A Remark on the Economics of Quantifier Raising

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Quantifier Raising is often considered to be a relatively local operation, though it has been argued that nonlocal applications are licensed by generating new scope interpretations (Fox 2000, Reinhart 2006) or resolving antecedent-contained deletions (Fox 2002, Wilder 2003, Cecchetto 2004). In this article, an account of the restricted distribution of sloppy pronouns in antecedent-contained deletions leads to the conclusion that exceptional applications of Quantifier Raising are in fact not licensed purely by virtue of QR's escaping the antecedent for ellipsis.

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1 Introduction

A currently influential view of the syntax-semantics interface considers scope-shifting operations like Quantifier Raising (QR) to be subject to both syntactic and semantic economy constraints. For example, Fox (1995, 2000) and Reinhart (1995, 2006) argue that QR is normally restricted to a position below the surface subject position and that further movement must be licensed by meaningfully permuting two quantificational elements (see also Bruening 2001, Takahashi 2006, Mayr and Spector 2010). Fox (2002), Wilder (2003), and Cecchetto (2004) argue that exceptional applications of QR can also be licensed by resolving antecedent-contained deletion (ACD) configurations.

This article provides further confirmation for a view of the grammar in which QR can be licensed by virtue of generating new scope interpretations. However, we will be led to the conclusion that QR cannot be licensed purely for the purpose of satisfying an identity condition on ellipsis. The evidence comes from an account of the novel and puzzling observation that sloppy interpretations of elided pronouns are more restricted in ACD configurations than in coordination configurations. The following minimally differing pair of sentences illustrates:

(1) Tom$_1$ wants his$_1$ brother to be on the train that you$_2$ (also) do Δ.
    a. *Strict:* Δ = want his$_1$ brother to be on
    b. **Sloppy:* Δ = want your$_2$ brother to be on

(2) Tom$_1$ wants his$_1$ brother to be on the train and you$_2$ also do Δ.

    a. *Strict:* Δ = want his$_1$ brother to be on the train

    b. *Sloppy:* Δ = want your$_2$ brother to be on the train

I will argue that the restricted distribution of sloppy pronouns in ACD configurations can be accounted for by treating sloppy pronouns as bound variable interpretations (Sag 1976, Williams 1977) and adopting the type of ellipsis-licensing constraint found in Rooth 1992 and Heim 1997 that might require seeking out an antecedent for a constituent containing the ellipsis site. Ultimately, we will find that the QR operation that aids in resolving antecedent containment may be unable to escape the extended antecedent constituent required to generate a sloppy pronoun interpretation. This makes it possible to understand the restriction on sloppy interpretations as a failure to license ellipsis.

Interestingly, sloppy pronouns are not categorically unavailable in ACD. We will see that one way to bring these interpretations out is to provide the host of the ACD site some additional means to take wider scope than would otherwise be expected. This suggests that the relevant application of QR that would license ellipsis, and therefore the sloppy interpretation, is in principle possible. On this basis, we will be led to the conclusion that escaping antecedent containment is not by itself sufficient motivation for additional applications of QR.

In section 2, I will briefly review some of the evidence suggesting that ellipsis resolution could plausibly license applications of QR. In section 3, I will demonstrate the restricted distribution of sloppy pronouns in ACD configurations and present the relevant generalization to be derived. In section 4, I will present the analysis sketched above in more detail. In section 5, I will investigate and discuss the significance of those instances of ACD where sloppy pronouns are available. I will conclude in section 6 by considering some implications and emergent puzzles of this analysis.

2 Ellipsis Licensing as Currency in a Semantic Economy

The containment relationship between the elided VP$_E$ and the antecedent VP$_A$ in ACD configurations like (3) presents a puzzle for theories of ellipsis resolution. On the face of things, there is no clear way to consider the two constituents to be identical in any sense, making it unclear how ellipsis could be licensed in such structures.[1]

(3) a. Sue [$_{VP_A}$ read [$_{DP}$ every article that you did ⟨$_{VP_E}$ ~~read x~~⟩]]

    b. [$_{VP_A}$ read every article that you read x] ≠ ⟨$_{VP_E}$ read x⟩

May (1977, 1985) proposes using QR here as illustrated in (4). An application of QR that places the DP host of the ACD site (DP$_{ACD}$) outside the matrix VP provides a step toward resolving the licensing issue.[2]

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[1] For the remainder of the article, I will strike through elided material and enclose the elided constituent in angled brackets.

[2] See also Larson and May 1990, Fiengo and May 1994, Kennedy 1997, and Fox 2002; but compare Baltin 1987, Jacobson 1992, and Hornstein 1995.

(4) a. Sue [$_{VP_A}$ read x] [$_{DP}$ every article that you did ⟨$_{VP_E}$ read y⟩]

b. [$_{VP_A}$ read x] ≈ ⟨$_{VP_E}$ read y⟩

It has also been proposed that exceptional QR is licensed in cases where the result permits the resolution of an ellipsis site that would otherwise remain antecedent-contained. Wilder (2003) refers to examples like (5) as *wide scope ACD*. Such examples show that the direct object of a finite complement clause can contain an ACD site resolved to the matrix VP.

(5) John [$_{VP_A}$ thought that the fire destroyed x]

[$_{DP}$ every book that Bill did ⟨$_{VP_E}$ think the fire destroyed y⟩]

(adapted from Wilder 2003:93, (49a))

On a QR-based analysis of ACD resolution, QR of the DP$_{ACD}$ in (5) would have to cross a finite-clause boundary, something that is generally not possible for QR. Seemingly, then, an exceptional application of QR is licensed by the fact that it can resolve the ACD site.[3] Cecchetto (2004:388) reaches the same conclusion, that resolving ACD in Italian and English can license otherwise unavailable applications of QR. Part of the evidence he presents comes from the observation, contra Wilder (2003), that otherwise unavailable inverse-scope interpretations with the matrix subject become "possible (although marginal)" in wide scope ACD configurations.

Syrett (2015) reports quantitative data from English that is intended to support this claim. A truth-value judgment task suggests that undergraduate participants were able to access the relevant inverse-scope interpretation on a matrix-level interpretation of an embedded ACD site. Participants in the experiment were shown a series of images and heard a story presenting a scenario supporting the inverse-scope interpretation. At the end of the story, the narrator delivered the target sentence and asked the participant about the accuracy of the statement. A sample target sentence is provided in (6).

(6) a. Someone$_1$ said he$_1$ could jump over every frog that Jessie did.
   b. ∀ > ∃: 'For every frog x such that Jessie said she could jump over x, there was someone who said he could jump over that frog.'
   (adapted from Syrett 2015:586)

Syrett (2015) points out that participants' ability to access the inverse-scope interpretation seems to confirm Cecchetto's (2004) claim, which is that ellipsis licenses exceptional QR that can in turn feed additional applications of QR.

Despite these results, it cannot be concluded on the basis of data like (6) alone that ellipsis licensing plays a role in achieving the inverse-scope interpretation. The minimum data required to make this argument would come from a comparison of (6) and the sentence in (7), from which I have removed the ACD site. If resolving the ACD site shared some of the responsibility for

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[3] Also see the interesting data introduced by Larson and May (1990), expanded upon by Tiedeman (1995), and discussed by Fox (2002) and Wilder (2003).

allowing the embedded object to take scope over the matrix subject, the inverse-scope interpretation should not be possible in (7).

(7) Someone$_1$ said he$_1$ could jump over every frog. $\quad\quad\quad (\exists > \forall), ?(\forall > \exists)$

However, Grano and Lasnik (2018) and others have argued that the relevant inverse-scope interpretation in examples like (7) is available. This observation is normally tied directly to the fact that the embedded subject is a bound pronoun. Relevant here is the observation that the embedded object can achieve exceptional scope in the absence of an ACD site in (7). This suggests that resolving ACD is not relevant to the exceptionally wide scope of the embedded object in (6). Thus, these data do not provide the evidence to confidently claim that ellipsis licensing motivates an exceptional application of QR.

Regardless, the observation that an embedded object can contain an ACD site that is resolved to the matrix clause in examples like (5) has been taken to suggest that licensing ellipsis is (at least partially) responsible for transporting the embedded object out of the embedded clause (Wilder 2003, Cecchetto 2004, Wurmbrand 2018). The way that Cecchetto (2004) suggests we think about this is that the exceptional application of QR is motivated as a means of removing an ellipsis site from its antecedent.[4] The remainder of this article can be read as a failure to confirm these results. In an investigation of the distribution of sloppy pronouns in ACDs, we will be led to the opposite conclusion. While QR may facilitate the resolution of ACD, additional or exceptional applications of QR are not licensed even though they would remove an ellipsis site from a constituent that would serve as a suitable antecedent. In section 6, I will suggest a way to think about these contradictory results.

3 Sloppy Pronouns in Antecedent-Contained Deletions

VP-ellipsis (VPE) offers the ability to interpret an elided pronoun faithfully, as in (8a), or unfaithfully, as in (8b). Following Ross 1967, I will use the terms *strict* and *sloppy* to refer to the faithful and unfaithful interpretations, respectively.

(8) Kim$_1$ likes her$_1$ photos and you$_2$ also do Δ.
    a. *Strict:* $\quad \Delta = $ like her$_1$ photos
    b. *Sloppy:* $\Delta = $ like your$_2$ photos

My analysis of sloppy pronouns is based on Sag 1976 and Williams 1977, where, following Partee 1973, the elided constituent is interpreted as a λ-expression. The strict interpretation emerges from treating the elided pronoun as referential; see (9a). A sloppy pronoun arises as a bound variable interpretation of the elided pronoun, as in (9b).

(9) Kim$_1$ likes her$_1$ photos and you$_2$ also do Δ.
    a. *Strict:* $\quad [\![\Delta]\!]^g = \lambda x.x$ likes $\boldsymbol{y}$'s photos
    b. *Sloppy:* $[\![\Delta]\!]^g = \lambda x.x$ likes $\boldsymbol{x}$'s photos

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[4] More accurately, Cecchetto (2004) assumes that ellipsis involves copying of the antecedent into the ellipsis site. QR is motivated in ACD configurations in order to avoid the infinite regress that would arise from copying into the ellipsis site a constituent that contains the ellipsis site.

It is commonly assumed to be a condition on sloppy interpretations that the elided pronoun is c-commanded by its new antecedent. This is a reflection of their treatment as instances of bound variables (e.g., Reinhart 1983, Tomioka 1999; but cf. Rooth 1992, Hardt 2003). On any analysis of ACD configurations like (10), this requirement would be met. Therefore, it is interesting that, while strict interpretations are easily available, sloppy interpretations are more restricted here than they are in coordinate VPE in (11).

(10) Jim_1 wanted his_1 brother to fix each bike

   that you_2 (also) did $\langle_{VP_E}$ ~~want his_1/*$your_2$ brother to fix x~~$\rangle$

(11) Jim_1 wanted his_1 brother to fix each bike

   and you_2 (also) did $\langle_{VP_E}$ ~~want his_1/$your_2$ brother to fix each bike~~$\rangle$

The context provided with the examples in (12) is designed to facilitate judgments. The strict interpretation of the elided pronoun is made false by this context and the sloppy interpretation true. Additionally, the target sentences have been designed to block resolution of the ellipsis site to the embedded predicate, which is incompatible with the auxiliary *do*. Even so, the asymmetric pattern persists; the sloppy interpretation is possible in coordinate VPE but is unavailable in the ACD configuration.[5]

(12) *Context:* You expect that your sister and absolutely no one else will be in today's meeting. However, Kim expects that her sister will also be in this meeting. So, . . .
   a. *Kim expects her sister to be in the meeting that you (also) do.   (ACD)
   b. Kim expects her sister to be in the meeting and you also do.   (VPE)

This asymmetry between ACD and standard VPE with respect to sloppy pronouns can be observed across a range of syntactic constructions. In addition to the raising-to-object constructions above, sloppy interpretations are missing from ACD sites in the second object of a double object construction (13), the embedded object of a verbal small clause (14), and the embedded object of a finite clause (15). In each case, the sloppy interpretation is available in the coordination configuration in the (b) variant.[6]

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[5] Tomioka (1999) presents an analysis of third person sloppy pronouns that are not c-commanded by their antecedent as E-type pronouns. I have attempted to control for this possibility here by using indexical pronouns in the ellipsis site, which resist an E-type interpretation. Given the example in (i), however, it seems that an E-type strategy is not available to generate sloppy interpretation in ACD environments.

   (i) *Kim_1 expects her_1 sister to be in the meeting that Dan_2 does $\langle$~~expect his_2 sister to be in~~$\rangle$

At present, I do not have a full explanation for this fact—although we might suppose that Grodzinsky and Reinhart's (1993) Rule I is at play here. Given a choice between direct binding or an E-type pronoun, the grammar may prefer binding when the two generate equivalent interpretations.

[6] A number of linguists who have provided me with judgments of data like those in (10)–(15) have observed that adding the adjective *same* (e.g., *the same meeting* in (12a–b)) to the head of the relative clause helps draw out the sloppy interpretation. While I share this intuition to an extent, I suspect that the peculiar behavior of *same*, as discussed by Barker (2007) for instance, means that something extra is going on in these cases. This suspicion must be left for future research.

(13) Tim_1 showed his_1 mother each photo . . .

    a. that I_2 (also) did $\langle_{VP_E}$ ~~show his$_1$/*my$_2$ mother~~$\rangle$

    b. and I_2 also did $\langle_{VP_E}$ ~~show his$_1$/my$_2$ mother each photo~~$\rangle$

(14) Sue_1 watched her_1 dog bite the people . . .

    a. that you_2 (also) did $\langle_{VP_E}$ ~~watch her$_1$/*your$_2$ dog bite~~$\rangle$

    b. and you_2 also did $\langle_{VP_E}$ ~~watch her$_1$/your$_2$ dog bite the people~~$\rangle$

(15) Bob_1 thinks his_1 sister was in every meeting . . .

    a. that you_2 (also) do $\langle_{VP_E}$ ~~think his$_1$/*your$_2$ sister was in~~$\rangle$

    b. and you_2 also do $\langle_{VP_E}$ ~~think his$_1$/your$_2$ sister was in every meeting~~$\rangle$

The generality of this pattern indicates that we are dealing with a configurational issue created by ACD constructions.[7] I propose that the relevant difference between ACD configurations and coordinate VPE is the relationship between the ellipsis site and the binder for the spoken pronoun, as schematized in (16) and (17).

(16)

(17)

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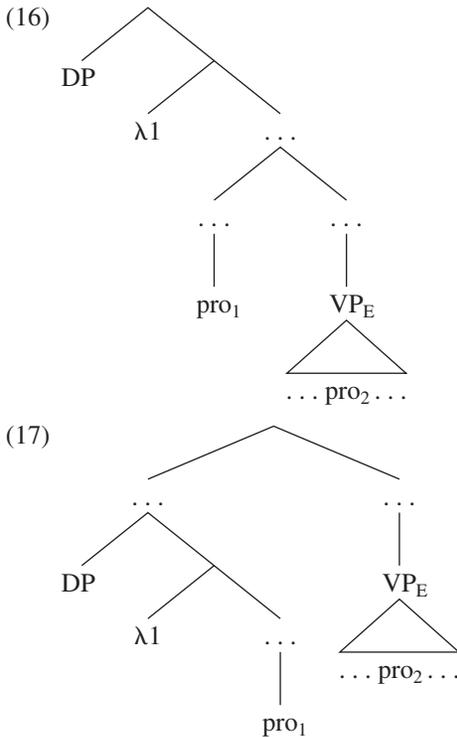
[7] The puzzle presented here is superficially similar to the previously observed pattern whereby a reflexive pronoun resists a strict interpretation in coordination configurations but allows it in adjunction configurations (see Williams 1977, Partee and Bach 1984, Hestvik 1995; but cf. Sag 1976, Dalrymple 1991, Kitagawa 1991, Fiengo and May 1994, Büring 2005, Ahn 2011). In our puzzle, however, the sloppy interpretation is missing in ACD configurations while both interpretations are available in coordination configurations.

In ACD configurations, the matrix subject binds the spoken pronoun in the antecedent and also c-commands the ellipsis site, as in (16). In VPE configurations, the elided material and the antecedent material are distributed over two conjuncts and cannot be in a c-command relationship; see (17). The generalization to be derived, then, can be stated as follows:

(18) A pronoun P_n elided with some VP_E will not permit a sloppy interpretation if VP_E is interpreted in the scope of the binder for a corresponding pronoun P_m in the antecedent VP_A.

Section 4 will explain why such a generalization should exist. However, it is worth clarifying now that the generalization is not that sloppy interpretations are entirely banned from ACD constructions. For example, if the VP_E managed to be interpreted above the matrix subject in configurations like those in (12)–(15), a sloppy interpretation should be able to emerge. We will find this prediction borne out in section 5.[8]

4 When Binding Bleeds ACD

I will ultimately argue that the generalization in (18) holds because ellipsis cannot be licensed in the structure responsible for generating the sloppy interpretation. I will adopt Takahashi and Fox's (2005) insight that sloppy interpretations of pronouns require identifying an antecedent for the ellipsis site that is larger than otherwise expected. The effect is that the standard application of QR involved in ACD resolution may fail to escape antecedent containment under a sloppy interpretation of an elided pronoun. The analysis, therefore, does not seek to constrain the distribution of sloppy pronouns. Instead, the idea is to derive their distribution directly from the conditions on ellipsis licensing.

That being said, it must be acknowledged for full disclosure that for some speakers, including myself, reflexive pronouns permit a sloppy interpretation in an ACD configuration; see (i).

(i) Kim₁ expects herself₁ to be in the meeting that you₂ do ⟨~~expect her/yourself to be in~~⟩

This is not obviously a result we would expect from the generalization in (18) or the analysis to follow. Accounting for this possibility and the observed speaker variation must be left for another occasion.

[8] It is because we will find in section 5 that the availability of the sloppy interpretation can be modulated as a function of where the VP_E is interpreted that I do not pursue an analysis that capitalizes on the distribution of focus marking. Consider (i), which is intended to demonstrate that a very natural prosody for the unelided variant of (12a) places a pitch accent on the elided pronoun and its binder.

(i) Kim expects her sister to be in the meeting that YOU [$_{VP}$ expect YOUR sister to be in]

Assuming that there is a general tendency to not elide focused material, one might assert that the focused pronoun blocks ellipsis of its containing VP. Left unconstrained, such an analysis would incorrectly predict that a sloppy interpretation is always unavailable.

The same observation from section 5 can also be taken to suggest that the availability of a sloppy interpretation is not purely a function of the discourse-coherence relations evoked by Kehler (2000) to account for the distribution of strict and sloppy interpretations. Looking ahead to (35) and (36), the inferred discourse-coherence relations of an utterance will not vary as a function of the scope of a *because*-clause. Nonetheless, variation is observed in the availability of a sloppy interpretation. Thank you to Jessica Rett (pers. comm.) for a helpful discussion of this latter point.

4.1 Binding and Parallelism Domains

Recall our basis for the analysis of sloppy pronouns, which is repeated in (19). Sag (1976) and Williams (1977) treat sloppy pronouns as variables bound within the ellipsis site, while strict pronouns are interpreted as referential variables.

(19) Kim$_1$ likes her$_1$ photos and you$_2$ also do Δ.
    a. *Strict:* $[\![\Delta]\!]^g = \lambda x.x$ likes y's photos
    b. *Sloppy:* $[\![\Delta]\!]^g = \lambda x.x$ likes x's photos

For Sag (1976), ellipsis is licensed in (19) because the logical formula derived for either VP_E can be identical to that of the VP_A, excepting the alphabetic names of the bound variables. Sag (1976:131–132) argues that this mode of capturing sloppy identity in VPE correctly predicts that it should not be possible for a sloppy pronoun in an ellipsis site to have an antecedent other than the DP that saturates the open predicate that is the elided constituent. Indeed, the availability of a sloppy pronoun in (20) correlates with the size of the ellipsis site; it does not appear to be possible to bind a sloppy pronoun from outside the ellipsis site, as seen in (20b).

(20) a.   Tim [$_{VP_A}$ λ1 said I hugged him$_1$] and Sue did ⟨$_{VP_E}$ λ2 say I hugged her$_2$⟩, too
     b.   *Tim λ1 said I [$_{VP_A}$ hugged him$_1$] and Sue λ2 said I did ⟨$_{VP_E}$ hug her$_2$⟩, too

Subsequent research has shown that it actually is possible under various conditions for a variable to be bound from outside a VP_E (e.g., Evans 1988, Jacobson 1992). For instance, in (21) the trace in the elided VP_E is bound from outside the VP_E by the binder index λ2 under the topicalized DP *Sue*.

(21) Tim λ1 I [$_{VP_A}$ hugged x_1] but Sue λ2 I didn't ⟨$_{VP_E}$ hug y_2⟩

The problem is that, from the point of view of licensing ellipsis, it is not obvious that the VP_A and the VP_E can produce equivalent logical formulas. These VPs contain variables that are free within those constituents and that also carry different indices. As (22) demonstrates, this is not something that ellipsis tolerates.

(22) *Tim [$_{VP_A}$ hugged him$_{1 \mapsto Dave}$] and Sue also did ⟨$_{VP_E}$ hug him$_{2 \mapsto Steve}$⟩

In response, Takahashi and Fox (2005) maintain the basic assertions of the Sag/Williams analysis but they adopt Rooth's (1992) and Heim's (1997) idea that the identity relationship required for licensing ellipsis might not be evaluated directly over the ellipsis site and an antecedent. Instead, the relevant identity relationship can be evaluated between some constituent that contains the ellipsis site and an appropriate antecedent. It will be sufficient for present purposes to state this condition on identity as in (23).

(23) For ellipsis of some VP_E to be licensed
    a. there must exist a parallelism domain (PD), which reflexively dominates VP_E;
    b. there must exist an antecedent constituent (AC); and
    c. for any assignment function g, $[\![PD]\!]^g = [\![AC]\!]^g$, modulo focus-marked constituents.
    (simplified from Takahashi and Fox 2005:229, (20))

Turning back to examples like (22), repeated in (24a), with no bound variables or Ā-traces, the PD will need to be only as big as the elided constituent. When the spoken and elided pronouns are contraindexed, as in (24a), it will be found that the PD and the AC are not semantically equivalent for any assignment function; see (24b). There could be assignment functions where $1 \mapsto$ *Dave* and $2 \mapsto$ *Steve*, assignment functions where $1 \mapsto$ *Bob* and $2 \mapsto$ *Randy*, and others. For this reason, the licensing condition in (23) will determine that ellipsis is not possible.

(24) a. *Tim [$_{AC}$ hugged him$_1$] and Sue also did [$_{PD}$ ⟨$_{VP_E}$ ~~hug him$_2$~~⟩]
  b. $[\![_{AC}$ hugged him$_1]\!]^g \neq [\![_{PD}$ hugged him$_2]\!]^g$

It is when a variable is bound from outside the ellipsis site—the VP_E in the case of topicalization that is provided again in (25)—that a PD larger than the VP_E must be identified. By including within the PD the binder index λ2 for the bound variable y_2, we can identify the bracketed AC with the binder index λ1 as an appropriate antecedent. Because binder indices are interpreted as modifiers of variable assignment functions, this PD and AC will be interpretively equivalent under any assignment function, modulo the focus-marked auxiliaries.[9]

(25) a. Tim [$_{AC}$ λ1 I DID hug x_1] but Sue [$_{PD}$ λ2 I DIDN'T ⟨$_{VP_E}$ ~~hug y_2~~⟩]
  b. $[\![_{AC}$ λ1 I DID hug $x_1]\!]^{g \begin{bmatrix} 1 \mapsto x \\ 2 \mapsto y \end{bmatrix}} = [\![_{PD}$ λ2 I DIDN'T hug $y_2]\!]^{g \begin{bmatrix} 1 \mapsto x \\ 2 \mapsto y \end{bmatrix}}$

The benefit of this extended system is the additional degree of freedom provided when choosing which constituent in the phrase marker requires the identification of an appropriate antecedent as part of licensing ellipsis. In the following section, I will capitalize on the idea that the AC necessarily enlarges as the PD enlarges in response to bound variables in the ellipsis site.

4.2 Bleeding ACD with Binding

Let us continue to analyze ACD as being resolved through an application of QR that covertly moves the DP$_{ACD}$. For reasons that will become apparent, I will more closely follow Merchant (2000) (as well as Fox (2002), who builds on ideas in Fox and Nissenbaum 1999) and assume that the relevant application of QR targets the edge of what I will continue to refer to as VP, as in (26).

(26) Pat [$_{VP}$ [$_{VP_A}$ watched x] [$_{DP}$ the documentary that I did ⟨$_{VP_E}$ ~~watch y~~⟩]]

The idea in what follows is that applications of QR employed to resolve antecedent containment may fail to do so if a larger-than-normal AC must be identified. In these cases, semantic equivalence will not be established and ellipsis will not be licensed on the desired sloppy interpretation.

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[9] To account for the original contrast in (20), Takahashi and Fox (2005:229, (21)) adapt the requirement, which ultimately appeared in Merchant 2008, that ellipsis target the largest deletable constituent—namely, the requirement known as MaxElide. Basically, their MaxElide favors ellipsis of the largest deletable constituent reflexively dominated by the PD. In (20), this is the embedding VP immediately under the DP *Sue*, which serves as the binder for the embedded pronoun.

4.2.1 Generating the Strict Interpretation First, consider the grammatical ACD configuration with a strict interpretation of the elided pronoun. A modified version of (12) is provided in (27a) alongside its LF representation in (27b), in which the DP_{ACD} has undergone QR to the edge of the matrix VP.

(27) a. Kim expects her$_7$ sister to be in

[$_{DP}$ the meeting that you do ⟨$_{VP_E}$ ~~expect her$_7$ sister to be in *x*~~⟩]

b.

IP
- Kim
- VP
  - AC
    - VP: expects her$_7$ sister to be in x_1
    - λ1
  - DP
    - the
    - meeting
    - CP
      - that
      - IP
        - you
        - do
        - VP
          - meeting
          - PD
            - λ2
            - ⟨VP$_E$⟩: expect her$_7$ sister to be in x_2
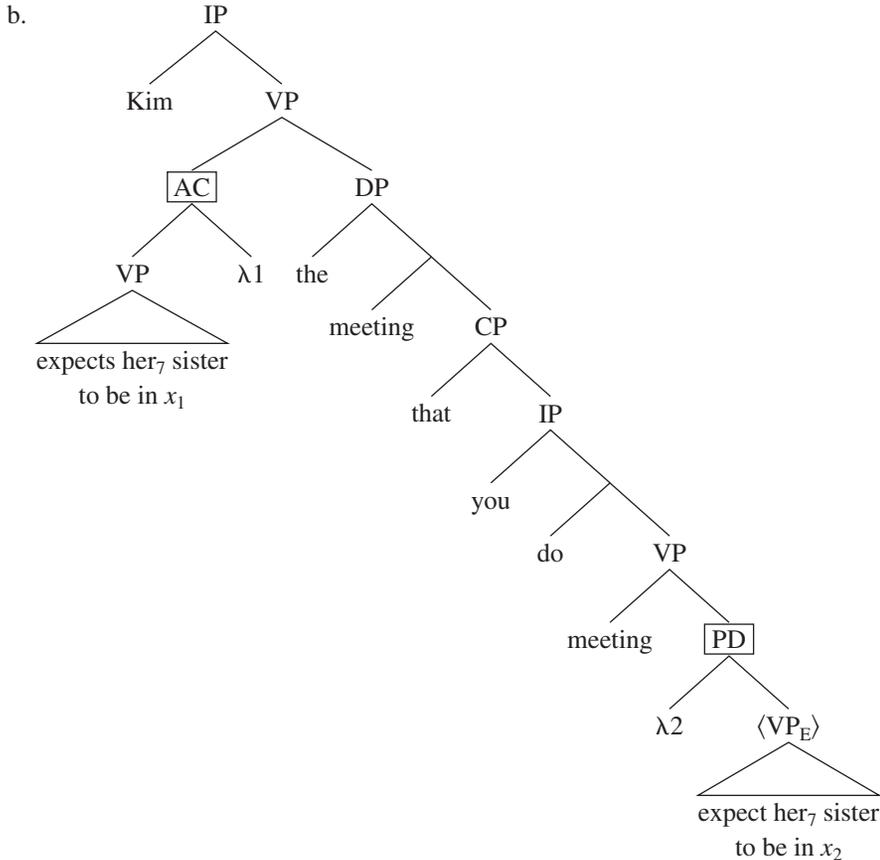
Generating the strict interpretation requires that the elided pronoun and its spoken correlate in the VP$_A$ be referential pronouns. This means that the only bound variable in the VP$_E$ is the trace x_2 of the relative clause head *meeting*. It is only this element for which we need to consider the effects of binding on ellipsis licensing. I will assert that, for the purpose of defining the PD, this variable is bound by the binder index introduced with an intermediate trace of *meeting* at the edge of the highest VP inside the relative clause domain. With this PD, an AC can be defined by the parallel binder index at the edge of the matrix VP that is introduced by the instance of QR involved in the resolution of the ACD site.

By comparing the logical formulas generated from the LF representations for these constituents, we can see in (28) that they do not contain contraindexed free variables. Since they are

otherwise parallel, they will be interpretively equivalent under any assignment function, including one where $g(7) = Kim$.

(28) $[\![_{AC} \lambda 1 \text{ expects her}_7 \text{ sister to be in } x_1]\!]^g = [\![_{PD} \lambda 2 \text{ expect her}_7 \text{ sister to be in } x_2]\!]^g$

The licensing condition on ellipsis is satisfied, and ellipsis of the relative clause VP is possible on the intended interpretation.

4.2.2 Blocking the Sloppy Interpretation   Example (12a) illustrating the unavailable sloppy interpretation is provided again in (29a). It is accompanied by its corresponding LF representation (29b), in which the DP$_{ACD}$ has undergone QR to the edge of the matrix VP.

(29) a. *Kim$_3$ expects her$_3$ sister to be in

[$_{DP}$ the meeting that you$_4$ do ⟨$_{VP_E}$ ~~expect your$_4$ sister to be in x~~⟩]

b.
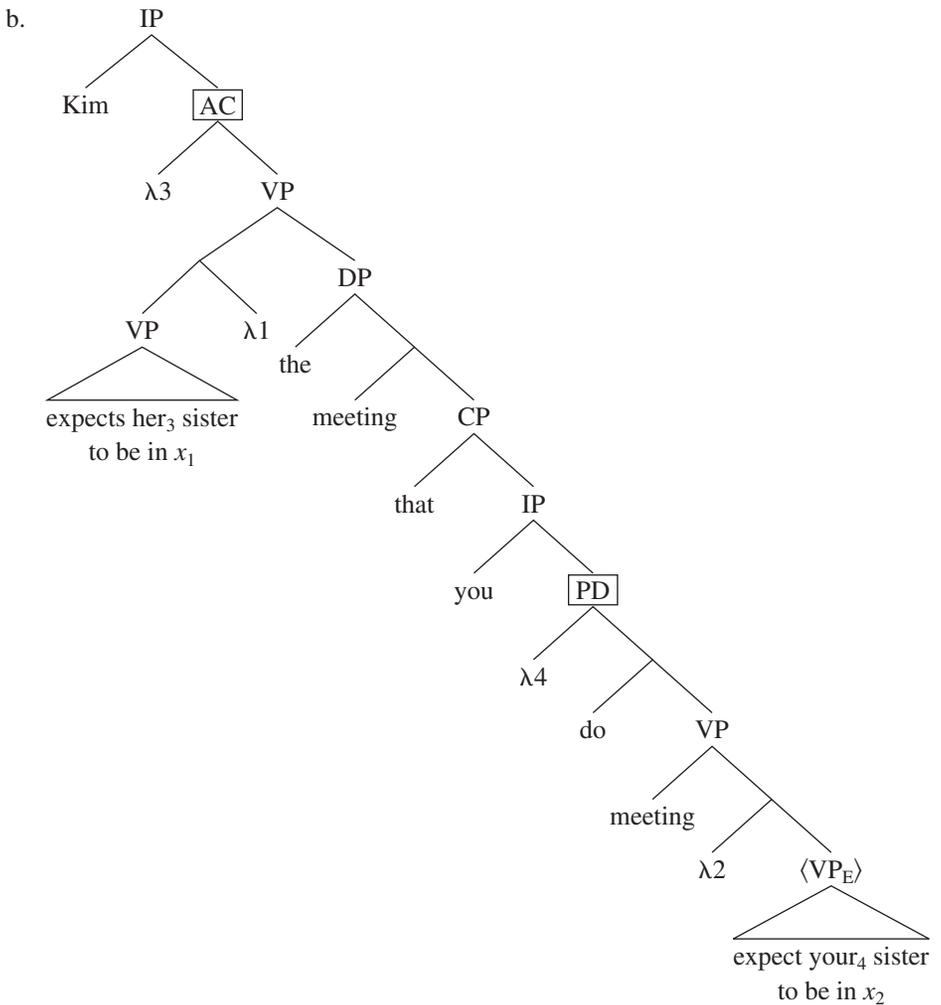
The elided pronoun and its correlate in the VP_A are each bound by the subject of their respective containing clauses. Therefore, the VP_E contains two bound variables: the trace of the relative clause head is still bound by an intermediate trace at the edge of the highest relative clause VP, and the pronoun *your* is bound by *you*. To ensure semantic equivalence with some AC, the binding of *your* will require extending the PD outside the highest relative clause VP to contain the binder index $\lambda 4$ under *you*. This in turn means that it will be necessary to extend the AC to find a parallel binder for the pronoun *her*. This makes the AC the constituent that immediately dominates the binder index $\lambda 3$ under *Kim*.[10]

As the structure in (29b) shows, sufficiently extending the AC picks out a constituent that now contains the PD. The logical formulas generated by these LF representations now cannot be interpretively equivalent. Considering (30), we can see that, at minimum, the moved element in the AC has a restrictor and will have stronger truth conditions than the PD. Therefore, the licensing condition on ellipsis cannot be satisfied and ellipsis of the relative clause VP is not possible on this interpretation.[11]

(30) $[\![_{AC} \, \lambda 3 \, [\text{the meeting that you } \lambda 4 \text{ meeting } \lambda 2 \text{ expect your}_4 \text{ sister to be in } x_2]$
$\lambda 1 \text{ expects her}_3 \text{ sister to be in } x_1]\!]^g$
$\neq [\![_{PD} \, \lambda 4 \text{ meeting } \lambda 2 \text{ expect your}_4 \text{ sister to be in } x_2]\!]^g$

In short, this analysis asserts that the variable binding associated with generating sloppy pronouns requires identifying an antecedent constituent that is too big for standard applications of QR to escape. With respect to the generalization in (18), it is specifically when the binder in the antecedent clause c-commands the ellipsis site that it may not be possible for QR to escape containment within the extended antecedent constituent, which disrupts ellipsis licensing. To better appreciate this, we can turn briefly to the account of sloppy pronouns in coordinate VPE.

4.3 Coordination Configurations

Recall from section 3 that the distribution of sloppy pronouns is not so constrained in the context of coordination configurations. Simply put, this is because, unlike in ACD configurations, the PD and the AC are in separate clausal conjuncts and will not interact. Extending the AC in response to an extended PD will not result in antecedent containment.

The rough LF representation of the strict interpretation in a coordination structure is given in (31). To generate the strict interpretation, the elided variable and its correlate in the spoken VP will be treated as referential pronouns. The elided VP will not contain any bound variables, and the PD will be coextensive with the VP_E.

---

[10] By comparing the treatment of (27) and (29), the reader might note that I am effectively assuming that ellipsis licensing is sensitive to the presence of a pronoun bound by the subject but is not sensitive to the trace left by A-movement of the subject (see Messick and Thoms 2016; cf. Hartman 2011).

[11] I will eventually adopt the assumption that traces are contentful and contain variables bound by the moved element (e.g., Engdahl 1980, Sauerland 1998, Fox 2002). The intermediate trace in (29b) will contain a variable that is free within the PD and has no correlate in the AC. The presence of this bound variable is another reason that ellipsis cannot be licensed in this representation.

(31) Kim [$_{AC}$ expects her$_7$ sister to be in the meeting] and
                 you also do [$_{PD}$ ⟨$_{VP_E}$ ~~expect her$_7$ sister to be in the meeting~~⟩]

As before, the sloppy interpretation arises when the elided pronoun is interpreted as a bound variable. This will require extending the PD to include the binder index introduced under *you*, as shown in the rough LF representation in (32). Because the ellipsis site and the antecedent are in separate clausal conjuncts in this case, the extended AC will not be extended to the point that it contains the PD. By comparing the AC and the PD pulled from this structure, one can confirm that they are guaranteed to be semantically equivalent under any variable assignment function.

(32) Kim [$_{AC}$ λ3 expects her$_3$ sister to be in the meeting] and
              also you [$_{PD}$ λ2 do ⟨$_{VP_E}$ ~~expect your$_2$ sister to be in the meeting~~⟩]

    On either the strict or the sloppy interpretation of the elided pronoun in a coordination structure, the PD and the AC in the resulting LF representation will not be in a containment relationship and will produce equivalent logical formulas. Thus, on either interpretation, the licensing condition on ellipsis will be satisfied and ellipsis of the VP will be possible.

5 Feeding ACD

5.1 A Prediction

The analysis presented in section 4 crucially relies on the assertion that the hypothetical LF representation in (33) is generally unavailable. If the DP$_{ACD}$ could outscope the matrix subject, the highest copy of the relative clause head could define the PD. This PD would escape the extended AC, semantic equivalence could be established, and ellipsis would be licensed on the sloppy interpretation. This is shown in (34), where it can be seen that this AC and PD would be guaranteed to be semantically equivalent, modulo focus-marked constituents.[12]

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[12] The intermediate traces have been omitted from the representation in (33) for expository purposes. It is worth adding, though, that it is the presence of intermediate traces that requires the PD in (33) to be defined by the highest copy of the relative clause head. As mentioned in footnote 11, the bound variable assumed to be part of an intermediate trace would disrupt ellipsis licensing if its binder were not included in the PD.

(33)

```
                          ┌──────────┴──────────┐
                    ┌─────┴─────┐          ┌─────┴─────┐
                  [AC]          λ1        DP
              ┌────┴────┐                 │
             IP        λ1    the   ┌──────┴──────┐
          ┌──┴──┐          meeting        [PD]
        Kim    ...
```

$$\llbracket [_{AC} \ \lambda 1 \ \text{KIM} \ \lambda 3 \ \text{expects her}_3 \ \text{sister to be in } x_1] \rrbracket^g =$$

Tree nodes: AC, IP, Kim, λ1, λ3, VP (expects her₃ sister to be in x₁), the, meeting, DP, PD, λ2, CP, that, IP, you, λ4, do, ⟨VP⟩ (expect your₄ sister to be in x₂)
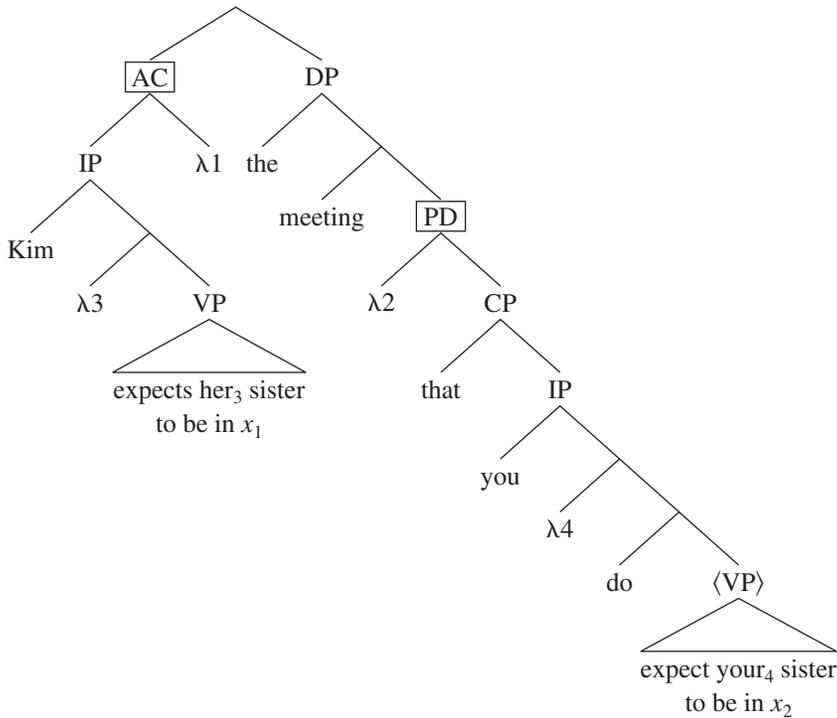
(34) $\llbracket [_{AC} \ \lambda 1 \ \text{KIM} \ \lambda 3 \ \text{expects her}_3 \ \text{sister to be in } x_1] \rrbracket^g =$

$\llbracket [_{PD} \ \lambda 2 \ \text{YOU} \ \lambda 4 \ \text{expect your}_4 \ \text{sister to be in } x_2] \rrbracket^g$

One way to block this representation is to restrict QR of the DP_{ACD} to the matrix VP. This can be done with at least two assumptions. The first is that QR is subject to a minimality condition that requires it to target the closest node at which it would be semantically interpretable, normally the edge of VP for internal arguments. Second, QR may proceed successive-cyclically beyond this position on the condition that each step is independently licensed and also minimal. This is the basic picture of QR that has emerged from the research by Fox (1995, 2000), Reinhart (1995, 2006), Nissenbaum (2000:chap. 5), Cecchetto (2004), Takahashi (2006:chap. 4), and others.

These assumptions were partly implicit in the account presented in section 4. By assertion, QR of the DP_{ACD} is licensed to move successive-cyclically out of the embedded clause but only as far as the matrix VP. One of the primary claims of this article is that, whatever licenses the involved movements, it is not the ability to escape the AC that is evaluated for ellipsis licensing. If it were, a step of QR that placed the DP_{ACD} beyond the matrix VP and above the matrix subject, as in (33), would be licensed by virtue of licensing ellipsis.

Of course, it is possible that some other, potentially undiscovered factor is blocking (33) or its derivation. We can see this is not the case by investigating a prediction made by the system as it has been laid out so far. If we can provide some alternative motivation for an instance of movement that we expect to simulate (33), ellipsis should be possible with a sloppy interpretation.

If this is what we observe, we will be licensed to conclude that the relevant application of movement is in principle capable of generating (33), but is not otherwise provided sufficient motivation. Specifically, QR is not licensed purely to ensure the semantic identity condition on ellipsis that we have adopted. The remainder of this section demonstrates that this prediction is borne out.

Before we look at those data, let me rule out a plausible alternative to the way I have characterized this prediction. One could imagine that, instead of the DP_{ACD} being moved over the subject to generate a sloppy interpretation, the subject was reconstructed to a position below the DP_{ACD}. The result would still be a configuration like the one in (17), where the VP_E is interpreted above the subject and the generalization in (18) is satisfied. There is empirical evidence suggesting that this is not a possible strategy for generating sloppy interpretations. Reconstruction of the subject fails to account for the distribution of sloppy pronouns in *because*-clauses, which we will see presently is a function of the scope of the *because*-clause.

Consider sentence (35b) in a context that biases toward interpreting the *because*-clause either below sentential negation (35a) or above sentential negation (36a).

(35) a. $\neg$ > CAUSE

   Context: Kim was not aware that you wanted your sister to be in this meeting. She decided that she wanted her sister to be in this meeting only after hearing there would be prizes given out.

   b. *Kim$_1$ doesn't want her$_1$ sister to be in this meeting

   because YOU$_2$ do $\langle_{VP_E}$ ~~want your$_2$ sister to be in this meeting~~$\rangle$

   c. 'It's not the case that, because you want your sister to be in this meeting, Kim wants her sister to be in this meeting. (It's because . . .)'

(36) a. CAUSE > $\neg$

   Context: When Kim heard that you wanted your sister to be in this meeting, she decided, out of spite, that she didn't want her sister to be in this meeting.

   b. Kim$_1$ doesn't want her$_1$ sister to be in this meeting

   because YOU$_2$ DO $\langle_{VP_E}$ ~~want your$_2$ sister to be in this meeting~~$\rangle$

   c. 'Because you want your sister to be in this meeting, it's not the case that Kim wants her sister to be in this meeting.'

When the *because*-clause is interpreted under negation in (35), a sloppy interpretation of the elided pronoun is unavailable. On the other hand, when the *because*-clause is interpreted above negation in (36), the sloppy interpretation becomes available. This is not a contrast that is straightforwardly captured as a function of the reconstruction of the subject. In both cases, the subject would supposedly be reconstructed to a position beneath the *because*-clause, which should permit a sloppy interpretation.[13]

---

[13] More accurately, the argumentation around examples (35) and (36) suggests that reconstruction to the base position of the subject is inadequate. These data may be compatible with theories of inverse-scope readings that involve reconstruction of the subject to some intermediate position in the clause, as argued for by Johnson and Tomioka (1998).

Instead, we can make sense of this finding if the VP_E in the *because*-clause must be interpreted in the scope of the surface position of the matrix subject when the *because*-clause is interpreted under negation. This would effectively produce a structure like (16) from section 3, which I am claiming blocks a sloppy interpretation of elided pronouns. The structure for (35), therefore, is functionally an antecedent containment configuration. The availability of a sloppy interpretation when the *because*-clause is interpreted above negation is expected if the VP_E in the *because*-clause at least can be interpreted outside the scope of the surface position of the subject. In other words, a structure like (17), which avoids antecedent containment, is available when the *because*-clause has scope over negation and a sloppy pronoun should be available according to (18).[14]

I turn now to the prediction that providing independent motivation for moving the DP_{ACD} will allow for ellipsis on a sloppy interpretation.

5.2 Inverse Scope

Fox (1995, 2000) and Reinhart (1995, 2006) have both argued that an object can be coerced into undergoing QR over the subject on the condition that they are both quantificational and that the movement would meaningfully invert the logical scope of the two elements. To the extent that this is the case, it should be possible to motivate a structure like the one in (33) by creating the possibility for QR to generate a new scope interpretation.

Observe first that it will in principle be possible for the embedded object to achieve scope over the matrix subject; see (37). The inverse-scope interpretation is available with a bound variable interpretation of a pronoun in the embedded subject position.

(37) a. A guard$_1$ expects his$_1$ sister to stand outside every building.
b. Every building [$\lambda 2$ a guard $\lambda 1$ y_1 expects his$_1$ sister to stand outside x_2]
c. $\forall > \exists$: 'For every building x, there is a guard y such that y expects y's sister to stand outside x.'

Next, Koster-Moeller and Hackl (2008) argue that Hirschbühler-Fox Scope Parallelism effects are observed in the domain of ACD. Put simply, the relative scope of two quantifiers in the ellipsis domain must be able to be parallel to the relative scope of their spoken correlates in the antecedent domain.[15] Controlling for these effects gives a test sentence like (38a).

(38) a. A guard$_1$ expects his$_1$ sister to stand outside
[$_{DP}$ every building that a spy$_2$ does $\langle_{VP_E}$ ~~expect her$_2$ sister to stand outside~~$\rangle$]

---

[14] Fox and Nissenbaum (2003) argue that some clausal adjuncts involve QR of the connector element and late merger of the embedded clause. One might imagine that something similar would generate a structure like (17) for a *because*-clause. Insofar as the data and argumentation around (35) and (36) are correct, they serve as evidence that this type of derivation is not available for the purpose of generating the desired sloppy interpretation in these instances.

[15] See Fox 2000 for a discussion of these effects, which are attributed to Hirschbühler (1982). For Koster-Moeller and Hackl (2008), this observation calls for a more articulated theory of relative clauses than I have assumed. The details do not affect the analysis presented here.

b. $\forall > \exists$: 'For every building x such that there is a spy y such that y expects y's sister to stand outside x, there is a guard z such that z expects z's sister to stand outside x.'

As predicted, the inverse-scope interpretation and the sloppy interpretation emerge together in (38). This suggests that there is nothing in principle wrong with a representation like (33) or its derivation. Instead, the inability of the DP_{ACD} to achieve the scope necessary to generate the sloppy interpretation must come from the lack of motivation to do so.

5.3 Topicalization

Additional evidence that the structure in (33) can be derived and that it can be derived by moving the DP_{ACD} over the subject comes from the observation that a sloppy interpretation becomes available inside a topicalized DP_{ACD}.

Correcting for linearization, the instance of topicalization in (39) generates a structure very much like (33). Topicalization places the DP_{ACD} in a position above the matrix subject and outside of an extended AC.

(39) [$_{DP}$ This meeting]$_1$ Kim WOULD expect her sister to be in x_1

As expected from the proposal in section 3 and the account in section 4, an elided pronoun in the ACD site hosted by the topicalized DP now permits a sloppy interpretation; see (40).[16]

(40) [$_{DP}$ The meeting that you$_2$ WOULDN'T $\langle_{VP_E}$ ~~expect your$_2$ sister to be in x~~$\rangle$]$_1$

Kim$_3$ WOULD expect her$_3$ sister to be in x_1

Again, we are seeing evidence that the derivation and representation required for a sloppy interpretation are in principle available. We are able to detect a sloppy interpretation once some motivation for movement, other than ensuring semantic equivalence, is provided.

5.4 Smuggling

Fiengo and May (1994) provide the example in (41) specifically to illustrate that ACD, like standard VPE, permits sloppy pronouns. In this example, the DP_{ACD} is contained in the PP argument of a ditransitive predicate. The example in (42) shows that sloppy pronouns also appear in ACD sites that are contained within a PP adjunct.[17]

(41) Oscar$_1$ introduced his$_1$ mother to

[$_{DP}$ everyone that Max$_2$ did $\langle_{VP_E}$ ~~introduce his$_2$ mother to~~$\rangle$]

(Fiengo and May 1994:240, (7))

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[16] An anonymous reviewer points out that the sloppy interpretation in (40) is "awfully subtle/difficult to detect." This may be a case in which more controlled experimental investigation is necessary.

[17] Thank you to Jeremy Hartman (pers. comm.) for bringing examples like (42) to my attention.

(42) Sue$_1$ practiced her$_1$ presentation with

[$_{DP}$ everyone that you$_2$ did ⟨$_{VP_E}$ ~~practice your$_2$ presentation with~~⟩]

These examples appear to be problematic for the generalization and analysis presented in sections 3 and 4. With respect to the generalization in (18), it is not immediately clear how the DP$_{ACD}$ manages to be interpreted outside of the scope of the binder for the spoken pronoun in a way that is not available to the examples from section 3. I will suggest that this is made possible by the fact that each DP$_{ACD}$ here is contained in an argument or adjunct PP that may be independently extraposed.

In the discussion surrounding (35) and (36), we saw that reconstruction of the subject is not plausible as the sole source of sloppy pronouns in adjuncts. Furthermore, this strategy could not be generalized to PP arguments, as the modern standard is to treat them as the most embedded argument of the predicate (e.g., Larson 1988, Johnson 1991, Marantz 1993, Harley 1995). For these reasons, I will pursue an alternative. Inspired by an analysis in Fox 2002, when the DP$_{ACD}$ is contained within a PP that is an argument or adjunct of the predicate—a kind of PP constituent suspected to be able to move—the DP$_{ACD}$ receives a free ride out of the VP. That is, movement of the PP in each of (41) and (42) allows the DP$_{ACD}$ to "surf" (Sauerland 1998) or be "smuggled" (Collins 2005) out of the VP and, in this way, obviate the usual locality conditions to take exceptional scope over the subject. This derivation is sketched in (43), where the PP containing the DP$_{ACD}$ is extraposed to the edge of the VP in (43a) and the DP$_{ACD}$ is subsequently extracted in (43b).

(43) a.   [$_{VP}$ [$_{VP}$ V^0 pro$_1$ e_{PP}] [$_{PP}$ P^0 DP$_{ACD}$]]
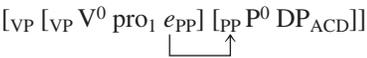
b. [[$_{IP}$ DP λ1 . . . [$_{VP}$ [$_{VP}$ V^0 pro$_1$ e_{PP}] [$_{PP}$ P^0 x]]] **DP$_{ACD}$**]
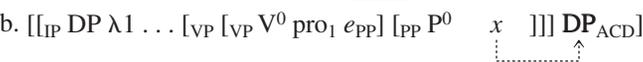
This derivation can be applied to both the PP argument and PP adjunct examples in (41) and (42). Focusing on (42), the result is the rough LF representation in (44), in which we would expect a sloppy interpretation to be possible on the basis of the generalization in (18).[18]

---

[18] A potential concern with the derivation sketched in (43) could be that PP-extraposition would induce freezing effects (Wexler and Culicover 1980). The following examples are intended to show that, with respect to QR, this is not the case. A DP within an extraposed PP adjunct (i) or PP argument (ii) is able to take logical scope over the subject.

(i) a. A professor looked at the course catalog e_1 today [$_{PP}$ with every new undergraduate student]$_1$
    b. ∀ < ∃: 'For every new undergraduate student x, there is some professor y such that y looked at the course catalog today with x.'

(ii) a. A professor showed the course catalog e_1 today [$_{PP}$ to every new undergraduate student]$_1$
    b. ∀ < ∃: 'For every new undergraduate student x, there is some professor y such that y showed the course catalog today to x.'

Also note that this derivation would not be available for (35). This is a consequence of the fact that QR is not generally possible out of *because*-clauses, which are finite. It is also not available in examples like (12a) where the PP containing the DP$_{ACD}$ is predicative and cannot be extraposed.

(44) [$_{DP}$ everyone λ4 that you$_2$ λ2 did ⟨$_{VP_E}$ ~~practice your$_2$ presentation with x$_4$~~⟩]

   [λ1 Sue λ3 [$_{VP}$ [$_{VP}$ practiced her$_3$ presentation e_{PP}] [$_{PP}$ with x$_1$]]]

This analysis provides a way to understand the possibility of sloppy pronouns in PP argument and PP adjunct constructions like those in (41) and (42). We also expect the contrast between the PP argument and double object frames of ditransitives in (45) and (46). As above, a sloppy interpretation is available for a DP$_{ACD}$ in a PP argument in (45). In the near-minimally-differing example (13), repeated in (46), where the DP$_{ACD}$ is contained in the second object of a double object construction, a sloppy interpretation is unavailable.

   (45) Tim$_1$ showed his$_1$ photo to [$_{DP}$ each person that I did ⟨$_{VP_E}$ ~~show my photo to~~⟩]

   (46) *Tim$_1$ showed his$_1$ mother [$_{DP}$ each photo that I did ⟨$_{VP_E}$ ~~show my mother~~⟩]

The interpretation-sensitive constraints on QR adopted here and the scope-freezing properties of the double object construction investigated by Bruening (2001) conspire to keep the DP$_{ACD}$ structurally lower in (46) than is otherwise possible in configurations with PPs. The effect is the inability to license ellipsis on the sloppy interpretation.

   As before, a representation that permits the sloppy interpretation can be derived once the means for doing so are provided. The question about this derivation, raised by one of the reviewers, is what licenses the instance of QR that takes the DP$_{ACD}$ out of the extraposed PP and above the subject in these examples. If my observations up to this point are correct, it is not the fact that this movement permits ellipsis on a sloppy interpretation of the pronoun. One alternative is that it is motivated by a semantic type mismatch. Supposing that these prepositions are lexically specified to combine with a type e argument, then additional movement of any DP$_{ACD}$ that can be treated as a first-order or higher semantic type would be licensed in order to ensure semantic composition.

5.5 Leapfrogging

An anonymous reviewer provides the two additional examples in (47a) and (48a), which further demonstrate that sloppy pronouns are not entirely unavailable in ACD constructions.

   (47) a. No student$_1$ practiced her$_1$ presentation with

             [$_{DP}$ everyone that her$_1$ neighbor$_2$ did ⟨$_{VP_E}$ ~~practice his$_2$ presentation with~~⟩]

         b. $\nexists > \forall$: 'There is no student x such that, for every person y such that x's neighbor practiced his presentation with y, x practiced x's presentation with y.'

   (48) a. Every boy$_1$ loves his$_1$ mother

             [$_{DegP}$ more than his$_1$ neighbor$_2$ does ⟨$_{VP_E}$ ~~love her$_2$ mother d-much~~⟩]

         b. $\forall > more$: 'For every boy x, the degree d such that x loves x's mother d-much exceeds the degree d' such that x's neighbor y loves y's mother d'-much.'

These examples are interesting for also appearing to be quite problematic for the generalization in (18) and the analysis above. With the modified smuggling example in (47), the VP$_E$ is forced

to be interpreted below the matrix subject *no student* in order to generate the intended bound variable interpretation of *her$_1$ neighbor* in the relative clause. This makes it seem that the VP$_E$ must be interpreted within the scope of the binder for the matrix pronoun, which is prohibited by (18). The example in (48) achieves the same effect with a comparative construction. Generating the bound variable interpretation for the embedded subject *his$_1$ neighbor* will require interpreting the VP$_E$ in the scope of *every boy*, which binds a pronoun in the matrix clause.

Moreover, the anonymous reviewer points out that a DegP like *more* cannot freely take scope over another quantificational DP, per Kennedy (1999) and Heim (2000). The relevant generalization can be stated as in (49).

(49) *The Heim-Kennedy Constraint*
If the scope of a quantificational DP contains the trace of a DegP, it also contains that DegP itself.
(Heim 2000:47, (27))

Similarly, there is some constraint—call it the *[∀ > ¬] Constraint—that tends to require inter-preting a universal quantifier in the scope of negative elements (see Beghelli and Stowell 1997, Mayr and Spector 2010). Whatever is responsible for these constraints, it could lead us to expect that the DP$_{ACD}$ and the VP$_E$ that it contains will necessarily be interpreted in the scope of the binder for the pronoun in the matrix clause.[19] Thus, on the basis of (18), it seems that we might expect a sloppy interpretation of the ellipsis site to be unavailable in (47) and (48), contrary to fact.

It turns out that these examples are consistent with the stated distribution of sloppy pronouns. They can even be given the same basic treatment as the examples in section 5.4. Consider the modified smuggling example first. Rightward movement of the PP will smuggle the DP$_{ACD}$ out of the VP and above the surface position of the subject, as shown in (50). Recall from section 5.4 that this is what generally licenses ellipsis on the sloppy interpretation of these types of constructions.

(50) [$_{DP}$ everyone λ4 that her$_5$ neighbor λ2 did ⟨$_{VP_E}$ ~~practice his$_2$ presentation with x$_4$~~⟩]
    [λ1 no student λ3 [$_{VP}$ [$_{VP}$ practiced her$_3$ presentation e_{PP}] [$_{PP}$ with x_1]]]

Of course, this representation does not produce the desired interpretation in which *no student* takes widest scope and binds the possessive pronoun inside *her$_5$ neighbor*. I propose that this is achieved with an additional application of QR whereby *no student* "leapfrogs" the DP$_{ACD}$ to a position where it again outscopes the VP$_E$. This application of QR is motivated by the need to satisfy the *[∀ > ¬] Constraint (or the Heim-Kennedy Constraint in the case of (48)) and results in the representation provided in (51).

---

[19] This is assuming, as I am, that the relative clause and the DP$_{ACD}$ must be interpreted together. See Fox and Nissenbaum 1999.

(51)

```
                        no student
                          λ5
                    AC              DP
               IP       λ1   everyone   PD
         x5 student                λ2       CP
              λ3    VP                  that      IP
           practiced her3                 her5 neighbor
           presentation with x1               λ4
                                           did      ⟨VP⟩
                                               practice his4
                                               presentation with x2
```
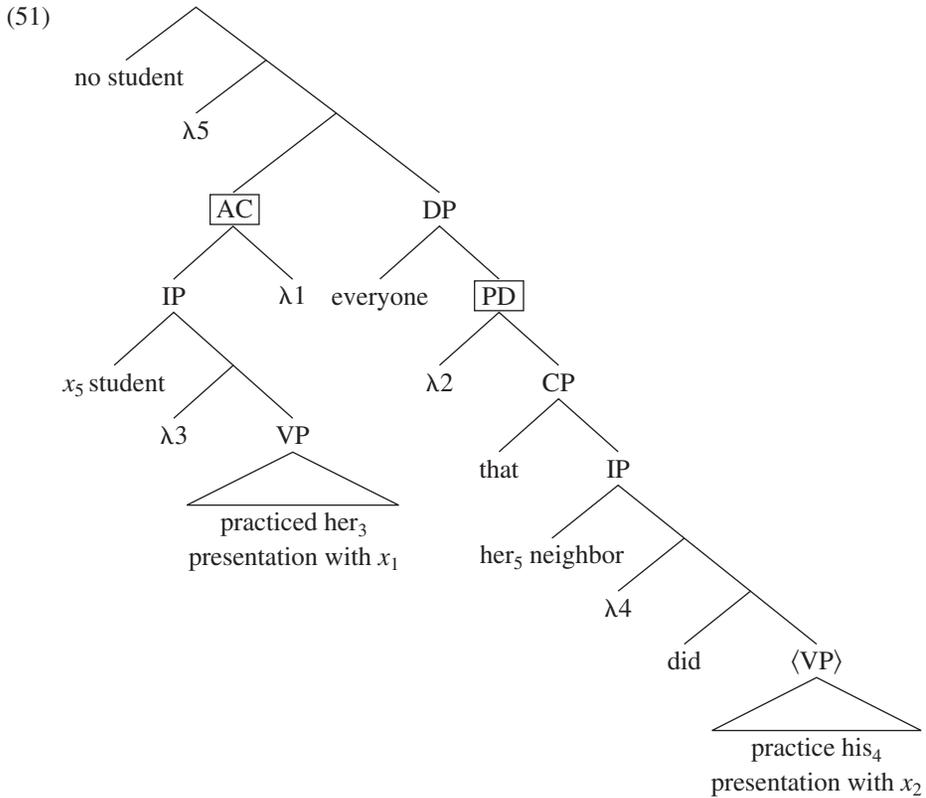
The first thing to note about this representation is that it satisfies the generalization in (18). While the VP_E is interpreted in the scope of *no student*, it is still the binder index λ3 under the trace of *no student* in the surface subject position that serves to bind the antecedent pronoun *her₃*. Recall that it is because of the post-smuggling QR of the DP_{ACD} illustrated in (50) that the VP_E is interpreted outside the scope of this binder index.[20]

The leapfrogging instance of QR serves another important function in this analysis. Assume, as shown in (51), that QR of *no student* leaves behind a contentful trace that contains a variable bound by the higher copy (e.g., Engdahl 1980, Sauerland 1998, Fox 2002). The instance of *no student* that has undergone QR comes to bind the variable in its trace (x_5) in the matrix subject position as well as the possessive pronoun (*her₅*) in the relative clause subject position. This parallel cobinding relationship makes it possible to bind into the relative clause, and effectively into the PD, without needing to extend the PD and the AC in response. The result is ultimately that ellipsis is licensed on the sloppy interpretation.[21]

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[20] Again, intermediate traces are omitted for exposition. See footnotes 11 and 12 for additional comments.

[21] The claim here is not that the indicated cobinding relationship is necessary to generate the sloppy interpretation in a leapfrogging representation. The claim is simply that binding into this PD is made possible by the resulting cobinding relationship.

Recall that the problem posed by binding configurations in ellipses is the existence of con-traindexed free variables. The remedy, which I have capitalized on to account for the distribution of sloppy pronouns, is to extend the domain for which an antecedent must be identified. In a cobinding configuration, like the one entertained in (51) and the one in (52), the problem of contraindexed free variables does not arise.

(52) a. This is the person λ1 that [Tim said I [$_{AC}$ hugged x_1]] and

[Sue also said I did [$_{PD}$ ⟨$_{VP_E}$ ~~hug x_T~~⟩]]

b. $[\![_{AC}$ hug $x_1]\!]^{g[1 \mapsto x]} = [\![_{PD}$ hug $x_1]\!]^{g[1 \mapsto x]}$

Because the bound variable in the ellipsis site shares a binder with the variable in the antecedent constituent, they will be assigned the same binding index. It is not necessary in this type of representation to extend the PD to include the binder index for this variable in order to establish semantic equivalence with an antecedent.

The same is true for the representation in (51). As shown there, the PD is defined by the binder index under the highest copy of the relative clause head. An AC can be defined by the parallel binder index introduced by QR of the DP_{ACD}. These constituents are provided in (53).

(53) $[\![_{AC}$ λ1 [x_5 STUDENT] λ3 practiced her$_3$ presentation with $x_1]\!]^g =$
$[\![_{PD}$ λ2 [her$_5$ NEIGHBOR] λ4 practiced his$_4$ presentation with $x_2]\!]^g$

The cobound variables (x_5, her$_5$) carry the same binding index and will be interpreted equivalently under any variable assignment function. Thus, it is not necessary to extend the PD and the AC in (51) to include their binder index, and antecedent containment does not arise.

A necessary assumption of this analysis is that, not just the bound variables, but the DPs that contain them (x_5 *student*, her$_5$ *neighbor*) can be considered equivalent for the purpose of ellipsis licensing. This can potentially be made to follow as an effect of focus marking. Note that a very natural pronunciation of the string in (47) places a pitch accent on both *student* and *neighbor*. This means that, according to the condition on ellipsis licensing in (23), these elements will not figure into the calculation of semantic equivalence between the AC and the PD. So long as we allow *student* and *neighbor-of* to be equivalent types of relations that are exempted from the derived logical formulas, the AC and the PD in (53) will otherwise come out as interpretively equivalent.

A similar leapfrogging derivation and representation can be proposed for the comparative construction in (48). The significant difference is that the DegP is not smuggled out of the VP via PP-extraposition. Instead, we can assert that the comparative *more* is base-generated at the edge of VP. Motivated by semantic type compatibility, the DegP *more* can undergo QR to some position above the matrix subject *every boy*, which subsequently undergoes QR to a position above that. The result is sketched in (54). From this representation, it is possible to extract the AC and the PD, as shown in (55).

(54) Every boy [λ5
     [$_{\text{DegP}}$ more than λ2 his$_5$ neighbor λ4 does $\langle_{\text{VP}_\text{E}}$ ~~love her$_4$ mother d_2-much~~$\rangle$]
                 [λ1 [x_5 boy] λ3 loves his$_3$ mother d_1-much]]

(55) $[\![_{\text{AC}}$ λ1 [x_5 BOY] λ3 loves his$_3$ mother d_1-much$]\!]^g$ =
                 $[\![_{\text{PD}}$ λ2 [his$_5$ NEIGHBOR] λ4 love her$_4$ mother d_2-much$]\!]^g$

These constituents can be considered semantically equivalent, modulo focus-marked elements, in the same way as above. Ellipsis is licensed in this representation, which generates a sloppy interpretation of the elided pronoun.

A brief remark is in order with regard to the leapfrogging QR being evoked here. I am committed to the idea that the Heim-Kennedy Constraint and the *[∀ > ¬] Constraint are either representational or postsyntactic constraints that verify specific scopal relations. This makes it possible for *everyone* and *more* to move by QR over the subjects in their respective derivations above on the condition that the subjects regain widest scope. This is in fact how Heim (2000:54) tentatively suggests we view the Heim-Kennedy Constraint given examples like the following:

(56) a. John saw everyone move more bags than Mary did.
     b. everyone$_1$ [$_{\text{DegP}}$ more bags than Mary did $\langle_{\text{VP}_\text{E}}$ ~~see x_1 move d_3-many bags~~$\rangle$]$_2$
                                       John saw x_1 move d_2-many bags

     c. ∀ > *more*: 'For every person x, the degree d_2 such that John saw x move d_2-many bags exceeds the degree d_3 such that Mary saw x move d_3-many bags.'

The quantificational DP *everyone* intervenes between the DegP headed by *more* and the edge of the matrix VP where the ellipsis site would avoid antecedent containment. The grammaticality of this example is expected if *everyone* can leapfrog the raised DegP, as is roughly shown above. This would result in both ellipsis being licensed and the Heim-Kennedy Constraint being satisfied.[22]

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[22] A second concern could be that the proposed leapfrogging derivations should induce crossover effects. On the assumption that crossover effects arise from representational constraints, we can observe with Reinhart (1998:55, (40a)) that the representations generated by QR do not necessarily display crossover effects; see (i).

   (i) a.   [A copy of his$_1$ speech] was placed in front of [every speaker]$_1$.

      b. ∀ > ∃: 'For every speaker x, there is a copy of x's speech y such that y was placed in front of x.'

If, on the other hand, we are assuming that crossover effects are derivational effects, the late merger approach to ACD that is found in Fox 2002 and Bhatt and Pancheva 2004 could provide a way to deploy all instances of QR before merging in the relative or comparative clause. Either way provides a means for understanding the lack of crossover effects.

6 Conclusion

6.1 Summary

In this article, I examined a puzzle presented by the restricted distribution of sloppy pronouns in antecedent-contained deletions. The analysis asserted that the variable binding responsible for generating sloppy interpretations requires an antecedent that standard QR of the DP_{ACD} is unable to escape, resulting in irreparable antecedent containment. Therefore, the restriction on sloppy pronouns is accounted for via a general condition on ellipsis licensing (e.g., Rooth 1992, Takahashi and Fox 2005). This is as opposed to positing additional restrictions on sloppy pronouns themselves (e.g., Kehler 2000, Hardt 2003).

   This approach found additional support through an investigation of several ways that the consequences of an extended antecedent can be circumvented. Providing the DP_{ACD} with some additional motivation to escape the extended antecedent that is required to generate a sloppy interpretation resulted in ellipsis being licensed. Several ways to accomplish this were presented in section 5. The examples there are important for demonstrating that nothing in principle rules out the types of configurations that would permit sloppy pronouns in ACD constructions. This is what allows us to conclude that the ability to escape an antecedent constituent, and in this way ensure semantic equivalence, is not sufficient for licensing exceptional QR. If it were sufficient, we would not observe the restrictions on sloppy pronouns characterized by the generalization in (18).

6.2 Implications

These conclusions are surprising in light of the examples of wide scope ACD discussed in section 2. If exceptional QR is not licensed by virtue of escaping an antecedent constituent, one should ask what motivates QR of a DP_{ACD} across a finite-clause boundary in cases of vanilla wide scope ACD, like the one in (5). At present, I cannot offer a full account of these apparently contradictory results. However, one way to preserve both sets of findings could be to assert with Rooth (1992), Fiengo and May (1994), and Wilder (2003) that there are two separate but parallel licensing conditions on ellipsis.

   One of these conditions could be the Rooth-style (1992) antecedence condition employed in the analysis above, which would be thought of as a postsyntactic or semantic identity condition on a PD and an AC as defined in (23). The other condition would be a structural or narrow syntactic condition that enforces a specified structural relationship between the material marked for ellipsis, VP_E, and the syntactic domain(s) from which the AC can be derived, VP_A.[23] This would make it possible to assert that QR can be licensed in the narrow syntactic component by the need to meet the specified structural licensing condition, but it cannot be driven by the postsyntactic identity condition on logical formulas.

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[23] This idea is loosely inspired by Hardt and Romero (2004), who argue that an ellipsis site and its antecedent must be in a specified structural relationship within a discourse representation tree.

With respect to examples like (5), repeated in (57), the structural condition on ellipsis licensing could be enough to drive a DP_{ACD} to the edge of the VP from which an AC could be calculated, namely, just outside the VP_A.

(57) John [$_{VP}$ [$_{VP_A}$ thought that the fire destroyed x]

[$_{DP}$ every book that Bill did $\langle _{VP_E}$ ~~think the fire destroyed y~~$\rangle$]]]

However, further movement of the DP_{ACD} to a position where the ellipsis site would escape any potential AC that is actually postsyntactically derived from the VP_A is not licensed solely for this purpose. Although quite vague as it has been presented here, this basic picture would lead us to expect that wide scope ACD should be bled by the binding involved in generating a sloppy interpretation. Per the analysis presented in section 4, this is what would require an AC that extended beyond the matrix VP. As it happens, we saw in example (15a), reproduced in (58), that this is precisely the case.

(58) *Bob [$_{AC}$ λ1 [$_{VP_A}$ thinks his$_1$ sister was in x]

[$_{DP}$ every meeting that you [$_{PD}$ λ2 do $\langle _{VP_E}$ ~~think your$_2$ sister was in y~~$\rangle$]]]

Wide scope ACD on the intended sloppy interpretation is unavailable in the absence of some independent factor that licenses movement of the DP_{ACD} over the subject.[24]

The picture being sketched here is approaching the idea that syntactic operations, including covert movement, cannot be licensed by postsyntactic conditions; that is, there are no lookahead operations. This idea, though, is apparently at odds with some of the previous research built upon here. Recall that for Fox (2000), Reinhart (2006), and others, exceptional applications of QR are licensed by virtue of meaningfully permuting the logical scope of two quantificational elements. One should ask, then, why the ability to ensure interpretive equivalence, and consequently satisfy a semantic condition on ellipsis, cannot license an application of QR. Again, I cannot offer a sufficiently articulated answer to this question. Nonetheless, it seems worth emphasizing the nature of the asymmetry being uncovered here: exceptional QR is apparently licensed by the possibility of creating a distinct interpretation, but not by the possibility of creating an equivalent interpretation. This is essentially the observation that underlies the aforementioned literature on interpretation-sensitive semantic economy conditions.

I will wrap up by pointing out that it is equally as interesting that the exceptional instance of QR illustrated in representations like (33) must also be unlicensed even though it would generate an otherwise unavailable bound variable interpretation of the elided pronoun (i.e., the sloppy interpretation). This makes bound variable interpretations markedly different from scope interpretations with respect to licensing QR. This becomes even more puzzling when we consider that

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[24] In light of this discussion, it is interesting to note the contrast between (58) and the example in (i).

(i) Bob$_1$ [$_{VP_A}$ thinks he$_1$ was in] [$_{DP}$ every meeting that you$_2$ do $\langle _{VP_E}$ ~~think you$_2$ were in y~~$\rangle$]

To the extent that the bound variable subject *he* can be tied to licensing exceptional QR of an embedded object over the matrix subject in (i), we correctly predict the availability of the sloppy interpretation.

it has been argued in accounts of Condition B that generating new bound variable interpretations licenses instances of exceptional binding (e.g., Grodzinsky and Reinhart 1993, Heim 1998). The question, then, should be why it is that bound variable interpretations would license exceptional binding but fail to license exceptional QR. A possible answer could come from defining separate interpretation-sensitive economy metrics for binding and movement (e.g., Aoun and Li 2003; cf. Fox 2000).

There is, however, a key difference we might take into account between the relevant Condition B examples and the examples under consideration here. The exceptional instance of QR in (33) is not directly involved in the binding relationship that is responsible for generating the sloppy interpretation. Thus, we might be observing only that QR is not licensed by an ability to indirectly generate a bound variable interpretation. This would leave open the possibility that QR could be licensed in the narrow syntax if a direct result of doing so was the creation of an otherwise unavailable operator-variable relationship (e.g., Ruys 1992; cf. Fox 2000).[25] As an anonymous reviewer points out, this might provide a way of understanding the ability to bind into the relative clause in (59).

(59) Every student$_1$ [$_{\mathrm{VP_A}}$ practiced her$_1$ presentation with x]

[$_{\mathrm{DP}}$ everyone that her$_1$ neighbor$_2$ did $\langle_{\mathrm{VP_E}}$ ~~practice his$_2$ presentation with y~~$\rangle$]

Given the scopal commutativity of the DP$_{\mathrm{ACD}}$ and the matrix subject *every student*, there is a question of what licenses the proposed instance of leapfrogging QR that would place *every student* in a position to bind the pronoun in the relative clause subject *her$_1$ neighbor*, as was shown in (51). The idea that is tentatively under consideration here is that, similar to a suggestion by Ruys (1992), the ability to generate the resulting cobinding relationship provides sufficient motivation for this application of QR.

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[25] To be precise, Ruys (1992) argues that variables that come to be bound as a result of QR should be treated as resumptive elements.

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