

On QUD-based licensing of strict and sloppy ambiguities*

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Abstract According to standard theories of VP-ellipsis, possible readings are determined by constraints (syntactic, semantic, discursal) that apply jointly to the antecedent and ellipsis clauses. Drawing on insights from a number of previous authors, I present two arguments for a model in which VP-ellipsis meanings are crucially dependent on the operative (and often implicitly resolved) question-under-discussion (QUD) (Roberts 1998/2012), specifically requiring that the meaning of an ellipsis clause be a member of the QUD’s alternative set.

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1 Introduction

Sentence (1) is an example of verb phrase (VP) ellipsis in English:

(1) John read his paper, and Bill did too. [read his paper]

The stranded auxiliary in the second clause (henceforth referred to as the ELLIPSIS CLAUSE) marks a vestigial verb phrase, a meaning for which must be identified from context. This meaning is typically derived from the occurrence of another linguistic expression (the ANTECEDENT), in this case the first clause.

It is well-known that under certain conditions, an antecedent clause that contains a pronoun may license more than one possible meaning for an ellipsis clause. For instance, assuming that the assignment of the pronoun *his* in the antecedent clause of (1) leads to the reading under which John read John’s paper, two possible meanings become available for the ellipsis clause: one in which Bill read John’s paper (the STRICT reading), and one in which Bill read his own paper (the SLOPPY reading).

Despite the considerable attention paid to VP-ellipsis in the literature over the past four decades, the conditions that determine the space of possible strict and sloppy

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interpretations are still not well understood. In what I will refer to as STANDARD ANALYSES, the space of meanings are determined by constraints that enforce some type of parallelism between the antecedent and ellipsis clauses. In early standard analyses (Keenan 1971; Sag 1976; Williams 1977), this parallelism was achieved by an identity condition on VP representations that assumed that pronouns were inherently ambiguous between referential and bound interpretations:

- (2) a. John_{*j*} read his_{*j*} paper, and Bill_{*b*} did read his_{*j*} paper too.
b. John β_1 read his₁ paper, and Bill did β_1 -read his₁ paper too.¹

If the pronoun *his* is coreferential with John as in (1a), the identity condition yields the strict reading for the ellipsis clause. Alternatively, if it receives a bound interpretation as in (1b), the sloppy reading results.

Despite its intuitive appeal, it has become clear that the ambiguity treatment suffers from a number of seemingly insuperable problems. For instance, sloppy readings are licensed within more extended parallelism domains, as in (3).

- (3) John β_1 told a man that Mary likes him₁, and Bill β_2 told a boy that Susan does like him₂. (Prüst 1992)

In light of the intervening material between the subject and ellipsis site, there is no possibility for the long distance binding necessary to derive the sloppy reading.

A second problem is created by what Dalrymple, Shieber & Pereira (1991) term CASCADED ELLIPSIS (Dahl 1972; Schiebe 1973):

- (4) John realizes that he is a fool, but Bill does not, even though his wife does.

An acceptable, and perhaps preferred, reading for (4) is:

- (5) John realizes that *John* is a fool, Bill does not realize that *Bill* is a fool, even though Bill's wife realizes *Bill* is a fool.

Example (4) contains two ellipses; the reading in (5) results from the second clause receiving a sloppy interpretation from the first and the third clause receiving a strict interpretation from the second. The ambiguity treatment specifically predicts that reading (5) should not exist, since the second clause only has the bound variable VP received from the first, and hence the referential VP that the third clause requires from the second to license the strict reading is not present.

Finally, strict and sloppy readings can result even when there is no possibility for a referential interpretation in the antecedent clause (Dahl 1972; Schiebe 1973):

¹ For present purposes I will assume an analysis in which elision occurs at a level of syntactic Logical Form, although other implementations are possible. Binding relations are represented using the semantic binding system described in Buring 2005.

- (6) Every department chair thinks that he will need to buy supplies for his office, and that the dean will too.

Example (6) has readings that correspond to the strict/sloppy distinction: the dean may need to buy supplies for the chair's office or her own. However, because the pronoun *his* can only be bound in the antecedent, there is no possibility for a referential interpretation.

Due to these and other problematic cases, researchers have pursued 'extended' standard analyses that do not assume ambiguity in the antecedent representation, but instead rely on parallelism conditions or special machinery of various sorts (Dalrymple et al. 1991; Prüst 1992; Hobbs & Kehler 1997; Fox 2000; Asher, Hardt & Busquets 2001; inter alia). An oft-cited example of the first type is from Fox (2000), who posits the following constraint:

- (7) *NP Parallelism*
 NPs in the antecedent and elided VPs must either
 a. have the same referential value (Referential Parallelism) or
 b. be linked by identical dependencies (Structural Parallelism)

The problem is that such conditions and/or machinery are stipulative: They do not follow from other properties of the grammar, as Fox himself notes for his analysis.² This is unfortunate, as one would like to think of the ability to elide a VP as being a natural consequence of independently existing constraints and processes, rather than the result of a specialized linguistic construction associated with its own form-specific principles and machinery. For example, one would prefer an explanation that appeals to the interaction of the grammar with discourse phenomena (e.g., information structure, coherence establishment) that we already know to operate independently of ellipsis.

This paper is intended to provide a step in this direction, specifically by claiming that the space of available VP-ellipsis readings is crucially dependent on the operative (and often implicitly resolved) question-under-discussion (QUD) (Roberts 1998/2012). Specifically, adopting insights from Rooth (1992), I pursue an analysis in which a verb phrase VP_E can be elided only if the meaning of the ellipsis clause C_E is congruent with the QUD — i.e., $\llbracket QUD \rrbracket^g = \llbracket C_E \rrbracket^g$ — assuming no focus-marking on or within VP_E .³ When the QUD is implicit, as it is in many cases, it is accommodated based on the antecedent and ellipsis clauses in a manner specified in Section 4.

The idea of employing QUDs to explain VP-ellipsis phenomena is not new. They have been appealed to either directly or indirectly in analyses of missing

² They tend to have problems as well, e.g., Fox's version also won't work for cases like (6).

³ I use brackets ($\llbracket \rrbracket$) to denote ordinary semantic values and bars ($\| \rrbracket$) to denote focus semantic values.

readings puzzles (Kehler & Büring 2007), examples with sloppy readings despite the lack of a C-command relation (Keshet 2013), the conditions under which syntactically mismatched antecedents are acceptable (Kertz 2008, 2013; Grant, Clifton & Frazier 2012), so-called ‘sticky’ interpretations (Elliott, Nicolae & Sudo 2014), exophorically-resolved cases (Miller & Pullum 2014), and cases with nominalized antecedents (Miller & Hemforth 2015).⁴ In this paper I add additional arguments for the claim by way of two examples. The first argument appeals to an example that appears to have a sloppy reading even though standard theories predict it to not be available. The second appeals to an example that lacks a sloppy reading even though standard theories predict it to be available.

2 QUDs: The idea

According to the QUD approach (I take Roberts 1998/2012 as an exemplar), discourses obtain their coherence through a hierarchical structure of question-answer relationships. Following Stalnaker (1979), discourse is viewed as an attempt by conversational participants to share “the way things are” (or in QUD terms, answer the question “What is the way things are?”). The interlocutors’ joint adoption of the goal of answering this question will necessitate the adoption and satisfaction of subgoals centered on answering subquestions, giving rise to a hierarchical discourse structure (the STRATEGY OF INQUIRY). Understanding a discourse therefore requires that interlocutors not only understand the particular utterances in the discourse, but also identify the questions they answer, and situate those questions in the underlying strategy of inquiry in light of their conversational goals.

Let us step through a couple of simple examples. Suppose I uttered (8a-b) to my wife Jill a few days before the SALT conference:

- (8) a. I need to work tonight.
b. I’m presenting a talk at SALT later this week.

Jill is unlikely to assume that I’m merely sharing two facts about myself. Instead, she’ll try to recover what question (8b) answers with respect to (8a), with world knowledge and inference suggesting that the answer is *Why?*. The accommodation of this QUD will lead to pragmatic enrichments — e.g., that my intention was to work on my SALT talk that evening — which go beyond what I actually said.

In other cases, an inferred QUD might sit on top of several utterances rather than intervene between them. Consider (9a-b):

- (9) a. Andy worked on his SALT talk this evening.

⁴ QUDs have also been utilized in analyses of other types of ellipsis as well, such as fragment answers (Reich 2007; Weir 2014) and sluicing (Ginzburg & Sag 2000; Ginzburg 2012; AnderBois 2014).

b. Jill answered her email.

Here, (9a-b) gain their coherence by understanding each to provide a partial answer to a common QUD, e.g., *Who did what this evening?*. With that background, we are ready to consider our first key example.

3 An unexpectedly available ‘sloppy’ interpretation

3.1 The example

The first argument is based on an example due to Hardt (1992a,b, 1999):

- (10) Every boy in John’s class hoped Mrs. Smith would pass him. In John’s_j case, I think she WILL ~~pass him~~_j. (variant of Hardt 1999, ex. 8)

The ellipsis clause in (10) appears to admit of a sloppy interpretation — *I think she will pass John* — despite the fact that the example lacks the type of syntactic or semantic parallelism between the clauses that almost all theories require. In particular, the anaphoric relationship in the ellipsis clause does not mirror the binding configuration between the pronoun and quantified noun phrase in the antecedent. While this example presents a clear adequacy criterion for any theory of strict and sloppy interpretations in VP-ellipsis, discussion of such examples is conspicuously lacking in the literature.

The apparent rebinding of the pronoun *him* to *John* in the ellipsis clause led Hardt to conclude that pronouns within elided material are not subject to parallelism conditions of the Sag/Williams variety, but instead reinterpreted freely in the ellipsis site using the same discourse principles that apply to overt pronouns. In (10), for instance, the semantic representation of the VP *pass him* would be copied to the ellipsis clause representation with the pronoun unresolved. With John being in a presumably salient position within the ellipsis clause, ordinary pronoun interpretation mechanisms then resolve *him* to John, on analogy with the unelided version in (11).

- (11) Every boy in John’s class hoped she would pass him. In John’s case, I think she will pass him.

Kehler & Shieber (1997) subsequently argued against Hardt’s analysis, claiming that it can only be maintained if it is assumed that the VPs in the unelided versions must be fully deaccented. They considered minimal pairs such as (12a-b).

- (12) a. # Every boy in Mrs. Smith’s class hoped she would pass him. Last night at John_j’s party, however, I predicted that she won’t ~~pass him~~_j.
 b. Every boy in Mrs. Smith’s class hoped she would pass him. Last night at John_j’s party, however, I predicted that she won’t pass him_j.

The reading where the speaker predicted that Mrs. Smith won't pass John, while available (12b), is not in its elided counterpart (12a).

So if we evaluate Hardt's analysis as stated, the contrast between (12a) and (12b) provides a counterexample. However, there's a rub: Accent appears to be required within the VP of (12b), in this case on the pronoun. Indeed, this is expected on standard theories of focus marking and accent placement; whereas both the verb meaning (*pass*) and the object NP meaning (*John*) represent Given information, the result of combining the two (*passed John*) does not. On theories such as Schwarzschild (1999), inter alia, the VP will therefore require F-marking, which in turn requires that either the verb or object pronoun receive accent. As shown by example (13), in such cases accent will typically fall on the pronoun:

- (13) John passed Bob, and Sue $\left\{ \begin{array}{l} \text{passed JOHN.} \\ \# \text{ PASSED John.} \\ \# \text{ passed John.} \end{array} \right\}$

Hardt's analysis can thus be maintained under the assumption that only deaccented VPs can be elided, since, by their nature, elided VPs cannot carry accent. In that case, however, all we have done is reduce the problem of identifying what Given predicates license VP ellipsis to a similar problem, namely, what Given predicates license deaccentuation (Tancredi 1992; Rooth 1992; inter alia); in either scenario we would expect pronoun interpretation to be more restricted than in the general case.⁵ So then the real mystery is why the VP can be deaccented in the unelided version of (10), shown in (11), but not in the unelided version of (12b), i.e., (12a).

3.2 The solution

So what's the solution to our mystery? I claim that prepositional phrases such as *In X's case* (and related ones, such as *As for X* and *Regarding X*) are markers of a CONTRASTIVE TOPIC X, which serve to introduce a QUD into the discourse. The idea takes its cue as far back as Jackendoff (1972), who says:

...the idea of the B-accented focus as topic accords with the intonation of preposed (or "topicalized") phrases, which almost always receive a B accent. [...]

As for FRED_B, I don't think HE_B can MAKE_A it. (Jackendoff 1972: p. 263)

⁵ Here I set aside the fact that deaccented VPs, in containing overt linguistic material, allow for a greater range of INFERRED antecedents than elided VPs, e.g., *John called Bill a Republican and MARY insulted him TOO* (Lakoff 1971).

Roberts' (1998/2012) QUD analysis, which formalized and extended Jackend-off (1972), argues that B-accented Contrastive Topics (typically appearing with a L+H* LH% prosodic contour) presuppose a strategy of inquiry with a superquestion/subquestion structure, which may need to be accommodated (see also Büring (2003)). To see the point, first consider the pedestrian example of question-answer congruence in (14), whereby the answer corresponding to the wh-term is focused and hence accented.

- (14) a. Mary: When are you going to China?
b. Sue: I'm going to China in APRIL.

Compare this case with (15):

- (15) a. Mary: When are you going to China? (= Roberts ex. 47)
b. Sue: Well, I'm going to CHINA_B in APRIL_A.
c. { QUD: When are you going to which place? }
d. Mary: Oh? Where else are you going, and when?

Sue's decision to use contrastive topic marking on *China* in (15b) has the effect of introducing an implicit superquestion with which it is congruent, as in (15c). This generates an implicature that there are other places that Sue intends to visit, which is likely to lead Mary to respond as in (15d).

This leads us to an analysis in which sentences containing phrases like *In X's case* function as question-answer pairs. Specifically, *In X's case* introduces a QUD into the discourse structure, created by focus-matching *X* against a corresponding entity within the meaning of an anaphorically-identified, contextually-salient proposition. The rest of the sentence answers (and hence is predicted to be intoned with respect to) this QUD.

Let's see how this works on (10), repeated below as (16).

- (16) a. Every boy in Mrs. Smith's class hoped she would pass him.
b. In John_j's case, I think she WILL_F pass-him_j.

On this analysis, the phrase *In John's case* triggers an anaphoric search for an antecedent, provided here by the first clause. The contrastive topic *John* is focus-matched against *him*, yielding a QUD containing polar and modal alternatives *Will/Did Mrs. Smith pass John?*. The discourse semantics of passage (16) is hence the same as that for (17):

- (17) a. Every boy in Mrs. Smith's class hoped she would pass him.
b. Will Mrs. Smith pass John?
QUD = { Mrs. Smith will pass John, Mrs. Smith will not pass John, ... }

c. (Yes,) I think she WILL_F pass him_J.

The ellipsis clause displays focus on the auxiliary, as would be predicted by congruence with this question. The interpretation is therefore entirely analogous to the situation in which the QUD is explicitly mentioned in a preposed *as*-PP, rather than anaphorically identified:

(18) As for whether she will pass John, I think she WILL_F pass him_J.

Thus, on this analysis, the interpretation under consideration is actually a STRICT reading with the QUD evoked by *In John's case* as the antecedent, rather than a sloppy reading with the first clause as antecedent, as first appearances would suggest.

This analysis explains the difference between (16) and (12a). Specifically, *Last night at John's party* in (12a) is simply a run-of-the-mill adverbial; it is not anaphoric nor does it receive a B-accent, and hence it does not introduce a QUD. Without a QUD to serve as the antecedent, standard rules of focus marking and accent placement will require accent on the pronoun, rendering the VP unable to be elided. Hence, the fact that the VP can be deaccented when overt in (16) but not in (12a) follows directly.

3.3 Additional evidence

This treatment makes a number of predictions that the data confirms. First, if *In X's case* evokes questions of the form of (17b), one would expect that it could be felicitously followed by typical short answers to such questions. This appears to be the case:⁶

(19) a. I think Mrs. Smith will pass most of the students in the class.

b. But in John's case, $\left\{ \begin{array}{l} \text{forget it.} \\ \text{no way.} \\ \text{no chance.} \\ \text{PUHLEEEASE!} \end{array} \right\}$

These answers appear to directly respond to the question *Will Mrs. Smith pass John?*.

Second, the interpretations in question are available with a variety of other event referential expressions that do not involve ellipsis:

(20) a. Every boy in Mrs. Smith's class hoped she would pass him.

b. In John's case, $\left\{ \begin{array}{l} \text{I'm sure she'll do it.} \\ \text{it's inevitable.} \\ \text{I'm quite optimistic.} \end{array} \right\}$

⁶ Interestingly, the simple answers *yes* and *no* seem awkward as follow-ons, for reasons that aren't entirely clear to me.

These follow-ons all comment specifically on the question of whether Mrs. Smith will pass John (i.e., and not all students), and hence their analysis is entirely analogous to our treatment of (16). These data demonstrate that any analysis in which the interpretation of (16) results specifically from a mechanism for reconstructing elided material misses an important generalization.

Third, if events introduced by QUDs are made available for subsequent reference, entities so introduced should be available as possible referents to entity-level anaphoric expressions such as pronouns as well. Consider (21–23):

- (21) The only guy I can think of who comes close - and who seems finally on the verge of a true breakout - is San Antonio's George Hill (who we all know had a mind-bogglingly great Summer League....not that Summer League performances are a great indicator of anything....but in his case I think they are).⁷ [= George Hill's Summer League performances]
- (22) We really don't care what words the candidates choose to use as long as they're said truthfully...and in Obama's case, they are.⁸ [= Obama's words]
- (23) The smears are only appropriate if they are true. In Obama's case they are.⁹ [= smears on Obama]

The pronoun *they* in (22), for instance, doesn't refer to all of the candidates' words, but specifically to Obama's words — a referent that is not explicitly denoted by any constituent in the context.

Lastly, one might recall that in the foregoing analysis, *John* gets focus-matched against the referent of *him* in the first clause of (16) during the process of forming the QUD. Despite the appearance that it is this pronoun that leads to the sloppy reading (recall that on Hardt's analysis this pronoun gets copied to the representation of the ellipsis clause and re-resolved in that context), on our analysis the fact that a pronoun was used is incidental. Consider (24–25):

- (24) I think Mrs. Smith will pass most of the students in the class. In John's case, however, I don't think she WILL pass ~~him~~_J.
- (25) George and John are both worried about their grades. I'm almost certain that Mrs. Smith will pass GEORGE. In John's case, however, I don't think she WILL ~~pass him~~_J.

7 http://blog.oregonlive.com/behindblazersbeat/2009/07/live_blazers_chat_noon_monday.html

8 <http://firstread.msnbc.msn.com/firstread/archive/2008/02/03/634198.aspx>

9 <http://answers.yahoo.com/question/index?qid=20081105131116AAMZyT>

The elided clauses in (24) and (25) have the same “sloppy” interpretation as (10), but crucially *do not contain a pronoun in the antecedent clause*.¹⁰ Examples (24) and (25) receive the same analysis as (16), since the question of whether the focus-matched constituent in the antecedent is pronominalized is irrelevant. All are strict readings with the QUD as the antecedent. Again, naturally-occurring cases are readily found:

- (26) Congress and the Electoral officials are supposed to vet the candidates and ensure that they are eligible to be President. In Obama’s case, they did not.¹¹
[= vet Obama]
- (27) Lauren, I never said that giving a convention speech is automatically going to thrust someone into the national spotlight. However, in Obama’s case, I think it did.¹² [= thrust Obama into the national spotlight]
- (28) They say that iron overload does not really impact your health until you’ve had it for a long time but I think, in John’s case, it did.¹³ [= impact John’s health]

In the case of (26), for example, the elided VP doesn’t refer to the concept of vetting candidates in general, but specifically to vetting Obama. Again, this referent could only arise through introduction of the QUD. Hence it seems reasonable to think that any analysis that captures the facts for (16) should apply equally to (24–25) and (26–28). The analysis proposed here does exactly that.

4 Inferring QUD antecedents

Consider where this puts us. If this story is on the right track, VP-ellipsis is acceptable with a QUD as an antecedent, where (i) there is no syntactic identity, and (ii) the denotation of the antecedent is not a property or a proposition, but a set of propositions (assuming a Hamblin semantics). In light of this, a constraint requiring membership in the alternative set denoted by the question seems like a natural one to consider. But then what about the vast majority of other cases, for which there is no explicit QUD?

10 Example (25) is reported to be marginal for some speakers, but even those speakers tend to find it acceptable if contrastive topic intonation is used on *George* and *John*. This is what the analysis predicts.

11 <http://community.comcast.net/comcastportal/board/print?board.id=news&message.id=880023&page=1&format=page>

12 http://popculturedish.blogspot.com/2008_09_01_archive.html

13 <http://theimmoralminority.blogspot.com/2009/03/lisa-demer-of-adn-must-not-have.html>

As is standard on the QUD model, in such cases QUDs will need to be inferred. Here we take our cue from Roberts (1998/2002), who notes that prosody and contextual clues feed the process of accommodating a QUD:

“Prosodic focus in English presupposes the type of question under discussion, a presupposition which enables the hearer, with some other contextually given clues, to reconstruct that question and its relation to the strategy being pursued” (p. 8)

For the purpose of resolving VP-ellipsis, the contextual “clue” at work will be the antecedent clause. For the task of QUD creation, I will use the focus-matching constraint proposed by Rooth (1992), adapted only to generate a QUD that the ellipsis clause answers rather than to license ellipsis directly:

For ellipsis clause C_E and antecedent clause C_A for which $\llbracket C_A \rrbracket^g \in \llbracket C_E \rrbracket^g$, $QUD = \llbracket C_E \rrbracket^g$

This simply says that the QUD is created by calculating focus alternatives of the ellipsis clause under the constraint that the meaning of the antecedent clause be a member of that set. Let us see how this works by stepping through a few examples. Consider first the basic case of VP-ellipsis in (1), repeated below in (29), which is characterized by subject focus:

(29) John read his paper, and Bill did too.

First suppose we have the candidate ellipsis clause in (30c).

- (30) a. { Who read John’s paper? }
 $QUD = \{ \{ x \text{ read John’s paper} \} \mid x \in D_e \}$
 b. John β_1 read his₁ paper, and ...
 c. ...Bill did read ~~John’s paper~~ too.

Focus matching on *Bill* yields the alternative set associated with (30a). Since the proposition denoted by the antecedent clause (30b) is a member of that set, ellipsis is licensed, thereby resulting in the strict reading. Importantly, note that there is no requirement for the antecedent and ellipsis clause VPs to be identical, as they aren’t here. This reading is therefore derived without having to posit a referential-bound ambiguity in the ellipsis clause or any special stipulations or machinery.

Alternatively, let’s say that we have the candidate ellipsis clause in (31c).

- (31) a. { Who β_3 read his₃ paper? }
 $QUD = \{ \{ x \text{ read } x\text{'s paper} \} \mid x \in D_e \}$

- b. John β_1 read his₁ paper, and...
- c. ... Bill did ~~β_2 read his₂ paper~~ too.

Here, focus matching on the ellipsis clause yields the alternative set associated with (31a). Since the antecedent clause (31b) is a member of that set, ellipsis is licensed, thereby resulting in the sloppy reading. No other readings are possible under the criterion that nothing can be focused in the VP to be elided, and hence focus-matched against it.

Finally, we consider a case involving auxiliary focus:

- (32) John was going to read his paper, and he DID.
- (33) a. John was going to β_1 read his₁ paper...
QUD = {John read John's paper, John didn't read John's paper, John is/was going to read John's paper, John is/was not going to read John's paper, ... }
 b. and he DID ~~β_2 read his₂ paper~~.

Here the accented auxiliary contrasts against *was going to*, creating a set of alternatives that includes the modal and polar alternatives shown (along with others). Here again the denotation of the antecedent clause is contained in that of the QUD, and the constraint is met.

5 An unexpectedly unavailable sloppy reading

With that background, we are now ready to move on to our second example. Consider a context in which a local school is looking for student volunteers, and Mary's family is talking about it. A canonical example of VP-ellipsis such as (34) clearly has the expected strict and sloppy readings:

- (34) Mary_m was going to sign her_m son up for a volunteer slot, and her_m SISTER was TOO.

On analogy with our analysis of (29), the strict and sloppy readings are licensed per (35) and (36) respectively:

- (35) a. { Who was going to sign Mary's son up for a volunteer slot? }
QUD = { { x was going to sign Mary's son up for a volunteer slot } | $x \in D_e$ }
 b. Mary_m β_1 was going to sign her₁ son up for a volunteer slot,
 c. and her_m SISTER was ~~going to sign Mary's son up for a volunteer slot~~.
- (36) a. { Who β_3 was going to sign her₃ son up for a volunteer slot? }
QUD = { { x was going to sign x's son up for a volunteer slot } | $x \in D_e$ }

- b. Mary_m β₁ was going to sign her₁ son up for a volunteer slot,
 c. and her_m SISTER was ~~β₂ going to sign her₂ son up for a volunteer slot.~~

Now consider the variant in (37):

- (37) Mary_m β₁ was going to sign her₁ son up for the last volunteer slot, but her_m SISTER already HAD.

Informants agree that (37) — crucially intoned without contrastive accent on *sister* — only has the strict reading. That is, it can only mean that Mary's sister signed up Mary's son, and not her own.

This is rather surprising. Standard analyses straightforwardly predict that the sloppy reading should be possible, in light of the availability of a suitable antecedent VP containing a bound pronoun:

- (38) Mary_m β₁ was going to sign her₁ son up for the last volunteer slot, but her_m SISTER already HAD ~~β₂ signed her₂ son up for the last volunteer slot.~~

There are several facts that point to the example's information structural properties as being the reason for the missing reading. For one, it cannot be due to felicity considerations. The example is constructed so that either reading is plausible — Mary's sister signing her own son up for the last available slot would be just as much of an impediment to Mary's plans as her sister signing Mary's son up. (Indeed, if anything, one would expect it to be more likely that someone would sign up her own son instead of a relative's.) Further, expressing the meaning corresponding to the sloppy reading is perfectly coherent in the discourse setting, but doing so requires an overt VP with accent on the pronoun:

- (39) Mary_m β₁ was going to sign her₁ son up for the last volunteer slot, but her SISTER β₂ had already signed HER₂ son up for the last volunteer slot.

The need for accent on the pronoun presumably renders the VP unable to be elided. This leaves us with the question of why such accent would be necessary, especially considering that the pronoun is bound.

Second, as the analysis predicts, the sloppy reading re-emerges for cases in which accented auxiliaries participate in a contrastive topic structure:

- (40) MARY_m β₁ WILL BE signing her₁ son up for a volunteer slot, and her_m SISTER already HAS ~~β₂ signed her₂ son up for a volunteer slot.~~

On analogy with examples like (36), the sloppy reading is licensed by a common QUD such as *Who β₃ will/did sign her₃ son up for a volunteer slot?*. Such examples show that the missing sloppy reading for (37) is not due specifically to the existence

of a focused auxiliary (or, for that matter, the adverb *already*), but to the information structural configuration in which the ellipsis clause participates.

So what is the correct analysis for (37)? The difference between (37) and (40) seems to point to a need to distinguish the two types of accent on *sister*, which is indicative of a difference between informational and contrastive focus.¹⁴ That is, whereas *sister* in (37) requires accent, it is neither nuclear nor contrastive, and clearly interacts differently with the surrounding discourse than the contrastive accent it receives in (40). Following intuitions expressed by Kratzer (2004), I suggest that only the contrastive focus on the auxiliary in (37) participates in the focus-matching process (and hence the computation of alternatives), whereas the informational focus on *sister* functions at a different level, specifically to distinguish foreground from background. If the binder for the pronoun in the antecedent clause doesn't participate in focus-matching, there is no way to derive the sloppy reading.

Let's see this proposal in action. Example (37) is interesting in that, despite the fact that the first clause sets up an expectation that the QUD *Will/Did Mary β_1 sign her₁ son up for the last volunteer slot?* will be answered (see the NON-ACTUALITY IMPLICATURES of Grant et al. (2012)), the second clause does not provide an answer directly. Instead, it implicates that the answer is *no* (or at least, not *yes*) by providing a REASON for this answer. These ruminations lead to me an analysis in which (37) is characterized by a strategy of inquiry of the sort shown in (41).

- (41) a. $Mary_m \beta_1$ was to sign her₁ son up for the last volunteer slot,
 b. { Will/Did Mary β_1 sign her₁ son up for the last volunteer slot? }
 c. but (= No!)
 d. { Why not? }
 e. { Will/Did someone sign Mary's son up for the last volunteer slot? }
 f. ...her_m SISTER already HAD signed ~~Mary's son up for the last volunteer slot.~~

Per the discussion above, the primary accent on the auxiliary takes part in focus matching to yield a QUD containing modal/polar alternatives as in (41b) which, again, also happens to be the QUD served up by the antecedent clause. As it stands, the denotation of the ellipsis clause is not in the QUD's alternative set, violating Rooth's (and therefore, my) constraint on elidability. At this point, the informational accent on *sister* triggers the inference to a generalization of the QUD, yielding (41d), the denotation of which the meaning of the ellipsis clause is now a member. At this

¹⁴ This of course steps into a long and controversial debate about whether such a distinction exists, the arguments for which I will not address here. See for instance Selkirk (2008) and citations therein for discussion.

point, inference takes over to establish the relationship between the first QUD and the newly accommodated one — i.e., that Mary didn't sign Mary's son up because someone else had signed Mary's son up. At the end of the day, the constraints on ellipsis are satisfied, but only when what's at issue is whether anyone has signed up Mary's son. The question of whether anyone else signed up their own son doesn't come into play.

Admittedly, this analysis helps itself to some degrees of freedom allowed by the QUD framework, and hence it has to remain tentative. With that caveat having been stipulated, insofar as the analysis is right, it provides a potential explanation for an otherwise mysterious pattern noted for sluicing by Merchant (2001: 8). Merchant notes that sluicing appears to not generally allow sloppy readings (42a), despite the fact that one of Ross's (1969) original examples appears to permit it (42b).

- (42) a. Abby said she'd stop smoking, but BETH wouldn't say WHEN. [strict]
 (adapted from Merchant's ex. (i)a)
- b. Bob knows how to crane his neck, but I don't know how. [strict/sloppy]
- c. ABBY said she'd stop smoking TOMORROW, but BETH wouldn't SAY when. [strict/sloppy]

The reason for the discrepancy between (42a) and (42b) is now evident. Whereas in (42a) the *wh*-term is focused in the sluiced clause (with *Beth* carrying only informational focus), in (42b) the subject *I* is focused. On a QUD-based analysis of sluicing (Ginzburg & Sag 2000; Ginzburg 2012; AnderBois 2014), only in (42b) do both clauses provide partial answers to a QUD that includes bound variable alternatives (*Who β_1 knows how to crane his₁ neck?*). In (42a), if *Beth* doesn't participate in focus matching on analogy with our treatment of (37), no sloppy reading results. On the other hand, I find (42c), a variant of (42a) with subject focus, to have a sloppy reading with the accent placed as indicated. In this case a QUD that licenses the sloppy reading is available:

- (43) a. { When did who β_3 say she₃ would stop smoking? }
- b. ABBY β_1 said she₁'d stop smoking TOMORROW,
- c. but BETH β_2 wouldn't SAY when she₂ would stop smoking.

The effect of information structure is particularly clear if we consider the following minimal pair:¹⁵

- (44) a. Bob can crane his neck, but I don't know HOW. [strict]
- b. Bob can crane his neck, but I don't know how. [strict/sloppy]

¹⁵ Thanks to Gwen Gillingham for suggesting these examples.

Examples (44a-b) differ only with respect to their focus marking. Passage (44a), which has auxiliary focus, only has a strict reading, whereas passage (44b), which has subject focus, has both strict and sloppy readings. Both facts are as predicted.

6 Remaining problems

The analysis presented here explains the readings for classic examples of VP-ellipsis without appeal to specialized principles or machinery, as well as certain cases that are problematic for previous accounts. The analysis is not without its own problems, however, which render the project a work-in-progress. I focus on three issues here.

First, recall that the analysis borrows heavily from the focus-matching procedure of Rooth (1992), used here to generate the QUDs that ellipsis clauses answer. Rooth argues that the semantic redundancy criterion associated with the procedure is a necessary, but not sufficient, condition for felicitous elision. As evidence for its insufficiency, he offers examples (45a-b), in which the antecedent clauses have coreferring elements but no possibility of binding.

- (45) a. 5 is less than or equal to 5, and 7 is β_1 less than or equal to itself₁ too.
b. # 5 is less than or equal to 5, and 7 is β_1 less than or equal to itself₁ too.
(= Rooth's exs. 5b and 6)

The first clause in (45a) licenses the deaccenting of the VP in the second clause, since the first clause expresses a proposition according to which a number is less than or equal to itself. The elision of this VP is not licensed on the sloppy interpretation per (45b) however; here only the (factually incorrect) strict reading is available. The lack of a sloppy reading is clearly due to the fact that the antecedent clause does not contain a pronoun. The analysis I have offered, in its utilization of Rooth's mechanism, nonetheless predicts it to be acceptable, since the focus alternative set for the ellipsis clause will contain all of the propositions whereby a number is less than or equal to itself, and the antecedent clause denotes a member of that set. This is a significant weakness: The existence of an anaphorically-dependent element in the antecedent clause is central to the licensing of sloppy readings, yet there is nothing in my analysis that cares about what referring expressions are used.

This issue caused Rooth to posit a second constraint, one calling for syntactic identity between the antecedent and ellipsis clause VPs. Such a constraint is hard to reconcile with examples like (16), however, in which there is clearly no syntactic parallelism between the ellipsis clause and the QUD-denoting antecedent *In John's case*. The same is true for a wide variety of other well-known cases involving syntactic mismatch that by now are well-discussed in the literature, including voice mismatches, nominalized antecedents, and so forth. Reconciliation of the relevant data points remains a subject for future work.

A second set of issues is brought to the fore by Weir (2014). Weir posits a QUD-based theory of fragment ellipsis along the same lines as what is proposed here for VP-ellipsis. Adapting an example due to Jacobson (2013), he points out that fragment answers and VP-ellipsis appear to operate under different constraints:

- (46) Which math professor left the party at midnight?
- a. Well, Jill left the party at midnight, but I don't think she's a math professor.
 - b. # Well, Jill ~~left the party at midnight~~, but I don't think she's a math professor.
 - c. Well, Jill ~~did left the party at midnight~~, but I don't think she's a math professor.

Answer (46a), which does not involve ellipsis, is perfectly felicitous, whereas the fragment ellipsis in (46b) is not. Weir's explanation is that because fragment ellipsis is constrained to provide an answer to the operative QUD, the proposition denoted by *Jill left the party at midnight* has to be in the alternative set denoted by the question. This in turn commits the speaker to believing that Jill is a member of the set of math professors, hence the oddity of the follow-on. Note that the VP-ellipsis in example (46c) is fine, however. If VP-ellipsis is similarly restricted as the current analysis would suggest, then the question is why (46c) doesn't express the same type of contradiction that (46b) does. As Weir himself notes, the support for his analysis and that for QUD-based analyses of VP-ellipsis remains to be reconciled.

A third (and related) set of issues regards the relationship between VP-ellipsis and event referential forms that do not involve ellipsis, such as *do it* anaphora. A central facet of Miller & Pullum's (2014) treatment of exophorically-resolved VP-ellipsis and Miller & Hemforth's (2015) treatment of examples with nominalized antecedents is that VP-ellipsis is sensitive to alternatives in a way that *do it* is not. Now it is of course well-known that *do it* anaphora gives rise to strict and sloppy ambiguities much as VP-ellipsis does:

- (47) John read his paper, and Bill did it too.

And from what I can tell, the examples I have focused on in this paper do not draw the kind of thick line in the sand between the two forms that one might expect in light of the observations of Miller and colleagues. For one, recall that we noted in Section 3 that QUDs denoted by phrases like *In X's case* make interpretations available for event-referential forms that seem to parallel those for VP-ellipsis (see example 20). Further, example (48), a modified version of (37) that employs *do it* instead of VP-ellipsis (crucially with the same informational focus on *sister*), according to my judgments has only the same strict reading as its VP-ellipsis counterpart:

- (48) Mary_m β₁ was going to sign her₁ son up for the last volunteer slot, but her_m SISTER had already DONE it.

This pattern weakens any claim that the relevant facts result from a dependence on QUDs that is specific to VP-ellipsis. Again, future work is required to sort out the commonalities and differences among competing forms of ellipsis and event reference and the respects to which they may be sensitive to QUDs.

7 Conclusions

This paper has pursued an analysis in which the primary constraint for felicitous VP-ellipsis is that the ellipsis clause provide an answer to the current QUD. This alleviates the need to rely on an untenable bound-referential ambiguity in antecedent clauses or specialized constraints or machinery. On this analysis, the relationship between the antecedent and ellipsis clauses is indirect: Whereas no constraint (identity or otherwise) applies directly to them, the antecedent and ellipsis clauses do often conspire to determine the QUD that is being answered.

This analysis yields a different explanation for Hardt's (16) than is found elsewhere in the literature. Whereas such examples are important and revealing, they do not provide support for his free-interpretation analysis. The mystery surrounding such examples is why the VP can be deaccented (and ultimately elided) when standard rules for focus marking and accent placement would normally require such VPs to carry accent, as we saw for (12). The QUD story provides an answer, in that it is the QUD denoted by *In John's case*, and not the first sentence, that serves as the antecedent for the ellipsis.

Further, the lack of sloppy readings with certain examples featuring auxiliary focus like (37) is mysterious and not predicted by any analysis of which I am aware. Although the analysis offered here remains tentative, the QUD-based constraint offers a potential explanation for why the reading would be missing when the requisite bound variable VP and parallelism between antecedent and ellipsis clauses are present. The analysis extends to a pattern for sluicing that to my knowledge has heretofore gone unaddressed.

Importantly, the evidence that VP-ellipsis is sensitive to QUDs goes well beyond the types of cases discussed here. As mentioned in the introduction, a number of authors have discussed phenomena that point to a role for QUDs, and the arguments made here find a natural home among them. Having said that, our understanding of QUD analyses is still in a relative state of infancy, allowing for many degrees of freedom, and differences among the behavior of different forms of ellipsis and event reference have emerged. As such, much work still needs to be done to have a more complete understanding of QUD analyses of discourse coherence and their relationship to VP-ellipsis and other forms of linguistic reduction in natural language.

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