

Which QuD?

Sharpening the semantic licensing conditions on ellipsis

Matthew Barros and Hadas Kotek
matthew.barros@yale.edu hadas.kotek@nyu.edu

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1 Ellipsis licensing

Sluicing: Clausal ellipsis in a Wh-question, leaving the Wh-phrase overt.

- (1) Sally called someone, but I don't know who; ~~Sally called t_i~~ .

Some terminology:

Remnant: any Wh-phrase left overt in sluicing.

Correlate: (typically) an indefinite in the antecedent corresponding to the remnant.

Antecedent, Sluice.

A central question: How is ellipsis licensed?

A consensus: Ellipsis is licensed under **identity** with an antecedent.

Q: How is identity computed?¹

- Syntactic identity
- Semantic identity
- Hybrid approaches

⇒ Semantic identity in sluicing has been implemented along different dimensions of meaning:

- Identity of literal meaning (Sag 1976a,b, Hartman 2009)
- Focus-theoretic meaning (Rooth 1992; Romero 1998; Merchant 2001; Takahashi and Fox 2005; Reich 2007; Chung 2006, 2013)
- Recent work makes reference to **Questions under Discussion** (Roberts 2012) as a way of defining semantic identity e.g. (AnderBois, 2011, 2014; Barros, 2014; Weir, 2014; Kotek and Barros, To appear).

Our goals today:

- Highlight challenges for existing QuD-equivalence approaches.
- Suggest how a sharpened implementation of QuD-equivalence may address such challenges.
- Raise a set of questions that any serious implementation of QuD-equivalence will have to address.

¹We set aside proposals that do not assume fully articulated (though unpronounced) clausal structure in sluicing (e.g., Lobeck 1995; Ginzburg and Sag 2000; Culicover and Jackendoff 2005; Barker 2013; Jacobson 2016 among others). See Merchant 2001, 2004, 2010; Vicente 2014, and many others following, for many empirical and conceptual arguments against such proposals. We additionally set aside “copying” proposals such as that in Chung et al. 1995, where the logical form of the antecedent TP is copied into an incomplete interrogative clause (missing TP in particular). (See Merchant 2001 for many compelling arguments against such an approach.)

QuD-Equivalence: The basic idea

Questions under Discussion (QuDs): semantico-pragmatic objects — salient Q meanings in a discourse with interrogative force (Roberts 2012). They:

- shape the information exchange, as interlocutors address the QuD.
- may be made salient implicitly or explicitly (e.g., by asking a direct question).

QuD-equivalence approaches to sluicing appeal to the intuition that assertions with indefinites and disjunctions make certain QuDs salient (AnderBois, 2011).

- *Sally is dating someone* ⇔ *who is Sally dating?*
- *Sally is dating either Mary or Bill* ⇔ *which of the two is Sally dating?*

(2) **Indefinites and disjunctions serve as natural correlates:**²

- a. Sally is dating someone, ~~but I don't know who~~ ~~Sally is dating~~.
- b. Sally is dating either Mary or Bill, ~~but I don't know which one~~ ~~Sally is dating~~.

QuD-equivalence approaches require sluiced Qs to be congruent to the QuD raised by the antecedent.

(3) **Congruence = identity (Roberts, 2012):**

Semantic identity is satisfied iff $\llbracket \text{QuD} \rrbracket = \llbracket \text{Sluiced Q} \rrbracket$.

An important question: Given an antecedent, how do we determine which QuD it raises? Relatedly, how are QuDs constructed? How are they constrained? (Are QuDs the right notion to use in the first place?)

Some live options:

- The **inquisitive denotation of the antecedent** (in the sense of inquisitive semantics, Groenendijk and Roelofsen 2009) is the QuD (AnderBois 2011).
 - Antecedents with alternative-evoking expressions (disjunctions and indefinites) raise “issues” as to which alternative holds.
 - Such antecedents have a question-like semantics which can then be identical to a sluice.
- Rely mostly on **intuitions** about QuD's that antecedents “make salient” (Ginzburg and Sag 2000; Weir 2014; Kotek and Barros To appear)
- **Heuristic approaches:**
 - **Büring 2003** (for a “family of questions” QuD computed based on contrastive topics):
 - * **Step 1:** Replace the focus with a Wh-word and front the latter; if focus marks the finite verb or negation, front the finite verb instead.
 - * **Step 2:** Form a set of questions from the result of step 1 by replacing the contrastive topic with some alternative to it.
 - (4) $\llbracket \text{Clara ate the BEANS} \rrbracket^{ct} = \{ \text{what did } x \text{ eat?} \mid x \in D_e \}$
 - **Barros 2014:** Form a question out of the antecedent by replacing the remnant's correlate with a Wh-phrase and fronting it. This is the QuD the antecedent makes salient.

- (5) Dana talked to someone, but I don't know who; ~~Dana talked to t_i~~ .

QuD = $\llbracket \text{who; did Dana talk to } t_i? \rrbracket$

Sluicing is licensed if $\llbracket \text{Antecedent} \rrbracket = \llbracket \text{Sluice} \rrbracket$ — holds in this case.

²To reduce redundancy, we use the abbreviation ~~but I don't know~~ henceforth for “but I don't know”.

⇒ These implementations are largely “proof of concept,” establishing that QuD-equivalence can work as a semantic condition accounting for several “core” cases of sluicing.

- Intuition-based approaches take a particular QuD for granted, but fail to address how the QuD actually comes about, and thereby, “defang” the theory somewhat.
- Heuristic approaches are explicitly so – they go a step further than intuitionistic approaches, but are just heuristics after all, sidestepping important questions as we’ll see.
- The most explicit sort of approach thus far is that in AnderBois 2011 et seq., which provides an explicit semantics in the Inquisitive Semantics framework — antecedent assertions have compositionally derived question-like meanings.

• Next, we motivate our proposal, inspired by the approach in AnderBois 2011, and then proceed to discuss challenges to it before concluding.

2 Meeting some challenges

2.1 Sprouting

Sprouting is sluicing when there is no correlate (Chung et al. 1995):

- (6) Jack left, but I don’t know {with whom/in which car/why/how/when/where to} ~~he~~-left.

Beyond being a general problem for semantic identity approaches (see e.g., Chung 2006, 2013), sprouting raises issues for QuD-equivalence approaches.

- There is no indefinite/disjunction correlate with an “issue raising” capacity in the antecedent.
- How does the antecedent make salient/raise any of the (possibly infinitely many) imaginable issues?
- **How is the sluice anaphoric to a Question “under Discussion” in these cases? (in what sense is the issue “under discussion” at all?)**

⇒ Some authors suggest that there is no actual sprouting: Such antecedents have implicit correlates (Fortin 2007, 2011; Barros 2014). Even if so, some accommodation is required.

- The existential ps. of the question is assumed to be met in context. (That he left in *some car*).
- In such a context, the antecedent raises the issue of which car Jack left in.
- However, as noted in Chung et al. 2011, this does not appear to be necessary.

- (7) a. A: Sally finished her homework.
 B: With whose help ~~did she finish her homework?~~
 b. A: Sally put in a bid.
 B: On whose behalf ~~did she put in a bid?~~

- A can be ignorant of the existential presupposition of B’s question’s.
- Does felicity rest on the capacity of A to accommodate the presupposition? (And thereby retroactively see that the antecedent could have raised the relevant issue?)

So sprouting raises two questions:

1. To what extent is the antecedent **responsible** for raising the sluiced issue? In these cases it seems as if it is the sluice itself that does so.
2. To what extent is accommodation of the sluice’s presupposition required in order for QuD-equivalence to go through? Importantly, **this is not a sluicing-specific issue**, as the “pre-sluices” arguably require the same sort of accommodation.

- (8) A: Sally left.
 B: Who ~~did she leave~~ with, if anyone?

Some additional reasons to worry

- (9) a. Jack would date anyone, it doesn’t matter who! (explicitly not raising an issue)
 b. There’s gonna be another faculty meeting, but no one cares what about. (Lucas Champollion p.c.)
 c. Jack knows who left, but not why ~~they~~ left. (different issue raised by the antecedent)
 d. * Jack knows who left, but Sally doesn’t know who left. (Antecedent is itself a question, sluicing still impossible)
 e. Sally left with Bill. So now we know both *that* she left, and who ~~she~~ left with.
 (Issue already answered in the antecedent.)
 f. Sally left and we all know who ~~she~~ left with.

We conclude that we shouldn’t necessarily place the burden of raising the issue on the antecedent.

2.2 Towards an Alternative: Potential Questions

- To capture the intuition that sprouting can be responsible for raising the relevant QuD, we absolve the antecedent of its role in raising issues.
- This is not to say that antecedents do not raise issues, just that that is not a necessary property of a sluicing antecedent.
- Instead of **raising** issues, antecedents **have** issues — a set of **potential Questions** that are about the antecedent: P-Question(\llbracket antecedent \rrbracket), to be defined momentarily.

- (10) **Sluicing is licensed if \llbracket sluice $\rrbracket \in$ P-Question(\llbracket antecedent \rrbracket).**
 (A sluice is licensed if it is a member of the set of potential questions established by the antecedent.)

- We assume that questions denote sets of propositions (their possible answers). This give us two possibilities below for how to define P-Questions, as we will show below.
- Each member of P-Questions(\llbracket antecedent \rrbracket) is built up out of subsets of \llbracket antecedent \rrbracket , so that $U\llbracket$ P-Questions $\rrbracket = \llbracket$ antecedent \rrbracket .

• This is to prevent sluices like below, where unrecoverable material is elided:

- (11) a. Jack was reading, but I don’t know when ~~Jack was reading a book~~.
 b. Jack was reading a book, but I don’t know when ~~Jack was reading anything~~.

(12) **The set of Potential Questions (partition version):**

For an arbitrary declarative antecedent, p , $PQuest_{G\&S}(p)$, is the set of non-trivial partitions of p :
 $PQuest_{G\&S}(p) = \{ Q : (\emptyset \notin Q) \wedge (|Q| > 1) \wedge (\cup Q = p) \wedge \forall p', p'' \in Q((p' \neq p'') \rightarrow ((p' \cap p'') = \emptyset)) \}$

(13) **The set of Potential Questions (cover version):**

For a declarative antecedent, p , $PQuest_{H/K}(p)$, is a set of sets of propositions whose members cover p , and are proper subsets of p (to ensure non-singleton Q meanings).³

$$PQuest_{H/K}(p) = \{ Q : (\emptyset \notin Q) \wedge (|Q| > 1) \wedge (\cup Q = p) \}$$

Now we can redefine equivalence. It's not clear anymore that QuD-equivalence is a useful term, so let's use the more general "sem(antic) equivalence" for now.

(14) **Sem-equivalence given a sluice CP, and an antecedent:**

$$\llbracket \text{Sluice CP} \rrbracket \in PQuest_{(12)/(13)}(\llbracket \text{Antecedent} \rrbracket)$$

In other words, sluicing should be possible if $\llbracket \text{antecedent} \rrbracket = \cup \llbracket \text{sluice} \rrbracket$

- With *when* as a remnant, it is easy to imagine how Sem-equivalence is satisfied, since any possible world in which Jack left is one where he left at some time.

(15) $\llbracket \text{Jack left} \rrbracket = \{ w : \text{Jack left in } w \} = \cup \{ \lambda w . \text{Jack left at } x \text{ time in } w \mid x \in D_s \}$

- This is not always the case, however (recall our accommodation cases above).

(16) a. Jack left, but I don't know who he left with.
b. $\{ w : \text{Jack left in } w \} \neq \cup \{ \lambda w . \text{Jack left with } x \text{ in } w \mid x \in D_e \}$

⇒ Here, we appeal to an accommodation process: *pruning*, which removes worlds from the antecedent that are inconsistent with the sluice's presupposition.

- For (16b), worlds where Jack did not leave with anyone are pruned from the antecedent's denotation, yielding equivalence.

2.3 Antecedent Correlate Harmony

(17) **Antecedent Correlate Harmony (ACH)** (Dayal and Schwarzschild 2010)

The remnant and correlate agree on the presence/absence of a contentful head noun.

- a. Sally ate a donut, but I don't know $\{ * \text{what/which donut} \}$ she ate.
- b. Sally ate something, but I don't know $\{ * \text{which donut/what} \}$ she ate.

- The unacceptability of *what* in (17a) follows since $\llbracket \text{antecedent} \rrbracket \subset \cup \llbracket \text{sluice} \rrbracket$.
- The unacceptability of *which donut* in (17b) follows since $\llbracket \text{antecedent} \rrbracket \supset \cup \llbracket \text{sluice} \rrbracket$.

One question our analysis raises, however, is why it is that *pruning* cannot apply in (17b) to remove worlds from $\llbracket \text{antecedent} \rrbracket$ where Sally ate anything other than a donut.

- While the improvement is not sufficient to make (17b) perfect with *which donut*, we do feel that it improves in a context where it is presupposed that the only thing Sally could have eaten was one of the donuts.
- Note that pruning will not help with (17a), assuming the sluice itself cannot be pruned.

³Worth noting perhaps is that, perhaps always: $PQuest_{G\&S}(p) \subset PQuest_{H/K}(p)$.

2.4 The Answer Ban

Barker 2013 notes that sluicing antecedents cannot address, nor partially address the issue raised by the sluice.

- (18) *Chris knows that Jack left, but Sally doesn't know who left.
- (19) Jack left, but Christine doesn't know who *(else) left.

This too follows from Sem-equivalence.⁴

- For (18), (19), $\llbracket \text{Jack left} \rrbracket \subset \cup \llbracket \text{who left} \rrbracket$.
- *Else* modification saves things in (19):

(20) Jack left, but I don't know who ELSE left.

- *Else* removes its antecedent *Jack* from the domain of quantification of the Wh-phrase it modifies (von Stechow 1993), presupposing that *someone who is not Jack left*.
- Pruning in the antecedent removes worlds where Jack was the only individual that left.
- This yields equivalence **provided that *else* is interpreted additively** (Jack was one of the leavers).
- This seems to be the case, as the *else* question seems to presuppose that Jack left:

(21) *Jack didn't leave, but I don't know who ELSE left. (Jack must be a leaver)

3 Some further issues to iron out

3.1 Scalar implicatures

The literal interpretation of singular indefinite correlates only entails "at least one," but pragmatic strengthening constrains the space of possible sluices when there is a correlate:

- (22) Jack talked to some student, but I don't know which student (??or students).
- (23) Jack talked to fewer than 5 students, but I don't know $\{ \text{which student or students/which students/*which student} \}$

Through pruning, we could remove worlds from the antecedent in (22) that are consistent with its *exactly one* implicature, which would then be consistent with the presupposition of the sluiced question.

Note that this seems to be a property of pre-sluices.

3.2 Question antecedents

It seems like it may be possible to form sluices with question antecedents. Do question antecedents generate sets of alternative questions just like assertions?

- (24) I know *whether* he left, but not *who with*.
- (25) I know *how many* papers she read, but not *which ones*.

Hunch: This seems related to contrast sluicing. The *wh*-words have to be stressed and act as alternatives to one another.

(26) I know how many *dogs* she has, but not how many *cats she has*.

⁴Actually, maybe it follows from any QuD-equivalence approach.

Consider furthermore:

- (27) A: How many papers did she read?
B: # Which ones?

And on the other hand:

- (28) B': *(and/or) which ones? for that matter . . .
B'': More importantly, which ones?
B''': I don't know, when (do you mean)?
- (29) A: What are you doing tomorrow?
B: When exactly?
- (30) A: We finally figured out how many papers Sally reviewed.
B: Oh really? How many?

3.3 Too much context

Pruning might predict the following should go through:

- (31) * Jack left, but I don't know when Sally left.

Though maybe this isn't a bad thing, provided we control for recoverability of *Sally*:

- (32) ? Jack left at 5 PM, but Sally, I don't know when she left. (Raffaella Zanuttini, p.c.)

(Though this, again, is reminiscent of the contrast cases.)

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