controversial is essential to her success]*.
 c. *Lady Gaga thinks that it is believed that [PRO promoting herself is important]*.
 d. *Lucy told Anna that [PRO meeting each other for lunch would be fun]*.
 e. *Lucy thinks that [PRO getting her resume in order is crucial, and Anna does too]*
 = (i) ...and A. thinks that L. getting her resume in order is crucial (SLOPPY)
 = (ii) ...and A. thinks that A. getting her resume in order is crucial (STRICT)
 (adapted from Hornstein 1999:73)

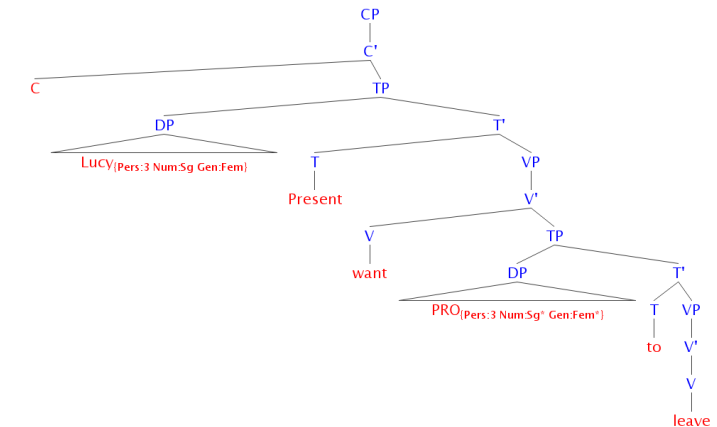
If controlled PRO is not derived by movement, but nevertheless shows that its

interpretation is syntactically constrained, we are forced to look outside of movement for the source of these constraints.

3.4 How co-indexation can be derived from Agree

Our view of Agree is due to a synthesis of Lee (2003) and Rooryck & Vanden Wyngaerd (2011). In this conception, the ϕ -features of a nominal are located on D, and, rather than being inherently unvalued, are marked as a *dependent occurrence*⁷ that requires an antecedent with an independent occurrence of these features.⁸ Applying this to obligatorily controlled PRO, we have a representation along the lines of (35) for this case, where dependent occurrences are marked with an asterisk:

(35) OBLIGATORILY-CONTROLLED PRO



We could view the linking of dependent and independent ϕ -features as a species of Agree: the anaphor's ϕ -features would be unvalued, and the antecedent's ϕ -features

would be transmitted to the anaphor (Kratzer, 2009; Rooryck & vanden Wyngaerd, 2011). We find this implausible in light of the existence of copy-reflexives in San Lucas Quiavini Zapotec and Thai, discussed above. The features of the lower copy, which is c-commanded by the higher, would seem to exist at the outset, and are not free to be anything but replicas of their antecedent's features. At any rate, it is clear that, while some anaphoric bound variables are residues of movement of their binders, others are not.⁹ Thus, we conclude that two syntactic mechanisms, MOVE and AGREE, are recruited for A-binding, and both replicate co-indexation via feature-sharing. It therefore follows that A-VARIABLES, whether derived by MOVE or AGREE, are legitimate syntactic objects. We now illustrate their irreducibly syntactic nature.

3.5 The irreducibly syntactic nature of A-VARIABLES

We show that the syntactic nature of A-VARIABLES reflects higher-order properties of the grammar. In particular, we account for why A-VARIABLES must be c-commanded, why they prohibit split antecedence, and why they are subject to locality.

3.5.1 Why A-VARIABLES must be c-commanded

Kayne (1984) reduces c-command to the graph-theoretic notion of an unambiguous path, where a path between a bound element and its binder must be a straight line, such that the binder dominates the bindee in a continuous sequence. This notion of an unambiguous path is only reconstructible if c-command obtains. Moreover, adopting binary branching also derives the subject orientation of anaphors.¹⁰ An alternative view of c-command is due to Epstein et al. (1998), who note that c-command can be defined derivationally as the stage at which a head merges with its sister, and the contents of the phrase are hence

accessible to the head with which it merges.¹¹

3.5.2 Why A-VARIABLES prohibit split antecedence

Hornstein (2001) argues that it is a virtue of the movement account of reflexives that it automatically accounts for the lack of split antecedence, due to the fact that it is impossible to move an element to two positions simultaneously. However, the impossibility of split antecedence follows more generally from any theory in which one position contains elements that trigger an operation in a lower position, and in which *Last Resort* holds. To see this, consider a case of a non-movement derivation of a variable, such as (36):

- (36) *Lucy told Fred that many people didn't like them, and*

Anna told Zach that many people did ____.

= '...and Anna told Zach that many people did like Lucy and Fred'

The reading of the pronoun in the elided clause is sloppy, indicating that the pronoun is interpreted as a bound variable; more specifically, we argue below that it is a Q-VARIABLE. To see this, consider the pronunciation of the pronoun when the VP is anaphorically distressed, as in (37).

- (37) *LUCY told FRED that many people didn't like them, and*

ANNA told ZACH that many people DID like THEM.

We take the stressing of the pronoun as indicative of quantificational focus binding, while non-stressing as indicative of A-BINDING. The question is not why Q-BINDING is available in this case, but why A-BINDING is not. To see this, consider the structure of the second conjunct of (37), where focusing is omitted.

Phases are generally taken to be vP and CP. Assuming this, taking the anaphor to reside within the complement of one of these categories will require that it be bound within one of these projections, and hence, these projections define binding domains as well.¹²



Last Resort (Move occurs only when it must) together with the fact that DP₃ is not a possible antecedent for the pronoun, means that the pronoun cannot be linked to DP₂. Hence, split antecedence can only be derived by other, crucially non-syntactic, factors.

(40) *Every man who owns a donkey beats it.*

A significant strand of syntactic research holds that syntactic operations take place in units of syntactic, semantic, and phonological processing called *phases* (Chomsky, 2000, 2001). The idea is that computation proceeds in a bottom-up fashion, and when a phase is constructed, it becomes unanalyzable, in accordance with the *Phase Impenetrability Condition*:

(41) λs_4 . for every individual y : for every minimal situation s_5
 such that $s_5 \leq s_4$ and y is a man in s_5 and **there is an individual x and a situation s_2**
 such that **s_2 is a minimal situation**, such that $s_2 \leq s_5$ and **x is a donkey in s_2** ,
 such that **there is a situation s_3** , such that $s_3 \leq s_5$ and s_3 is a minimal situation
 such that $s_2 \leq s_3$ and **y owns x in s_3** ,
there is a situation s_6 , such that $s_6 \leq s_4$ and s_6 is a minimal situation

such that $s_5 \leq s_6$ and **y beats in s_6 iz z is a donkey in s_6**

(Elbourne 2005:53, Ch. 2, (27))

So the donkey pronoun, interpreted as a variable that is bound by a non-c-commanding antecedent, is in fact bound by a situation operator (s_6 in this case), that c-commands it. We can extend this to variables bound across sentence boundaries by repeating the sentence operator.¹³ Without taking a stand on the particulars of (41), we note that it cannot be, strictly speaking, a property of I-language, regardless of whether or not it is a property of discourse grammar. The governs the behavior of speakers who, in all likelihood, have no knowledge of the concepts in the statement (Fodor, 1983; Lewis, 1972). Rather, the statement, if correct, is couched in a meta-language, in this case a language of thought (Fodor, 1975); our task is to try to characterize this language of thought. We propose that this language of thought in which discourse representations are stated is given in the form of phrase-markers. Our reasons for this are due to the properties of ellipsis, and have their basis in Williams (1977), who noted that ellipsis (a) does not require c-command by the antecedent; (b) operates across sentence boundaries; (c) allows split antecedents; and (d) is non-local. As we have shown here, all of these properties are shared by Q-BINDING. On the basis of sluicing in German, Merchant (2001) shows how fine-grained ellipsis resolution can be. When the antecedent of the sluiced sentence includes the main verb *schmeicheln* ‘to flatter’, which assigns Quirky Dative Case to its object, a remnant object in the sluice must be dative:

(42) Er will **jemandem** schmeicheln, aber sie wissen nicht, {**wem**/***wen**}.

he wants someone.DAT flatter but they know not who.DAT who.ACC

‘He wants to flatter someone, but they don’t know who.’

(Merchant 2001, Ch. 2, (14))

Similarly, Baltin & Moulton (in preparation) explore the hypothesis that split antecedents in ellipsis are triggered by the possibility of a quantifier in the language in question that introduces the conjoined elided phrases, such as the English *both* or the Chinese *dou*. If the language lacks such a quantifier, the split reading becomes impossible. It would seem, therefore, that ellipsis resolution is syntactic in nature and, more generally, discourse representations must incorporate syntactic representations. However, discourse representations must also include additional elements that are not present in syntax. More specifically, it would seem that discourse grammar must be able to violate *Inclusiveness*; in other words, to add elements. The literature is replete with the addition of quantificational operators that serve to bind variables, but the addition of such operators raises a whole host of questions from a syntactic standpoint:

- (i) How do such quantificational operators arise?
- (ii) Where are quantificational operators located?
- (iii) How do quantificational operators interact with syntactic conditions, such as relativized minimality (Rizzi, 1990) or blocking (Huang, 1982)?

In our view, the main difference between syntactic representations and discourse representations, is that the former creates representations, while the latter interprets these already-formed structures. In particular, discourse-grammar can violate INCLUSIVENESS,

allowing for elements that can occur after the phonology, which is a part of sentence grammar. Therefore, such elements will be unpronounced. This possibility is in fact realized, in the analysis of null operators that play a role in semantic representations but do not induce blocking effects of overtly introduced operators, the latter being the province of syntax (Browning, 1987; Chomsky, 1986). We discuss this in the next section.

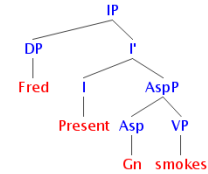
6. Consequences for the Organization of the Grammar

A-variables are legislated by the Narrow Syntax: as such, they must be c-commanded by their antecedent, they cannot occur across sentence boundaries, they prohibit split antecedents, and they must be locally bound. Q-variables are legislated by the Discourse Grammar, which operates on enriched phrase-markers. In this regard Q-variables have the same properties as ellipsis: neither requires a c-commanding antecedent, both operate across sentence boundaries, both allow split antecedents, and both are exempt from locality. With this in place, we examine the consequences of our proposal, focusing on the implications of our analysis for covert quantificational operators, for binderless sloppy readings, for Weak Crossover, and for fake indexicals.

6.1 Quantificational operators

The semantic literature is replete with the postulation of operators. To take but one example, Chierchia (1989) discusses a covert generic operator, at work in such sentences as (43), and locates it within what he terms an aspect phrase, giving it an associated phrase-marker:

- (43) a. COVERT GENERIC OPERATOR (adapted from Chierchia 1989, (35))

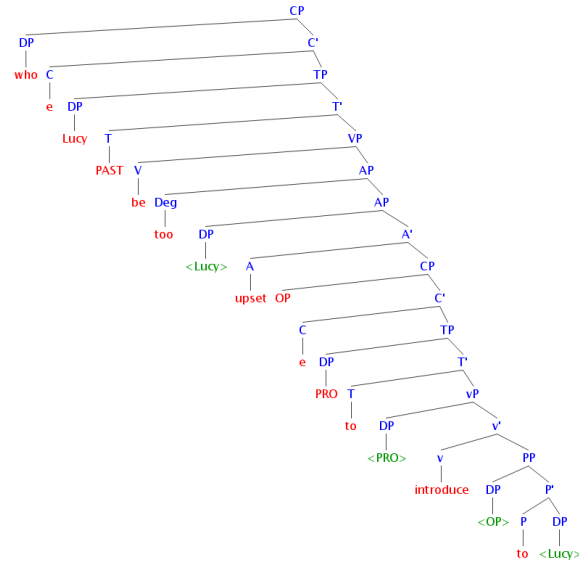


- b. $Gn\ s\ [C\ (f, s)][smoke\ (f, s)]$
 = 'Every situation s of the appropriate type containing Fred is a situation in which Fred smokes'

The generic operator does not block overt operator extractions to higher positions, in contradistinction to null operators in infinitives that act as barriers, as in (44). The embedded question would have the structure in (45).

- (44) $*(I\ wonder)\ who_i\ Lucy_j\ was\ too\ upset\ OP_j\ [PRO\ to\ introduce\ t_i\ to\ t_j]$.

(45) NULL OP BLOCKS WH-MOVEMENT



Were it not for the fact that the embedded operator blocks wh-movement to the matrix CP, (44) would be grammatical. The embedded operator is possible when it is controlled by the immediately superior subject, as in (46)a, synonymous with (46)b. When the embedded CP is empty, devoid of an operator, wh-movement of the embedded dative to the matrix [Spec, CP] is possible, as in (46)c.

- (46) a. ***Lucy** was too upset **Op** to PRO_{ARB} introduce <Lucy> to Sally.*
 b. ***Lucy** was too upset to PRO_{ARB} introduce **her** to Sally.*
 c. *Who_i was **Lucy** too upset [PRO to introduce **her** to t_i]?*

Hence, we have an argument for the blocking effect of the null operator in (44).

However, we fail to find an analogous argument for the blocking effect of a generic operator. For example, (47)a and (47)b seem equally generic, and we can perfectly well question the object (47)c.

- (47) a. *Fred **GEN** smokes.*
 b. *Fred **GEN** smokes medicinal marijuana.*
 c. *What does Fred **GEN** smoke?*

In short, there is a discrepancy between the null operator in infinitives and the generic operator. We could devise a mechanical fix, such as distinguishing the featural content of *Op* and *GEN*, with the later exempt from Relativized Minimality (Rizzi, 1990), but such moves seem artificial. However, if we introduce the generic operator in discourse grammar, after wh-movement has applied in the syntax, there will be no operator to block wh-movement. The null operator, on the other hand, whose antecedent is non-quantificational, is introduced in the syntax, and so blocks wh-movement.

6.2 Binderless sloppy readings

A “binderless sloppy reading” arises when a pronoun is not c-commanded by any apparent antecedent, and hence, assuming that binding requires c-command, is binderless (Elbourne, 2005, 2008; Wescot, 1989). An example is given in (48):

- (48) *If **Lucy** falls, we'll catch **her**, but if Anna falls, we won't.*
 = ‘If Lucy falls, we'll catch Lucy, but if Anna falls, we won't catch Anna’

From our perspective, binderless sloppy readings should not exist, unless the binders are quantificational. There is evidence that they are: if we replace the ellipsis example in (48) with an anaphoric destressing example, we see that the pronoun is stressed:

- (49) If LUCY falls, we'll catch her, but if ANNA falls, we WON'T catch HER/?her.
The stress on the pronoun is a hallmark, we claim, of focus-indexing. This is confirmed by the fact that the German counterparts examples require a D-pronoun (*die*), rather than a personal pronoun (*sie*).¹⁴

- (50) a. *Wenn die LUZIA stürzt fangen wir sie,*
when D Luzia falls catch we her
... aber wenn die ANNI stürzt dann nicht
... but when D Anni falls hen not
'If Luzia falls, we catch her, but if Anni falls, we don't [catch Anni]'
- b. *Wenn die LUZIA stürzt fangen wir die,*
when D Luzia falls catch we her
... aber wenn die ANNI stürzt dann nicht
... but when D Anni falls then not
'If Luzia falls, we catch her, but if Anni falls, we don't [catch
Anni/Luzia]'

Finally, the pronoun triggers weak crossover:

- (51) *If Lucy comes early, we'll bring her friends to her table,
but if Anna comes early, we won't ____.

If the pronoun is focus-indexed, we can interpret it as being a quantifier, just as its antecedent, and it would therefore trigger weak crossover. (We return to WCO in the next sub-section.) In short, the binder in so-called "binderless sloppy reading" constructions is a quantificational binder, and so does not require c-command. However, a theory that simply dispenses with c-command as a requirement would fail to restrict such variables to quantificational variables, and hence would cast too wide a net.

6.3 Weak Crossover

Quantifiers, including WH-words, are almost universally agreed to be operators. As such, the argument positions they are related to enter into an operator-variable relation. A criterial diagnostic for the existence of such an operator-variable relation is weak crossover (WCO), which arises with both WH-movement (52)a, and quantifier binding (52)b.

- (52) a. **Who* did her friend greet *t*? (≠ Whose friend greeted her)
b. **[The fact that nobody liked him] bothered every senator.*

The exact formulation of WCO is not, at this point, settled. For concreteness, we adopt Koopman & Sportiche's (1983) proposal that an operator can bind one and only one variable.¹⁵ Whichever analysis is adopted for WCO, designation of a pronoun as a variable is often taken as dependent on its obedience to Weak Crossover. For example, while pronouns related to focused DPs obey WCO as in (53) (Chomsky, 1976) — just as pronouns related to raised quantifiers (54) and wh-moved operators (55) do — pronouns related to A-moved DPs do not (56) (Lasnik & Stowell, 1991).¹⁶

- (53) a. *Her students really like EMILY.
 b. LF: * [EMILY [[her students] really like <Emily>]]
- (54) a. *Her students really like every professor.
 b. LF: * [Every professor [[her students] really like <every professor>]]
- (55) a. *Who do her students really like.
 b. LF: * [Who [[her students] really like <who>]]
- (56) a. Lucy seems to her students __ to be an excellent teacher.
 b. LF: * [Lucy seems to her students <Lucy> to be an excellent teacher.]

Chomsky takes WCO with focus to indicate that focused DPs are A-bar moved at LF. Whatever the merits are in general of covert movement for focused DPs, it remains that A-movement does not trigger Weak Crossover. So whatever relation obtains between an A-moved DP and a pronoun, it must be distinct from the relation that arises with WH-movement, quantifier-binding, and focus-binding. Inasmuch as WCO is a diagnostic for an operator-variable relation, this leads to the conclusion that A-movement arise in a distinct fashion, namely via A-BINDING. This further implies that WCO, which is sensitive to Q-binding, operates in the Discourse Grammar, rather than in the Syntax.

6.4 Fake indexicals

We now turn our attention to Kratzer's (2009) treatment of fake indexicals and its implications, as she sees them, for the analysis of bound variables. We discuss the treatment of "default 3rd person pronouns", not considered by Kratzer, and some asymmetries between default 3rd person variables and fake indexicals that confirm our distinction between NARROW SYNTAX and DISCOURSE GRAMMAR.

The central phenomenon, discovered by Partee (1989), is exemplified in (57)a. Kratzer attributes the source of the bound variable reading to the bolded genitive pronoun, which she takes to be a "minimal pronoun", born without valued ϕ -features. For Kratzer, the ϕ -features are valued by transmission from a higher verbal functional head, presumably T in the relative clause. Kratzer shows, on the basis of data from German dialects, that the fake indexical reading only occurs when this higher functional head shows an agreement pattern in which 1st and 3rd person are morphologically identical. Since 3rd person allows a bound variable reading in the semantics, this "fake indexical" reading is derived by non-distinctness with the 3rd person. However, Kratzer does not consider examples where the genitive pronoun is 3rd person, discussed above, and repeated in (57)b.

- (57) a. *I am the only one who takes care of **my** children.* FAKE INDEXICAL
 b. *I am the only one who takes care of **his** children.* DEFAULT 3RD

(57)a and (57)b are synonymous, and presumably should be treated as such by the semantics. However, there are some asymmetries between fake indexicals such as (57)a, and default 3rd person such as (57)b, which require explanation. In general, default 3rd person requires syntactic binding by the quantifier, while fake indexicals do not.

First, consider a contrast noted by Heim (2008), who observes that fake indexicals can be bound by floated *each*, (58)a. However, Heim also notes that (58)b, which contains an instance of what we have been calling default 3rd person for the lower pronoun, is unacceptable as a bound variable.

- (58) a. We each thought we would win. (Heim 2008, (36)) FAKE INDEXICAL

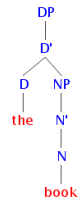
- b. *We each thought he would win. (cf. Heim 2008, (39))¹⁷ DEFAULT 3RD

Furthermore, while a fake indexical can appear across sentence boundaries, the default 3rd person cannot:

- (59) a. Each one of us chooses a pawn. We each place it on square one. FAKE INDEX'L
 b. *Each one of us chooses a pawn. He places it on square one. DEFAULT 3RD

We can make sense of this by noting a distinction due to Abney (1987) between the syntactic and the semantic head of a projection, in the context of his proposal for a DP analysis of nominals. For example, in Abney's analysis of *the book*, given as (59), the determiner (here D) is the syntactic head, while the noun (N) is the semantic head:

- (60) SYNTACTIC VERSUS SEMANTIC HEAD



Keenan (1996) takes quantifiers to be determiners, and Grimshaw (2000) takes functional projections that introduce lexical categories to be extended projections of those lexical categories. In short, these proposals allow the restrictors of quantifiers to act as heads of the functional projections within which they reside, and to c-command out of those projections. At the same time, what we have been calling default 3rd person may actually be an instance of a quantifier *qua* D being taken as a noun. Accordingly, 3rd person pronouns are structurally ambiguous, in that they are integrated into a DP-shell in one of two ways: as the syntactic head of DP 0a, or as the semantic head of DP 0b.¹⁸

- (61) a. [DP [D *he*] [NP *e*]]
 b. [DP [D *e*] [NP *he*]]

That this is possible can be seen by cases where the quantifier does not have a restrictor, and can bind a pronoun, as in (62):

- (62) a. Many thought that they would succeed.
 b. Everyone thought that they would succeed.

With this in mind, we revisit the inability of 3rd person pronouns to act as variables bound by 1st or 2nd person operators in the floated construction, as in (58) above. Note that the quantifier intervenes linearly between the subject and the 3rd person pronoun. In this case, the quantifier blocks the subject from binding the 3rd person pronoun by Rizzi's (1990) *Relativized Minimality*, in which a binder must be the closest possible binder to a bindee, with closeness defined in terms of c-command: A cannot bind B if there is another possible binder, C, that c-commands B but does not c-command A. In the non-floated nominal, on the other hand, *Relativized Minimality* does not come into play because both the quantifier and the restrictor are in the same projection. Therefore, the quantifier is not closer to the 3rd person pronoun than the restrictor.

We must now explain why 1st (and 2nd, though not discussed here) person restrictors cannot scope over 3rd person variables across sentence boundaries. We take the quantifier to be the syntactic head, and the restrictor to be the semantic head. Following considerations suggested by ellipsis resolution, Discourse Grammar operates on semantic elements, but these elements are determined syntactically. In particular, the 1st person restrictor has a person presupposition that includes the speaker; the 3rd person pronoun is

(63) a. Each one of **us** chooses a pawn. **We** each place it on square one. FAKE INDEX'L
[Speaker, pl]_i [Speaker, pl]_i
b. *Each one of **us** chooses a pawn. **He** places it on square one. DEFAULT 3RD
* [Speaker, Pl]_i [Anim, Masc, Sg]_i

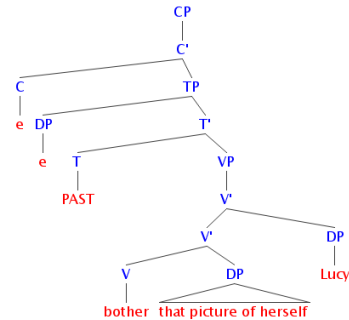
This paper is an attempt to characterize the difference between syntax and discourse representations. In our view, Barker (2012) is correct in claiming that Q-BINDING does not require c-command; in this regard, he is correct in challenging Reinhart's (1983) generalization that all bound variable anaphora requires c-command. However, as we have argued at length, the c-command property isolates but one property of Q-BINDING. In addition to c-command, a cluster of properties distinguishes Q-BINDING from A-BINDING, including split antecedence and locality. The proper question to ask, in light of these findings, is what is the overall architecture of syntax as well as discourse grammar. It is only once this perspective is taken that Barker's findings can be appreciated. In short, while we agree with Barker that quantificational variables need not be c-commanded, it is not the case that c-command plays no role in the grammar. We hence disagree with works such as Safir (2008) and Bruening (2014) that take Barker's findings to require wholesale changes in the nature of sentence grammar itself.

Appendix 1. Experienter Antecedents

Belletti & Rizzi propose underlying structures in which the experiencers c-command the anaphors, and binding by Condition A is taken to be an anywhere rule. So, for example, (61) would have the underlying structure in (62).

(64) *That picture of herself bothered Lucy.*

(65) Belletti & Rizzi treatment of experiencer predicates



Given that Condition A can be satisfied at any point, including underlying structure, *Lucy* binds *herself*; after which the object moves to subject position. Hence, experiencer antecedents are assimilated to normal cases of binding.

However, this integration of experiencer antecedents into binding runs afoul of the fact that split antecedents are readily acceptable in the former, but not in the latter, as we have noted here. Hence, (63a) contrasts with (63b), the latter is repeated from above:

- (66) a. *Lewis said that those pictures of themselves bothered Emily.*
 = ‘Lewis said that those pictures of him and her bother Emily’
- b. **Lewis talked to Emily about themselves.*
 ≠ ‘Lewis told Emily about himself and her’

The ability of reflexives with experiencer antecedents to tolerate split antecedents hence contrasts with the inability of reflexives that are bound, arguing against any unity of these two cases. Furthermore, Reinhart & Reuland (1993) count such reflexives as

logophors.¹⁹ They are not arguments of predicates, which must have subjects. However, Chinese does not seem to restrict logophoric distribution in this way, so that long-distance reflexives in Chinese, as in Icelandic, can function as logophors in spite of being arguments of predicates. The question, therefore, is whether reflexives such as Icelandic *sig* or Chinese *ziji* can tolerate split antecedents, even when they are arguments of predicates. We leave this issue open.

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¹ We adopt the following definition of c-command: A c-commands B iff A does not dominate B and the first node that dominates A also dominates B.

² Such examples are ubiquitous (J. Muehlbauer, personal communication):

- (i) Every housewife in town voted before 3PM. She was anxious to get home before the kids arrived from school.
- (ii) Every woman came in. She sat down wherever she could, and listened.

³ See Elbourne (2005) for a critique of dynamic semantics, on the grounds of theoretical parsimony.

⁴ Ross (1967) established that complex NPs are islands; Postal (1997) established that factive complement clauses are islands.

⁵ The statement in the text must be qualified. Sag (1976) reports that a minority of his consultants interpret examples such as (i) strictly.

- (i) Lucy admires herself, and Anna does __ too.
- = (i) Lucy admires Lucy, and Anna admires Anna. (SLOPPY)
- = (ii) [%]Lucy admires Lucy, and Anna admires Luch ([%]STRICT)

However, Flengo & May (1994) suggest that the strict reading arises from the morphological composition of the reflexive, so that the pronoun part of the reflexive can be interpreted with an (in their terms) independent α -occurrence of the index. When this is controlled for, as in the case of reciprocals or reflexives that are not composed in this way, the claim in the text stands.

⁶ For Icelandic, see Thráinsson (1991); for Chinese, see Huang & Tang (1991).

⁷ Dependent occurrences are equivalent to Flengo & May's (1994) β -occurrences.

⁸ This accounts for the asymmetry in binding noted by Higginbotham (1983), leading to his proposal that co-indexing be replaced by linking, which is inherently asymmetric.

⁹ Hornstein (2001) argues that while reflexive A-VARIABLES are not created by movement, pronominal A-VARIABLES are not. In a related vein, below, we take up cases of non-quantificational split antecedents and argue that, in such cases, the antecedent is focussed, and hence quantificational.

¹⁰ See Kayne (1984) for pertinent comments.

¹¹ Noting that A-BINDING requires c-command, Epstein et al's (1998) definition to anaphoric binding holds if we apply Kratzer's (2009) definition of variable-binding to our A-VARIABLES. Kratzer takes variable-binding to be co-indexing with a higher functional head, rather than the phrase with which the head agrees. However, Kratzer is only concerned with Q-BINDING, and it remains to be seen whether diagnostics can be constructed where the binders are non-quantificational and hence clearly instances of A-VARIABLES.

¹² Something needs to be said about long-distance anaphors, which are typically morphologically simplex, and which operate in a domain that is larger than complex anaphors; see, *inter alia*, the papers in Koster & Reuland (1991). As discussed in §2.3, in some languages, such as Icelandic, long-distance anaphora is possible if the anaphor is separated from the antecedent by a complement clause boundary that is non-factive or subjunctive, but not if the complement is indicative and factive. See Harves (2002) for relevant observations.

¹³ For details, see Elbourne (2005).

¹⁴ For discussion and analysis of the syntax and semantics of German *d*-pronouns and personal pronouns see Wiltschko (1998).

¹⁵ Koopman & Sportiche's (1983) original proposal was stated in terms of the Bijection Principle, which requires that: (i) an operator can bind one and only one variable; (ii) a variable be bound by one and only one operator. While (i) is accurate (and adopted in the main text), (ii) is falsified by the possibility of split antecedents for variables. Moreover, the inability of topicalization by non-quantified NPs to induce weak crossover stands in the way of viewing all A-bar elements as operators that bind variables.

¹⁶ Both focused and topicalized DPs occupy A-bar positions at LF (Rizzi, 1997). Because of this, Koopman & Sportiche's (1983) attempt to distinguish different types of variables cannot be quite right. In particular, they distinguish semantic versus syntactic variables, with the former being A-bar bound traces. This incorrectly predicts that focused and topicalized DPs will pattern in the same way: while (quantificational) focused DPs obey WCO, (non-quantificational) topicalized DPs do not (Lasnik & Stowell, 1991; Rizzi, 1997).

¹⁷ Heim's (2008) original example contains a feminine instance of the lower 3rd person pronoun, but this doesn't affect the point. No instance of 3rd person is acceptable in this configuration as a bound variable that is bound by a 1st person antecedent.

¹⁸ For related discussion concerning the structural ambiguity of pronouns relative to bound variable anaphora, see Déchaine & Wiltschko (2002).

¹⁹ Reinhart & Reuland (1993) do not treat reciprocals, but nothing in their approach prevents a straightforward extension. Therefore, all of our remarks apply to reciprocal with experience antecedents as well; i.e., they will have the status of logophors.