Ellipsis Licensing in Sluicing: A QuD Account

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0 Introduction

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

(1) Sally called someone, but I don't know who [$_{TP}$ ~~Sally called *t*~~].

Some terminology:

- *Remnant*: any Wh-phrase left overt in sluicing.
- *Correlate*: (typically) an indefinite corresponding to the remnant.
- *Antecedent, sluice*.

Multiple sluicing: sluicing with more than one remnant.

(2) Some boy likes some girl, but I don't know which boy which girl.
(3) Some boy danced with some girl, BIDK[2] which boy with which girl.

- Seen as degraded, but "real phenomenon" in English (Lasnik, 2014)
- In our own investigation, we find:
  - Many find (2)–(3) unimpeachable, others wholly reject them.
  - Variation in acceptance of $\langle DP, DP\rangle$ sluices (2) vs. $\langle DP, PP\rangle$ sluices (3).
- We concentrate on $\langle DP, DP\rangle$ sluices.

Multiple sluicing with quantified antecedents:

(4) a. Every boy likes some girl, BIDK which boy which girl.
b. * Some boy likes every girl, BIDK which boy which girl.

The puzzle:

- How can quantified antecedents license sluicing?
- What are the restrictions on sluicing with quantified antecedents, and what do they teach us about ellipsis licensing more generally?

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[2]Henceforth we will occasionally use BIDK as short for "but I don't know" in examples in order to reduce redundancy.

1 Quantified antecedents and challenges to syntactic identity

1.1 Multiple sluicing in Russian

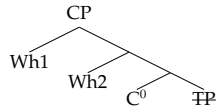
Perhaps unsurprisingly (as a multiple *wh*-fronting language), Russian allows multiple sluicing:

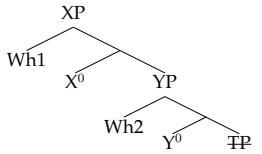
(5) a. Kto-to kogo-to videl, no ja ne znaju, kto kogo.
someone someone saw but I not know who whom
'Someone saw someone, but I don't know who whom.' (Bailyn, 2012)
b. Každyj priglasil kogo-to na tanec, no ja ne pomnju, kto kogo.
everyone invited someone to dance but I not remember who whom
'Everyone invited someone to dance, but I don't remember who invited whom to dance.' (Grebenyova, 2009)

Judgments appear much more robust than in English (Stjepanović 2003; Grebenyova 2009; Bailyn 2012; Scott 2012; Antonyuk 2015).

For concreteness, we'll assume a tucking-in (Richards, 1997) derivation, though what we say would be compatible with a (Rizzi, 1997) style articulated left periphery:[3]

(6) **Tucking-in (left) and articulated (right) left peripheries:**

a. 

b. 

A **superiority effect** in Russian Sluicing: Correlates must match remnants

(7) a. Každyj priglasil kogo-to na tanec, no ja ne pomnju kto$_1$ kogo$_2$.
everyone invited someone to dance, but I not remember who whom
b. * …no ja ne pomnju kogo$_2$ kto$_1$.
…but I not remember whom who
'Everyone invited someone to a dance, but I don't remember {who whom/ *whom who}.'
c. A: Každogo$_i$ kto-to priglasil t_i na tanec.
Everyone$_{ACC}$ someone$_{NOM}$ invited to dance
B: {Kogo kto?/*Kto kogo}
{whom who?/*who whom}

(Grebenyova, 2009)

[3]Throughout, we'll use "Wh1" to refer to the base-generated higher Wh and "Wh2" to refer to the base-generated lower one.

1.2 Syntactic Identity and "Super Quantifier Raising"

Grebenyova adopts the LF identity analysis in Fox and Lasnik (2003):

- Structural parallelism between elliptical clause and antecedent.
- Variables contained in elliptical clause and antecedent are bound from parallel positions.

(8) **LFs for unscrambled antecedent and superiority obeying sluice:**
  a. $\forall x \exists y$[x invited y to dance] antecedent in (7a,b)
  b. who$_x$ whom$_y$[x invited y to dance] (Wh1 > Wh2) sluice in (7a)

(9) **LFs for scrambled antecedent and superiority violating sluice:**
  a. $\forall y \exists x$[x invited y to dance] antecedent in (7c)
  b. whom$_y$ who$_x$[x invited y to dance] (Wh2 > Wh1) sluice in (7b,c)

Seemingly good result:

- ✓ Unacceptability of superiority mismatches between remnants and correlates (7a vs 7b)
- ✓ Scrambling data (7c)

But!

Grebenyova 2009, most other work: All Wh-phrases in sluicing are outside elided category, TP.

For quantifiers in antecedent to bind vbls from parallel positions, they must also be outside TP

☞ Requires exceptionally high QR of universal to left periphery. Call this Super-QR.

Parallelism obtained via Super-QR, ∃-closure of indefinite from outside TP:

(10) [$_{CP}$ everyone$_x$ $\exists y$ [$_{TP_A}$ x invited y to dance]] antecedent
[$_{CP}$ who$_x$ whom$_y$ [$_{TP_E}$ x invited y to dance]] sluice

But, Super-QR ruled out by Scope Economy considerations (Fox, 2000).

(11) Some boy likes every teacher, and Mary does ~~like every teacher~~ too. (*$\forall > \exists$)

- High QR of *every teacher* (above Mary) is ruled out in the sluice because it doesn't lead to a new scope relation compared to shorter QR (below Mary).
- Inverse scope in the antecedent is ruled out because of parallelism, even though in the antecedent there *would* be a new scope relation.

☞ QR can't be motivated by the need to license ellipsis alone!

☠ We need to have Super-QR for (7), and we need to not have it for (11).

See Appendix 1 for an attempt to save Super-QR and why it fails.

2 Proposal: a QuD account

2.1 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.

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

(12) **Indefinites and disjunctions serve as natural correlates:**
  a. Sally is dating someone, BIDK who ~~Sally is dating~~.
  b. Sally is dating either Mary or Bill, BIDK which one ~~Sally is dating~~.

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

- Congruence = equivalence (Roberts, 2012); semantic identity satisfied iff $[\![\text{QuD}]\!] = [\![\text{Sluiced Q}]\!]$.

We adopt a standard Hamblin/Karttunen semantics for questions, where they denote the set of possible answers to the question.

- A question like *Who is Sally dating?* denotes { that Sally is dating Mary, that Sally is dating Bill } (in a toy model with just two individuals).

Recall Grebenyova's motivation for her LF-identity account of Russian multiple sluicing:

☞ Russian multiple questions are insensitive to superiority, but remnants in sluiced questions must match superiority of correlates (7a–b).

Our proposal: Superiority in multiple Wh-questions has consequences for question meaning (Comorovski 1989; Dayal 1996, 2002; Fox 2012; Kotek 2014, a.o.). Hence, the antecedent in (7a) raises a distinct QuD from the sluice in (7b); QuD-equivalence is not met.

2.2 The interpretation of PL multiple questions and QuD-equivalence

Multiple questions can have both single-pair and pair-list answers:

(13) Which boy likes which girl?
  a. Mark likes Sarah. single-pair
  b. Mark likes Sarah, and Bill likes Maria. pair-list

Under the PL interpretation, multiple questions have two presuppositions, referencing the syntactic position of the Whs (Comorovski 1989; Dayal 1996, 2002; Fox 2012; Kotek 2014, a.o.).

(14) Exhaustivity: Every member of the higher Wh-phrase's restriction is paired with a member of the lower Wh-phrase's restriction.
  a. Guess which one of these 3 kids will sit on which of these 4 chairs.
  (Good with a single-pair answer and with a pair-list answer.)
  b. Guess which one of these 4 kids will sit on which of these 3 chairs.
  (Only good with a single-pair answer.) (Fox 2012)

(15) Uniqueness (functionhood): No member of the higher Wh-phrase's restriction may be paired with more than one member of the lower Wh-phrase's restriction.
  a. I wonder which one of the 3 boys will do which one of the 3 chores.
  b. # I wonder which one of the 3 boys will do which one of the 4 chores.
  (Suggests that the boys will not do all of the chores.) (Fox 2012)

Recall our Russian examples (7a–b) and the scrambled (7c):

(16) **Superiority in Russian Sluicing: Correlates must match remnants**
  Každyj priglasil kogo-to na tanec, no ja ne pomnju
  everyone invited someone to dance, but I not remember
  a. ✓kto$_1$ kogo$_2$, b. *kogo$_2$ kto$_1$.
  who whom whom who
  'Everyone invited someone to a dance, BIDK {who whom/*whom who.}'

(17) A: Každogo$_i$ kto-to priglasil t_i na tanec.
  Everyone$_{ACC}$ someone$_{NOM}$ invited to dance
  B: {Kogo kto?/*Kto kogo}
  {whom who?/*who whom}

Superiority-obeying and violating questions have different meanings:

(18) **Sluice in (16a), *who whom (invited)*, sorted by *inviters*:**
  { which invitee did v_1 invite?, which invitee did v_2 invite? }
  ⇔ { { v_1 invited i_1, v_1 invited i_2 }, { v_2 invited i_1, v_2 invited i_2 } }
  (= antecedent's QuD in (16a))

Generalization: the universally quantified correlate in the antecedent contributes the sorting key for the QuD.

(19) **Sluice in (16b), *whom who (invited)*, sorted by *invitees*:**
  { which inviter invited i_1?, which inviter invited i_2? }
  ⇔ { { v_1 invited i_1, v_2 invited i_1 }, { v_1 invited i_2, v_2 invited i_2 } }
  (= Q meaning for sluice in (16b), ≠ antecedent's QuD in (16a))

2.3 Supporting evidence from English

Recall the English contrast:

(20) a. Every boy likes some girl, BIDK which boy which girl.
  b. * Some boy likes every girl, BIDK which boy which girl.

Unlike Russian, English *does* allow inverse scope, yet sluicing with an inverse scope antecedent is not possible. This is a sluicing-specific problem:

(21) Some boy likes every girl, BIDK which boy likes which girl.
  (A PL question asking for boy-girl pairs in the *like* relation.)

QuD-equivalence captures the acceptability of examples like (20a).

(22) **QuD and sluice meanings in (20a), sorted by *boys*:**
  { which girl does b_1 like?, which girl does b_2 like? }
  ⇔ { { b_1 likes g_1, b_1 likes g_2 }, { b_2 likes g_1, b_2 likes g_2 } }

In the antecedent, in English as in Russian, the universally quantified correlate in the antecedent contributes the sorting key for the QuD.

(23) **QuD meaning in (20b), sorted by *girls* (≠ sluice in (20a,b)):**
  { which boy likes g_1?, which boy likes g_2? }
  ⇔ { { b_1 likes g_1, b_2 likes g_1 }, { b_1 likes g_2, b_2 likes g_2 } }

☞ The QuD-equivalence approach captures Grebenyova's paradigm.

- The English data parallel the Russian data.

We achieve sensitivity to syntactic structure in a manner similar to LF/Syntactic identity approaches, without the pitfalls of those approaches.

3 Implicature calculation and QuDs

3.1 Context and accommodation in ellipsis licensing

Speakers who accept multiple sluicing find (20b) degraded to varying degrees compared to (20a), with some reporting only a subtle contrast.

☞ QuD-equivalence does not predict variation, but ungrammaticality.

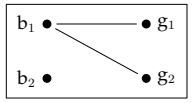
We appeal to accommodation: the QuD's meaning and the sluiced Q's meaning are manipulated in context in order to achieve semantic identity.

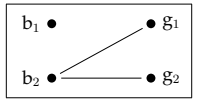
We begin with the unsluiced (21), which is perfectly acceptable even to speakers who find sluicing in (20b) strongly unacceptable.

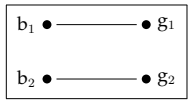
(21) ✓ Some boy likes every girl, BIDK which boy likes which girl.
(20b) * Some boy likes every girl, BIDK which boy ~~likes~~ which girl.

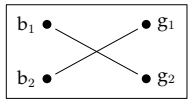
- The QuD made salient by the antecedent is sorted by *girls*.
- The continuation in (21) (and sluice in (20b)) is sorted by *boys*.
- What contexts are compatible with these antecedents and sluices?

(24) **Contexts satisfying QuD's presuppositions in (21):**

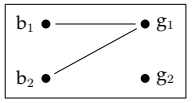
a. 

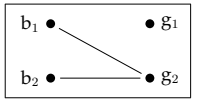
b. 

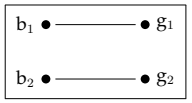
c. 

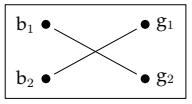
d. 

(25) **Contexts satisfying multiple-Q's presuppositions in (21):**

a. 

b. 

c. 

d. 

Only bijective contexts like (c) and (d) satisfy the presuppositions of both QuD and continuation.

Proposal: in the absence of sluicing, QuD-equivalence is irrelevant; speakers *accommodate* that only bijective contexts are possible, (21).

With sluicing (20b), even with accommodation, the meanings of the antecedent's QuD and the multiple Wh-question are distinct:

(26) a. $[\![$**QuD** (some boy likes every girl)$]\!]$ = $\neq$ **(26b)**
{ which boy likes g_1?, which boy likes g_2? }
$\Leftrightarrow$ { { b_1 likes g_1, b_2 likes g_1 }, { b_1 likes g_2, b_2 likes g_2 } }

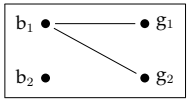
b. $[\![$**which boy ~~likes~~ which girl?**$]\!]$ = $\neq$ **(26a)**
{ which girl does b_1 like?, which girl does b_2 like? }
$\Leftrightarrow$ { { b_1 likes g_1, b_1 likes g_2 }, { b_2 likes g_1, b_2 likes g_2 } }

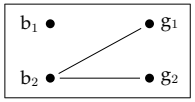
Proposal: Accommodation involves removing from consideration those contexts where the presuppositions of either question are not met.

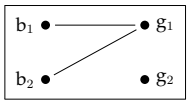
This "pruning" will result in equivalence.

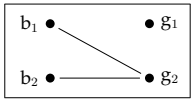
- But, costly and subject to speaker variation.
- Explaining the subtlety of judgments.

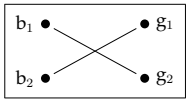
We illustrate with a more fine-grained representation for propositions, as sets of worlds.[4]

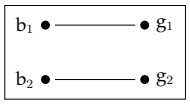
(27) w1 

w2 

w3 

w4 

w5 

w6 

Only w5 and w6 will survive pruning.

(28) **Unpruned QuD and multiple Q meanings: equivalence not met**

a. $[\![$QuD$]\!]$ = $\neq$ (28b)
{ which boy likes g_1?, which boy likes g_2? }
$\Leftrightarrow$ { { b_1 likes g_1, b_2 likes g_1 }, { b_1 likes g_2, b_2 likes g_2 } }
$\Leftrightarrow \left\{ \{\{w1,w3,w6\}, \{w2,w3,w5\}\}, \{\{w1,w4,w5\}, \{w2,w4,w6\}\} \right\}$

b. $[\![$which boy likes which girl?$]\!]$ = $\neq$ (28a)
{ which girl does b_1 like?, which girl does b_2 like? }
$\Leftrightarrow$ { { b_1 likes g_1, b_1 likes g_2 }, { b_2 likes g_1, b_2 likes g_2 } }
$\Leftrightarrow \left\{ \{\{w1,w3,w6\}, \{w1,w4,w5\}\}, \{\{w2,w3,w5\}, \{w2,w4,w6\}\} \right\}$

(29) **Pruned QuD and multiple Q meanings: equivalence met**

a. $[\![$QuD$]\!]$ = = (29b)
{ which boy likes g_1?, which boy likes g_2? }
$\Leftrightarrow$ { { b_1 likes g_1, b_2 likes g_1 }, { b_1 likes g_2, b_2 likes g_2 } }
$\Leftrightarrow \left\{ \{ \{ w6 \}, \{ w5 \} \}, \{ \{ w5 \}, \{ w6 \} \} \right\}$

b. $[\![$which boy likes which girl?$]\!]$ = = (29a)
{ which girl does b_1 like?, which girl does b_2 like? }
$\Leftrightarrow$ { { b_1 likes g_1, b_1 likes g_2 }, { b_2 likes g_1, b_2 likes g_2 } }
$\Leftrightarrow \left\{ \{ \{ w6 \}, \{ w5 \} \}, \{ \{ w5 \}, \{ w6 \} \} \right\}$

[4] We set aside worlds where neither question's presuppositions are met (for instance worlds where the *like* relation is empty, or consists of only one pair). We also leave out imaginable pairings irrelevant to the interpretations of the examples under consideration here (involving e.g., mappings from boys to boys, girls to girls, or of individuals to themselves.)

3.2 How and when QuDs are calculated

We've seen that context matters in the computation of the QuD. Next we'll show that the implicatures of the antecedent also play a crucial role in determining the QuD.

Puzzle: The antecedent of (20a) may be true in a context where the uniqueness ps of the QuD needed to license sluicing is not met.[5]

(30) Context: Every boy likes two girls.
  a. Every boy likes some girl — true under $\forall > \exists$
  b. # Every boy likes some girl, BIDK which boy which girl.

The sluiced question's uniqueness presupposition requires that for every boy, there is *exactly one* girl that he likes. The context explicitly contradicts this presupposition, thus blocking the QuD *which boy likes which girl?*, needed to license the sluice in (30b).[6]

Proposal: the singluar *some girl* gives rise to an implicature of *exactly one girl*.

This, in turn, gives rise to the QuD *Which boy likes which girl?*, which licenses the sluice in (20a).

This strengthened meaning is the result of a silent EXH operator operating on the antecedent (Sauerland, 2001; Spector, 2007; Fox, 2007, 2009; Chierchia et al., 2012, a.o.).[7]

If exhaustification is obligatory whenever possible, this would block potential QuDs such as *Which boy likes which girls?* from being accessible. As predicted from this proposal, the examples below — with sluices that would be licensed by a non-exhaustified QuDs — are ruled out:

(31) a. * Every boy likes some girl, BIDK which boy which girls.
  b. * Every boy likes some girl, BIDK which boy which girl or which girls.

Note, exhaustification of antecedent takes place independently of sluicing:

(32) Every boy likes some girl, BIDK which boy likes which girl.
Felicitous in a context in which each boy likes exactly one girl.
Infelicitous in a context in which some boys like more than one girl.

4 Conclusion

- The availability of multiple sluices with quantified antecedents is surprising.
- ☞ **Both the semantics *and* the pragmatic implicatures of the antecedent matter** for the purposes of ellipsis licensing.
- Within **QuD-equivalence**, QuDs are computed after antecedent's contribution to CG has been computed — taking into account any (scalar) implicatures antecedent gives rise to.
- This explains a complex set of judgments in Russian and English, and contributes to our understanding of ellipsis licensing more generally.[8]

[5] Our native Russian speaking consultants report the same intuition in Russian for all the examples in this section

[6] The context in (30b) *does* allow multiple sluicing — as well as a non-sluiced continuation — when each boy is mapped to a *group* of two girls: *Every boy likes two girls, BIDK which boy (likes) which (two) girls.* Similar considerations apply to the antecedent in (20b): *Some boy likes every girl* is true when for each girl, there is *at least* one boy that likes her. Nonetheless, the intuitive QuD for (20b) is *for each girl, which boy likes her?*, requiring a context where exactly one boy likes each girl.

[7] Alternatively, the implicature may be calculated via appeal to (neo-)Gricean reasoning.

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[8] It is worth noting that our results here do not argue against hybrid identity approaches that adopt QuD-equivalence alongside a sufficiently "limited" syntactic identity condition. (See Chung 2013; Barros 2014; Lipták 2015 for discussion of how this might be achieved, and AnderBois 2011; Weir 2014 for specific implementations.) Such proposals have the benefit of not requiring wholesale syntactic or LF identity between elided phrase markers and their antecedents, avoiding many of the pitfalls we discuss for such approaches here.

Appendix 1: A failed attempt to rescue Super-QR

An attempt to rescue Super-QR might go along the following lines:

(33) a. Instead of covert long-distance QR (perhaps unavailable)[9]
b. Assume (independently available) string-vacuous overt scrambling of ∀-subject to left periphery.
c. ⇒ (7a) predicted good using only available operations.

Grebenyova reports on a variety of Russian that is strictly surface scope; covert scope-taking operations are unavailable.

We also find speakers who accept inverse scope (cf Antonyuk 2015; Ionin and Luchkina 2015). This will allow us to show that (33) won't work.

For some speakers, inverse scope readings are available:

(34) ? Kakoj-to malčik ljubit každuju devočku.
Some boy likes every girl
'For each girl, there is some boy that likes her.' ✓∀ > ∃

For those speakers, we expect — and observe — that sluicing is possible with superiority-violating word orders.

(35) ? Kakuju devočku kakoj malčik?
which girl which boy
'Which girl does which boy like?'

☞ Here string-vacuous overt scrambling isn't an option. Super-QR is needed to yield inverse scope in the antecedent.

- We are back to our original problem: we need Super-QR to license sluicing in Russian, but we need to rule it out to account for sluicing facts in English (Scope Economy).

[9]See Wurmbrand 2017 for a discussion of the locality of QR and some exceptions that allow for long-distance QR, in particular in cases involving Antecedent Contained Deletion. These exceptional cases are distinct from the one we study here.

Appendix 2: Truth conditional mutual entailment undergenerates

Focus-theoretic implementation of semantic identity in ellipsis:

(36) **Focus Condition on Ellipsis (FCE, Merchant 2001)**
a. A constituent E can be deleted iff E is e-GIVEN.
b. An expression counts as e-GIVEN iff E has a salient antecedent A and, modulo ∃-type shifting,
i. A entails the Focus closure of E (written F-clo(E)), and
ii. E entails F-clo(A)
c. F-clo(α) is the result of replacing F-marked parts of α with ∃-bound variables.

This works in simple cases of sluicing:

(37) [$_{TP_A}$ Someone left], but I don't know who [$_{TP_E}$ ~~*t* left~~].

TP$_A$ = F-clo(TP$_A$) = $\exists x$[human(x) & left(x)]
TP$_E$ = F-clo(TP$_E$) = $\exists x$[human(x) & left(x)]

F-clo(TP$_E$) entails TP$_A$, and F-clo(TP$_A$) entails TP$_E$, satisfying the FCE.
(Assuming Wh-traces are ∃-bound variables (cf Schwarzschild 1999).)

The FCE can also account for single-pair multiple sluices:

(38) [$_{TP_A}$ Some boy likes some girl], BIDK which boy$_i$ which girl$_j$ [$_{TP_E}$ ~~*t*$_i$ likes *t*$_j$~~].

TP$_A$ = F-clo(TP$_A$) = $\exists x \exists y$[boy(x) & girl(y) & likes(x, y)]
TP$_E$ = F-clo(TP$_E$) = $\exists x \exists y$[boy(x) & girl(y) & likes(x, y)]

However, antecedent/sluice pairs in PL multiple sluices in Russian fail to be mutually entailing with their quantified antecedents.

(5b) Každyj priglasil kogo-to na tanec, NJNP kto kogo.
everyone invited someone to dance BIDK who whom
'Everyone invited someone to dance, but I don't remember who invited whom to dance.'
(Grebenyova 2009)

The FCE incorrectly predicts PL multiple sluicing to be ruled out:[10]

(39) a. [$_{TP_A}$ Everyone invited someone to dance] (∀ > ∃)
TP$_A$ = F-clo(TP$_A$) = $\forall x$[person(x) → $\exists y$[person(y) & invited-to-dance(x, y)]]

b. …BIDK who$_i$ whom$_j$ [$_{TP_E}$ ~~*t*$_i$ invited *t*$_j$ to dance~~]

TP$_E$ = F-clo(TP$_E$) = $\exists x \exists y$[person(x) & person(y) & invited-to-dance(x, y)]

[10]This adds to existing arguments against a characterization of the semantic identity condition on sluicing in terms of truth conditional mutual entailment. The general complaint in the literature about the FCE is that it *over*-generates ellipsis in certain contexts. See Hartman 2009 for discussion of FCE-overgeneration in VP ellipsis, AnderBois 2011, 2014; Barros 2014 for sluicing, and Weir 2014 for fragment answers.