Multiple Sluicing, Scope, and Superiority: Consequences for Ellipsis Identity

Hadas Kotek
Matthew Barros

This article defends a semantic identity account of ellipsis licensing. The argument comes from examples of multiple sluicing, especially from Russian. Concentrating on antecedents that contain two quantified statements, we uncover a surprising asymmetry: surface scope antecedents can license a multiple sluice, but inverse scope antecedents cannot. We explain this finding in terms of semantic accounts of ellipsis licensing, where ellipsis is licensed when the sluice corresponds to an (implicit) question under discussion. We show that QUDs cannot be computed from the truth-conditional content of the antecedents alone; instead, they must be computed only after (scalar) implicatures have been calculated and added to the common ground, along with the context of utterance. We further discuss the commitments required of syntactic/LF identity accounts of ellipsis licensing in order to accommodate multiple sluicing with quantified antecedents, and argue that such accounts are practically untenable.

Keywords: sluicing, ellipsis licensing, pair-list readings, scope, parallelism

1 Introduction

Sluicing is clausal ellipsis in a *wh*-question, leaving just the *wh*-phrase overt, as in (1a) (Ross 1969). We adopt the standard analysis in (1b), where sluicing involves *wh*-movement followed by PF deletion/nonpronunciation of TP (e.g., Merchant 2001). Following Merchant, we refer to *wh*-phrases left overt in sluicing as *remnants.* A remnant typically corresponds to some indefinite XP in the antecedent, the remnant's *correlate.* (In (1), the correlate is *someone.*)

(1) *Simple example of sluicing in English*
   a. Sally called someone, but I don't know who.
   b. Sally called someone, but I don't know who $[_{TP}$ ~~Sally called *t*~~$]$.

For helpful comments and suggestions, we would like to thank Scott AnderBois, Michael Yoshitaka Erlewine, Bob Frank, Danny Fox, James Griffiths, Güliz Günes, Larry Horn, Anikó Lipták, Jason Merchant, Gary Thoms, Rashad Ullah, Jason Zentz, two anonymous *LI* reviewers, and audiences at the Yale University syntax reading group, the workshop Multiple Questions about Sluicing, GLOW 40, and CLS 53. We also thank Vera Dvorak, Inna Goldberg, Vera Gor, and Vera Gribanova for Russian judgments. None of these people should be held responsible for our thoughts. Both authors contributed equally to this work.

Linguistic Inquiry, Volume 49, Number 4, Fall 2018
781–812

doi: 10.1162/ling_a_00289

Sluicing, alongside other ellipsis phenomena, is subject to an identity condition that must hold between the elided clause and some discourse-local linguistic antecedent (Hankamer and Sag 1976). As Chung (2013), Barros (2014), and Lipták (2015) note, there is no consensus position on how to state this identity condition. Proposals fall into three broad categories: purely semantic identity approaches (e.g., Tancredi 1992, Romero 1998, Merchant 2001, Takahashi and Fox 2005, Barros 2014), purely syntactic/LF identity approaches (e.g., Ross 1969, Fiengo and May 1994, Chung, Ladusaw, and McCloskey 1995, Fox and Lasnik 2003, Thoms 2015), and hybrid approaches adopting a semantic condition alongside some degree of syntactic identity (e.g., Rooth 1992a, Fox 1995, 1998, 1999, Chung 2006, 2013, AnderBois 2011, 2014, Weir 2014).[1]

We contribute to the debate by examining *multiple sluicing* (Takahashi 1994), where more than one remnant survives ellipsis. Some examples of multiple sluicing in Russian and English are as follows:[2]

(2) *Multiple sluicing in Russian and English*

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 2012:105, (68a))

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 a dance, but I don't remember who invited whom to a dance.'
(Grebenyova 2009)

c. Some boy likes some girl, but I don't know which boy which girl.

Multiple sluicing is a particularly interesting domain of investigation with regard to the identity condition. First, we encounter examples like (2a) and (2c), where both remnants have indefinite correlates. Hence, whatever issues affect syntactic identity in simple sluicing cases should carry over to these more complex cases, and whatever solutions are proposed for the simple cases should apply here as well (see, e.g., Chung, Ladusaw, and McCloskey 1995, Fox and Lasnik 2003 for some proposals). Interestingly, we also observe examples like (2b), where

[1] We 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 2014, Jacobson 2016). See Merchant 2001, 2004, 2010 and Vicente 2014, among other works, for many empirical and conceptual arguments against such proposals. We additionally set aside "copying" proposals such as Chung, Ladusaw, and McCloskey's (1995), where the logical form (LF) of the antecedent TP is copied into an incomplete interrogative clause (lacking TP in particular). (See Merchant 2001 for many compelling arguments against such an approach.)

[2] Under the Ross 1969/Merchant 2001–style conjecture that sluicing is derived via regular *wh*-movement followed by TP-deletion, one might expect multiple sluicing to be attested only in languages with multiple *wh*-fronting. Perhaps surprisingly, multiple sluicing has been attested in a variety of languages, including *wh*-in-situ languages (e.g., Japanese and Mandarin Chinese: Takahashi 1994, Nishigauchi 1998, Takahashi and Lin 2012), single *wh*-fronting languages (e.g., English, German, Spanish, Portuguese, Norwegian, Italian: Rodrigues, Nevins, and Vicente 2009, Lasnik 2014, Abels and Dayal 2016), and (unsurprisingly) multiple *wh*-fronting languages (e.g., Czech, Russian, Serbo-Croatian, Bulgarian, Polish, Hungarian: Richards 1997, Stjepanović 2003, Grebenyova 2009, Bailyn 2012, Scott 2012, Lasnik 2014, Abels and Dayal 2016).

one of the remnants (*kto* 'who') has a universally quantified NP as a correlate (*každyj* 'everyone'). Here it is not at all clear how an antecedent with a universally quantified correlate can count as syntactically or semantically identical to the sluiced multiple *wh*-question.

Our goal in this article is to highlight important challenges that multiple sluicing raises for a certain class of extant accounts of ellipsis licensing, namely, those that require fairly strict syntactic identity between the antecedent clause and the sluiced clause (e.g., Fox 1995, 1998, 1999, Fox and Lasnik 2003, Chung 2006, Thoms 2015).[3] We illustrate how recent semantic approaches (AnderBois 2011, Barros 2014, Weir 2014; see also Reich 2007, Collins et al. 2015, Elliott, Nicolae, and Sudo 2016)—requiring equivalence between the sluiced question's meaning and a question under discussion (QUD; Roberts 1996/2012) associated with the antecedent—can handle the facts.

We concentrate on data from Russian, a language in which multiple sluicing is robustly attested (Stjepanović 2003, Grebenyova 2009, Bailyn 2012, Scott 2012, Antonyuk 2015). For convenience, we will occasionally refer to parallel English data, where a similar grammaticality judgment pattern obtains, but where the judgments tend to be less robust.[4]

2 Challenges for Syntactic Identity

In this section, we introduce the pattern of multiple sluicing with quantified antecedents that will be central to this article. We first lay out preliminary assumptions about the derivation of sluicing in Russian, and discuss Grebenyova's (2009) data and her proposed analysis. We then present novel data to extend the paradigm and challenge Grebenyova's analysis, which is rooted in the tradition of syntactic identity. In section 3, we will offer an account of the data in terms of semantic identity.

2.1 Syntactic Preliminaries

Movement of *wh*-phrases is an obligatory step in the formation of Russian questions, although there is disagreement about whether this is true *wh*-movement, driven by interrogative features to Spec,CP (Bailyn 2012, Scott 2012), focus fronting, or some combination thereof (Bošković 1998, Stepanov 1998, Grebenyova 2009). We will not weigh in on the debate here, as our results would be compatible with either approach. We note, however, that under the standard assumption that the syntax of overt *wh*-movement feeds TP-ellipsis in sluicing, the fact that multiple sluicing

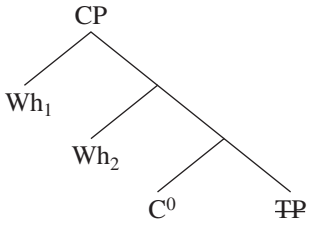
[3] More precisely, we are interested in conditions on *recoverability* in the context of multiple sluicing. As a reviewer notes, the conditions governing licensing of sluicing may be different from those governing VP-ellipsis. We believe that these conditions may be the same, but we do not commit to this strong position; here, we investigate sluicing alone and do not comment on VP-ellipsis.

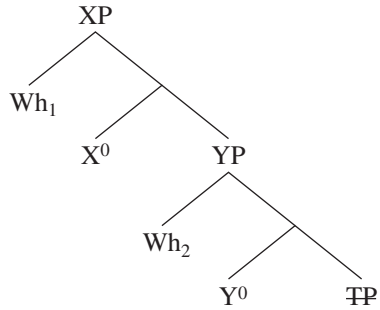
[4] Much of the literature on multiple sluicing claims it to be only marginally acceptable in English. To our knowledge, the most systematic investigation of the facts is found in Lasnik 2014, where the results of an informal survey are reported, supporting the conclusion that multiple sluicing is a "real phenomenon" in English. However, Lasnik reports pooled data, which may obscure interspeaker variation. Our own informal investigations have identified two sorts of speakers: a substantial number who find multiple sluicing unimpeachable, alongside others who find it marginal at best. We will therefore investigate multiple sluicing in the grammars of English speakers for whom it is available as a productive questioning strategy; and we will concentrate more strongly on Russian, where these concerns do not arise. See also footnote 17 and section 3.2.3.

is available in Russian argues against approaches that take some or all of the *wh*-phrases to be adjoined to TP (e.g., Rudin 1988, Stepanov 1998).[5]

We follow Scott (2012) in assuming a Richards (1998)–style tucking-in analysis in Spec,CP for multiple *wh*-phrases, as in (3a), though everything we say for such structures carries over to analyses that place each *wh*-phrase in the specifier of a separate projection in a Rizzi (1997)–style articulated left periphery, as in (3b).[6]

(3) *Tucking-in (a) and articulated (b) left peripheries*

a.


b.


2.2 *Syntactic Identity and "Super Quantifier Raising"*

We begin with a discussion of the syntactic identity account of Russian multiple sluicing in Grebenyova 2009. Examples (4a–c) illustrate multiple sluicing with quantified antecedents. As Grebenyova notes, Russian multiple *wh*-fronting is not subject to Superiority;[7] nonetheless, in sluicing contexts, Superiority-obeying multiple sluicing is available with a surface scope antecedent, whereas Superiority-violating multiple sluicing, corresponding to the inverse scope reading of the antecedent, is unavailable (4a–b). It is not the case that Superiority-violating orders are ruled out in multiple sluicing, however. Scrambling in the antecedent does allow for this word order (4c).

[5] Strictly speaking, it is possible that a combination of analytical options are available in Russian with regard to the landing sites of multiple fronted *wh*-phrases. What will be important for our purposes is that, at least in sluicing—involving TP-deletion—it must be the case that all *wh*-phrases are outside the ellipsis site (i.e., above TP in the left periphery).

[6] In (3), Wh_1 and Wh_2 encode the relative order of the *wh*-phrases, such that Wh_1 is base-generated in a higher position than Wh_2. The two schematic left peripheries in (3) obey Superiority.

Both structures in (3) are adopted as possibilities for Russian *wh*-movement in Scott 2012, where Superiority violations in multiple *wh*-questions are derived via "hopping" of Wh_2 over Wh_1 in the multiply filled Spec,CP into Spec,HOP (High Operator Phrase) above CP. (In (3b), this would place Wh_2 in Spec,XP (XP = HOP), leaving Wh_1 in Spec,YP (YP = CP) in Scott's (2012) analysis.) Other authors propose that the lower projection hosting *wh*-elements is a Focus projection, and elements that move into this specifier hence undergo focus movement instead of *wh*-movement. See Bošković 2007, among others, for details. While authors may disagree on the label of this projection, they share the idea that it is a functional projection above TP, as we illustrate in (3b). We remain agnostic about the correct label, as this is immaterial for present purposes.

[7] For example, (ia–b) are both grammatical and reported to have a similar meaning (data from Bošković 2007).

(i) a. *Kto kogo* ljubit?
who whom loves
'Who loves whom?'
b. *Kogo kto* ljubit?

(4) *Superiority in Russian sluicing: Correlates must match remnants*
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 know {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) adopts Fox and Lasnik's (2003) LF identity analysis, requiring that the elliptical clause and its antecedent be structurally parallel and that variables contained in the elliptical clause and its antecedent be bound from parallel positions (see Griffiths and Lipták 2014, Thoms 2015, and Messick and Thoms 2016 for such an implementation of syntactic identity). Following Kratzer (1998), Grebenyova also adopts the assumption that indefinites in antecedents contribute a variable bound by existential closure.[8]

For the unscrambled antecedent and the Superiority-obeying multiple sluice in (4a), Grebenyova (2009) provides the logical forms (LFs) in (5a–b). Here, variables are bound from parallel positions, meeting identity as defined above. In the unscrambled antecedent in (4a) and the Superiority-violating sluice in (4b), variables are bound from different positions, in violation of LF parallelism (see (5a) and (6b)). The scrambled antecedent in (4c) is identical only with Superiority-violating multiple sluicing, as illustrated in (6a–b).

(5) *LFs for unscrambled antecedent and Superiority-obeying sluice*
a. $\forall x \exists y$ [x invited y to a dance] antecedent in (4a–b)
b. who$_x$ whom$_y$ [x invited y to a dance] ($\text{Wh}_1 > \text{Wh}_2$) sluice in (4a)

(6) *LFs for scrambled antecedent and Superiority-violating sluice*
a. $\forall y \exists x$ [x invited y to a dance] antecedent in (4c)
b. whom$_y$ who$_x$ [x invited y to a dance] ($\text{Wh}_2 > \text{Wh}_1$) sluice in (4b–c)

Grebenyova's adoption of Fox and Lasnik's proposal captures the unacceptability of Superiority mismatches between remnants and correlates. Additionally, her account captures scrambled antecedents, since the variable contributed by the indefinite subject in (6b) can be existentially bound in situ.

However, closer consideration of the assumptions we are forced to adopt in order to achieve parallelism in this way highlights some immediate problems. Grebenyova (2009) assumes that

[8] An additional assumption made by Fox and Lasnik (2003), which we return to in section 2.3, is that *wh*-movement under ellipsis takes place in one fell swoop. This is required under their approach in order to maintain parallelism between an antecedent without movement and the sluice, which otherwise would contain intermediate copies, interrupting identity.

Grebenyova's (2009) implementation differs slightly from Fox and Lasnik's (2003). For Fox and Lasnik, existential quantification takes place over choice function variables, following Reinhart (1997), whereas Grebenyova uses individual variables, following Kratzer (1998). As far as we can tell, this difference will not matter here, so we keep to Grebenyova's implementation for consistency.

multiple sluicing in Russian places both *wh*-phrases outside of the elided category, TP. To maintain that the quantifiers in the antecedent bind variables from a parallel position, it must be the case that the binders in the antecedent are themselves outside of TP as well. This would require exceptionally high Quantifier Raising (QR) of the universal subject in the antecedent to a position in the left periphery (call this *Super-QR*).[9]

Likewise, existential closure of the variable contributed by the indefinite in the antecedent would need to take place from outside TP.

(7) *Super-QR of* everyone *in unscrambled antecedent satisfies parallelism*
$[_{CP}$ everyone$_x$ $\exists_y$ $[_{TP_A}$ x invited y to a dance]] antecedent
$[_{CP}$ who$_x$ whom$_y$ $[_{TP_E}$ x invited y to a dance]] sluice

While the latter assumption about the height of existential closure is rather innocuous, considering the capacity of indefinites to take exceptionally wide scope, the former assumption raises the question of what the motivation for the additional QR step for the universal quantifier might be.

There is, in fact, independent reason to think that Super-QR should not be generable. Fox (1999) shows that QR is constrained by economy. When comparing two derivations, one with an extra QR step and one without, the more complex derivation is rejected if QR yields no interpretive consequence. Invoking Super-QR to satisfy parallelism in multiple sluicing has this "semantically vacuous" character.

In Fox's (1999) proposal, inverse scope in the antecedent in (8) is ruled out by appeal to the interaction between Scope Economy and ellipsis parallelism.

(8) *Inverse scope is ruled out by economy considerations*
Some boy likes every teacher, and Mary does ~~like every teacher~~ too. $*\forall > \exists$

Fox takes the parallelism condition to be LF identity between the sentence containing the elided constituent (E) (the right conjunct in (8)) and its antecedent (A). LF identity in Fox 1999 is sensitive to F-marking. Parallelism is met between A and E when A $\in$ F(E), where F(E) is a set of structured meanings corresponding to E's focus alternatives in the sense of Rooth 1992b. An inverse scope reading of A in (8) would require parallel QR of *every teacher* over *Mary* in E to meet LF identity. However, since such QR yields no interpretive consequence in E, Scope Economy rules such a derivation out, in turn forcing a surface scope reading for A. If Fox is correct, the Super-QR needed to meet LF identity in multiple sluicing should be ruled out, a point against LF identity approaches.

Nonetheless, one may wonder whether the need to satisfy identity alone can count as a motivation for Scope Economy–violating QR. Fox (1999) does note that inverse scope appears to become available in an example like (9), where the antecedents in (8) are switched, so that it

[9] See Wurmbrand 2018 for a discussion of the locality of QR and some exceptions that allow for long-distance QR, especially in cases involving antecedent-contained deletion.

would seem at first glance that Scope Economy–respecting QR in an E-clause can motivate Scope Economy–violating QR in an A-clause.

(9) *Apparent violation of Scope Economy in A-clause*
[$_A$ Mary likes every teacher], and [$_E$ some boy does ~~like every teacher~~ too].
a. LF of E-clause = [every teacher$_x$ some boy likes x]
b. LF of A-clause = [every teacher$_x$ Mary likes x]

We might, then, take *wh*-movement in a multiple sluice to be like QR in the E-clause in (9); the *wh*-phrases independently raise to Spec,CP, outscoping everything else in the sentence. On analogy with apparent QR in the antecedent in (9), Super-QR of the universal in (4a) may be motivated to satisfy parallelism. However, Fox (1999) provides an account of data like (9) that preserves the conclusion that Scope Economy is never violated, despite appearances. In other words, it is not the case that Scope Economy–respecting QR in an E-clause may license Super-QR in its A-clause, only to satisfy parallelism.

To capture the pattern in (9), Fox (1999) appeals to a mechanism whereby an alternative antecedent LF, call it A′, can be accommodated under certain conditions (met in (9)). First, Fox observes that the antecedent in (9) entails an LF that is in F(E) for (9), namely, that in (10). (That is, if Mary likes every teacher, then it is true for every teacher that some girl likes him or her.)

(10) *Accommodated antecedent in (9)*
[$_A$ Mary likes every teacher] $\models$ [$_{A'}$ every teacher$_x$ some girl likes x]
A′ $\in$ F([$_E$ every teacher$_x$ some [boy]$_F$ likes x])

Crucially, in A′, Scope Economy is respected, without any need to appeal to Super-QR in the actual antecedent itself. In other words, there is no provision in Fox's theory for Super-QR.[10]

To summarize, an important challenge for LF identity lies in generating the acceptable cases with surface scope antecedents without appealing to Super-QR. Adopting Super-QR solely for the purposes of motivating parallelism in acceptable examples is conceptually unattractive because it lacks independent motivation and is therefore stipulative. If we reject Super-QR, however, LF identity approaches like Fox and Lasnik's (2003) and Grebenyova's (2009) run into trouble in ruling in sluices with quantifier correlates. In other words, proponents of the LF parallelism approach to ellipsis licensing must perforce believe that Super-QR is not possible (in order to capture Fox's (1999) original data). However, the multiple sluicing data presented here would

[10] Note that even if Super-QR were possible in accommodated antecedents, there are additional constraints in place that block accommodation in our sluicing contexts. Super-QR is semantically vacuous by definition, so one could imagine that an antecedent like *Everyone invited someone to a dance* can license the accommodation of its Super-QR'd LF *everyone$_i$ t_i invited someone to a dance.* In order for accommodation to take place, the E-clause must contain *accommodation-seeking material*, which Fox (1999) defines as deaccented material (i.e., nonelided and non-F-marked) that lacks identical correlates in the antecedent. In (9), the accommodation-seeking material consists of the determiner *some* in the E-clause. (F-marking is on *boy*, since if it were on the entire subject DP, there would be no accommodation trigger.) In multiple sluicing, there is no accommodation trigger, since everything but the F-marked remnants is elided. The notion that sluicing remnants are F-marked is explicitly adopted in Grebenyova 2009, where sluicing is movement to the specifier of a Focus projection in the left periphery. (See also Romero 1998 for an analysis of the distribution of F-marking on remnants in sluicing.)

require Super-QR, on the LF parallelism approach.[11] This is a contradiction, and therefore an LF parallelism approach to ellipsis is untenable.[12]

Finally, extending the discussion to other views of LF identity, consider for example the proposal in Thoms 2011, where it is the complement of the moving remnant-to-be (in this case, a lower TP-segment) that is elided. If one imagines that *wh*-movement can target a low projection inside TP, this approach would predict parallelism. However, this seems to us untenable. Although some research suggests that some *wh*-phrases in Russian can move to a projection below Spec,CP, assumed to be Spec,TP (e.g., Rudin 1988, Richards 1997), more recent work suggests that this position is a functional projection above TP on the clausal spine (see, e.g., Bošković 2007 and citations therein for arguments that this is a Focus projection). More importantly, all these researchers agree that the highest *wh*-phrase in a multiple *wh*-question always targets Spec,CP, even if lower *wh*-phrases can target a lower projection. Similarly, (overt and covert) *wh*-movement in English is argued to target Spec,CP (Nissenbaum 2000, Pesetsky 2000, Cable 2007, Kotek 2014), and T-to-C movement confirms this fact: the *wh*-phrase appears to the left of the auxiliary. It suffices that overt movement of the highest *wh*-phrase in the question targets Spec,CP in English and Russian for Super-QR of at least one quantifier to be required. As a result, this analysis runs into the same problems as Fox and Lasnik's (2003). Yoshida's (2010) account, where vPs can constitute antecedents for sluicing, would face a similar difficulty.

Before we conclude this section, some words are in order regarding interspeaker variation with respect to the structure and interpretation of multiple *wh*-questions and the judgments reported in Grebenyova 2009. Grebenyova reports on a variety of Russian with the following properties: (a) it is a "surface scope" language, where inverse/covert scope-taking operations are unavailable; (b) Superiority violations are freely available in both matrix and embedded multiple *wh*-questions; and (c) multiple *wh*-questions can only have pair-list answers, where each value for one *wh*-term is paired with a corresponding value for the other.

In our investigations with L1 Russian speakers, we have found speakers not only of this variety but of other varieties as well. There is some dispute about whether Russian is a surface scope language (see, e.g., Antonyuk 2015, Ionin and Luchkina 2015). One of our consultants did, in fact, marginally accept inverse scope interpretations of sentences like (11).

(11) *Inverse scope interpretation of a Russian sentence*
?Kakoj-to malčik ljubit každuju devočku.
some boy likes every girl
'For every girl, there is some boy that likes her.' $\forall > \exists$

[11] Examples like (i) show that the problem extends beyond multiple sluicing, to any sluice with a quantified correlate.

(i) She has read most books, but we don't know EXACTLY which ones ~~she has read~~.
(Romero 1998:25, (51a))

[12] A reviewer suggests an alternative "fix" to the Super-QR problem—namely, to replace Fox and Lasnik's (2003) requirement that variables be bound from (absolute) parallel positions with a requirement that they be bound from *relative* parallel positions. While we see the intuitive idea, it is not clear to us how one would go about spelling out the conditions of such relativization in a precise way. Furthermore, we suggest that at this point we would no longer be dealing with a strict syntactic approach to ellipsis licensing, requiring instead something that comes closer to a semantic condition.

This state of affairs allows us to strengthen our argument against Super-QR, as follows. One way Grebenyova's parallelism account may get around our criticism that scopal parallelism requires Super-QR is to assume that examples like (4a) instead involve string-vacuous overt scrambling of the universal subject to the left periphery. This would ensure scopal parallelism between the elided clause and its antecedent by appealing to an independently available operation (scrambling) in Russian, instead of the problematic Super-QR. If such a derivation were available, it would challenge our argumentation above.

However, overt scrambling cannot be behind the inverse scope interpretation of (11) for those speakers who accept it. In (12), we show that such speakers also accept sluicing with examples like (11) as antecedents. Here, on an account as in Grebenyova/Fox and Lasnik, Super-QR of the universal correlate in the antecedent is necessary in order to scope at the same position as the corresponding *wh*-remnant—in violation of Scope Economy.[13]

(12) *Multiple sluicing continuation is available for speakers who accept (11)*
?Kakuju devočku kakoj malčik?
which girl which boy
'Which girl does which boy like?'

On the other hand, for our consultants who do not accept inverse scope in (11), the sluice in (12) is categorically rejected with (11) as antecedent.[14]

2.3 Additional Challenges for Syntactic Identity

Fox and Lasnik (2003) highlight an immediate problem for LF identity approaches to ellipsis licensing in the context of sluicing. Specifically, sluicing antecedents do not involve *wh*-movement, yet sluiced *wh*-questions do. Successive-cyclic movement of the *wh*-phrase on its way to Spec,CP through phase edges contained in the sluiced TP threatens to interrupt identity between the antecedent LF and the sluice. (Below, we ignore subject movement from Spec,vP to Spec,TP.)

(13) *With successive-cyclic movement, antecedent and sluice are not parallel*
a. Jack saw someone, but I don't know who.
b. $[_{TP}$ Jack $[_{vP}$ saw someone]]
c. $[_{CP}$ who λy ~~$[_{TP}$ Jack $[_{vP}$ t_y λx $[_{vP}$ saw $t_x]]]]$~~

[13] To achieve the wide scope universal interpretation of (11), it is only required that the universally quantified object scope over the subject. There are two standardly accepted ways to obtain this result: (a) subject lowering: the object adjoins to vP, scoping over the subject, which is interpreted in Spec,vP at LF; (b) object raising: the object adjoins to TP, c-commanding the subject in Spec,TP. Neither option satisfies Fox and Lasnik (2003)–style parallelism, requiring the universal to scope above TP.

[14] Grebenyova (2009) reports that (unsluiced) Russian multiple *wh*-questions are immune to Superiority effects across the board, though Bailyn (2012) and Scott (2012) report that some speakers require obedience to Superiority in embedded/indirect *wh*-questions. As far as we can tell, this interspeaker variation will not matter for present purposes (where it might, we explicitly control for such variation). An additional dimension of variation concerns the availability of multiple *wh*-questions and multiple sluicing with or without a pair-list reading: Grebenyova claims that only pair-list multiple *wh*-questions and multiple sluices are possible in Russian, whereas Bailyn (2012), Scott (2012), and Antonyuk (2015) claim that single-pair multiple *wh*-questions and multiple sluices are also possible. Here, we focus on pair-list interpretations for multiple *wh*-questions/sluices.

To compensate for this, in defense of an LF identity account, Fox and Lasnik (2003) propose that *wh*-movement under ellipsis takes place in one fell swoop (see also Messick and Thoms 2016 for a more recent implementation of this idea). The indefinite correlate introduces a variable that is bound in situ by existential closure from a position in the antecedent parallel to the remnant.

One-fell-swoop movement of the remnant, coupled with existential binding of the indefinite in situ in the antecedent, allows LF identity to go through.

(14) *One-fell-swoop* wh-*movement + existential closure allow LF identity*
a. $[_{CP} \quad \exists y \ \sout{[_{TP} \text{Jack} [_{vP} \text{saw } y]]}]$
b. $[_{CP}$ who $\lambda y \ \sout{[_{TP} \text{Jack} [_{vP} \text{saw } t_y]]}]$

While such an analysis may work for indefinite correlates, it runs into trouble with unambiguously quantificational correlates. We have already illustrated one problem for multiple sluicing in the preceding section. Specifically, universally quantified correlates must undergo Super-QR to a position parallel to the *wh*-phrase in the sluice in order to ensure that variables are bound from parallel positions.

The problem goes beyond multiple sluicing, to any sluice with an unambiguously quantified correlate.

(15) *Account illustrated in (14) cannot extend to cases of nonexistential quantifiers*
She's read most books, but I don't know exactly which ones ~~she's read~~.

Existential closure is unavailable for *most books* in (15). If we assume that *most books* is interpreted in situ (perhaps via type-lifting; see, e.g., Heim and Kratzer 1998), a problem will arise: there will be a variable bound in the sluice, contributed by the *wh*-trace. Antecedent and sluice will lack parallel binding configurations, and sluicing is incorrectly predicted to be impossible. One could posit short movement of *most books* to adjoin to the next highest propositional node (vP) in order to avoid a type mismatch in situ. However, this will not remedy the problem, as the antecedent and the sluice will now have distinct binding configurations.

(16) *(Wrongly) predicted nonparallel antecedent and sluice with* most
a. $[_{TP}$ she $[_{vP}$ most books $\lambda z \ [_{vP}$ read $t_z]]]$
b. $[_{CP}$ which ones $\lambda y \ \sout{[_{TP} \text{she} \quad [_{vP} \text{read } t_y]]}]$

Super-QR might again come to the rescue, allowing *most books* to violate Scope Economy and raise into the left periphery to a position parallel to that of the remnant. However, this would lead back to the objections raised in the previous section.

Without Super-QR, an additional challenge to syntactic/LF identity approaches emerges. In particular, there is a lexical mismatch whereby *most books* in (16) entirely lacks a correlate in the antecedent, let alone one in a parallel structural position (since one-fell-swoop movement would not leave a trace of movement at the edge of vP). The latter issue could perhaps be addressed by jettisoning the notion that *wh*-movement under ellipsis takes place in one fell swoop after all, but we would still be left with a lexical mismatch, whereby the quantified DP *most books* corresponds to a trace (or trace-converted copy, in Fox's (2002) sense) in the sluice.

(17) *Trace-theoretic representation with successive-cyclic movement*
a. [$_{TP}$ she [$_{vP}$ most books λz [$_{vP}$ read t_z]]]
b. [$_{CP}$ which books λx ~~[$_{TP}$ she [$_{vP}$ t_x λy [$_{vP}$ read t_y]]]~~]

(18) *Copy-theoretic representation*
a. [$_{TP}$ she [$_{vP}$ most books λz [$_{vP}$ read the books z]]]
b. [$_{CP}$ which books λx ~~[$_{TP}$ she [$_{vP}$ the books x λy [$_{vP}$ read the books y]]]~~]

With trace conversion, at least, the mismatch reduces to one between the determiners (here, *most* in the antecedent and *the* in its corresponding intermediate copy in the ellipsis site, although this problem would extend to the universally quantified subject correlates discussed in the previous section for multiple sluices). Super-QR could, once again, come to the rescue here. It would render the copy of *most books* at the left edge of vP a lower copy, allowing for determiner replacement to replace *most* with *the*. If such an operation were allowed, parallelism would be predicted.

(19) *Copy-theoretic representation with Super-QR*
a. [$_{TP}$ *most books* λu [$_{TP}$ she [$_{vP}$ the books u λz [$_{vP}$ read the books z]]]]
b. [$_{CP}$ which books λx ~~[$_{TP}$ she [$_{vP}$ the books x λy [$_{vP}$ read the books y]]]~~]

However, Super-QR is otherwise unmotivated, and so this would be a stipulative and confounded solution, for the reasons outlined in the preceding section.

As Merchant (2001) discusses, an additional challenge for LF identity approaches comes from *contrast* sluicing, where the restrictions of correlates and their remnants are disjoint, with correlates and remnants bearing contrastive focus (in italics).

(20) *Contrast sluicing presents another challenge to LF identity*
I know which *puppy* you should adopt, but I haven't decided yet which *kitten* ~~you should adopt~~.

Fox and Lasnik (2003) discuss such cases and offer trace-theoretic representations, which avoid the obvious challenge posed by the copy theory of movement for LF identity, namely, that contrast sluices introduce mismatches in semantic content between the LF of the antecedent and the LF of the sluice. A copy-theoretic representation of the antecedent and sluice in (20) is given in (21).

(21) *A copy-theoretic representation of (20) breaks parallelism*
a. which puppy λx you should the puppy x λy adopt the puppy y
b. which kitten ~~λx you should the kitten x λy adopt the kitten y~~

There are some ways around this issue that do not involve resorting to trace-theoretic LFs, which would lead us back to the nonisomorphic LFs in (16)–(17). For instance, one could adopt the assumption that the NP restrictions for the *wh*-phrases in both clauses are subject to wholesale late merger (Takahashi and Hulsey 2009), only merged countercyclically to the head of the chain, so that lower chain links would lack the semantically conflicting content. However, such a move would be challenged by the observation that reconstruction to intermediate landing sites appears

to be possible under sluicing.[15] Consider (22), for instance, a contrast sluice in which the anaphor contained in the *wh*-phrase must reconstruct to an intermediate position in Spec,CP of the embedded clause in order to satisfy Condition A of the binding theory.

(22) *Reconstruction to intermediate landing sites is possible, challenging wholesale late merger*
I know which *painting* of herself$_1$ Sally$_1$ said Bill hated, but I don't know which *photo* of herself$_1$ ~~she$_1$ said he hated~~.
a. which painting of herself$_1$ λx Sally$_1$ said ⟨the painting of herself$_1$ x⟩ Bill hated
b. which photo of herself$_1$ ~~λx she$_1$ said ⟨the photo of herself$_1$ x⟩ Bill hated~~

Chung (2013) makes a suggestion that may help save syntactic/LF identity approaches in the face of data such as (22). In brief, the suggestion is that sluicing remnants, by virtue of being pronounced at the heads of their chains, render the content of lower copies irrelevant when calculating syntactic identity. This is a natural move, under the assumption that the identity condition is intuitively motivated by recoverability considerations, and the content of elided chain links is recoverable from the pronounced remnant at the head of the chain. Perhaps this assumption, in tandem with the operation of Super-QR in order to achieve parallel binding configurations, would be sufficient to save an LF identity account in the face of all these challenges. However, in the following section, we entertain an alternative approach—semantic identity—and show that it avoids these issues.

3 Semantic Parallelism and Pair-List Multiple Sluices

In this section, we entertain an alternative to syntactic identity: namely, semantic identity. Semantic identity is not without its own challenges, which we highlight in the following discussion. We show that Merchant's (2001) truth-conditional "e-GIVENness" approach is insufficient to account for our multiple sluicing data. In particular, e-GIVENness fails to rule in multiple sluices with pair-list readings. Instead, we argue for semantic approaches to identity that reference the *question under discussion* (QUD; following Roberts 1996/2012) in calculating identity, in keeping with much recent work (e.g., AnderBois 2011, Barros 2014, Weir 2014).

3.1 Truth-Conditional Mutual Entailment Undergenerates

Merchant (2001) proposes an influential focus-theoretic implementation of semantic identity in ellipsis, outlined in (23).

[15] This is not necessarily a challenge to the notion that *wh*-movement under ellipsis *may* take place in one fell swoop. That is, it is possible that successive-cyclic movement under ellipsis is at least an option. Of course, given that we have evidence for successive-cyclic movement under ellipsis in any case, it seems easier to believe, following Merchant (2001), that *wh*-movement under ellipsis is "regular," and therefore successive-cyclic as often as its nonelliptical counterpart is (i.e., always). See Agüero-Bautista 2007 for independent argumentation supporting the claim that *wh*-movement under sluicing is successive-cyclic.

(23) *Focus Condition on Ellipsis (FCE; see Merchant 2001:secs. 1.2–1.5)*
  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.

Merchant treats traces of *wh*-phrases in sluiced TPs as existentially bound variables (see also Schwarzschild 1999). For a simple ("single") sluice like that in (24), F-clo(TP_E) entails its antecedent TP_A, and F-clo(TP_A) entails TP_E, satisfying the FCE.[16]

(24) *Deriving simple sluicing using Merchant's FCE*
  $[_{TP_A}$ 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)]

Merchant's FCE straightforwardly accounts for single-pair multiple sluices, presented here in English.[17]

(25) *The FCE can account for single-pair multiple sluices*
  $[_{TP_A}$ Some boy likes some girl], but I don't know 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, the FCE undergenerates. Antecedent/Sluice pairs in pair-list multiple sluices in Russian fail to be mutually entailing with their quantified antecedents. Consider (2b), repeated in (26).

[16] In calculating F-clo(A/E), we assume that the remnant's trace in TP_E contributes its restriction to ∃-clo(E)/F-clo(E). We stick to trace-theoretic representations for ease of exposition, but we assume the copy theory throughout. We make this more explicit below.

[17] As mentioned in footnote 4, not all English speakers accept multiple sluicing to begin with. Among those who do, there are speakers for whom ⟨DP,DP⟩ remnants as in (25) are degraded, but ⟨DP,PP⟩ remnants as in (i) are much improved.

(i) Some boy danced with some girl, but I don't know which boy with which girl.

Speculatively, we suggest that the degraded nature of (25) for these speakers stems from the similarity of the two DPs (see Richards 1997, as well as extensive discussions in the processing literature, e.g., Garraffa and Grillo 2008, Grillo 2008, Friedmann, Belletti, and Rizzi 2009), but this is irrelevant for present purposes. We will concentrate on ⟨DP,DP⟩ cases in the text and therefore report judgments only from speakers who find such examples acceptable.

(26) *Pair-list multiple sluice is not e-GIVEN*
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 a dance, but I don't remember who invited whom to a dance.'
(Grebenyova 2009)

(27) *The FCE incorrectly predicts pair-list multiple sluicing to be ruled out*
a. $[_{TP_A}$ everyone invited someone to a dance] $\forall > \exists$
TP_A = F-clo(TP_A) = $\forall x$[person(x) $\rightarrow \exists y$[person(y) & invited-to-a-dance(x, y)]]
b. . . . but I don't know who$_i$ whom$_j$ $[_{TP_E}$ ~~t_i invited t_j to a dance~~]

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

The same holds true for any pair-list multiple sluice whenever the antecedent has a wide scope universal; existential closure or Focus closure of *wh*-traces in TP_E inevitably leads to a failure of mutual entailment.

This discussion adds to existing arguments against characterizing the semantic identity condition on sluicing in terms of truth-conditional mutual entailment. The general criticism in the literature about the FCE is that it *over*generates ellipsis in certain contexts.[18] In this section, we have argued that the FCE also *under*generates when it comes to pair-list multiple sluices. In the next section, we entertain an alternative semantic condition that fares better.

3.2 QUD Equivalence

3.2.1 The Basic Idea Following Roberts (1996/2012), we take questions under discussion (QUDs) to be semanticopragmatic objects—salient question meanings in a discourse with interrogative force. Their role in discourse is to shape the flow of information exchange, as interlocutors engage in the cooperative task of addressing the QUD. QUDs can be made salient implicitly or explicitly (e.g., by asking a direct question).

QUD equivalence approaches to sluicing identity appeal to the intuition that assertions with indefinites and disjunctions make certain corresponding QUDs salient (see AnderBois 2011, 2014). For instance, the assertion *Sally is dating someone* intuitively raises the question *Who is Sally dating?* Likewise, *Sally is dating either Mary or Bill* raises the question *Which of the two is Sally dating?* Relevantly, an assertion with an indefinite or disjunction makes for a natural sluicing antecedent, with the indefinite or disjunction serving as the remnant's correlate.

(28) *Indefinites and disjunctions serve as natural correlates*
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~~.

[18] For discussion of FCE overgeneration in VP-ellipsis, see Hartman 2009; in sluicing, AnderBois 2011, 2014, Barros 2014; and in fragment answers, Weir 2014.

QUD equivalence approaches require a sluiced question to be congruent to the QUD raised by the antecedent. Following Roberts (1996/2012), congruence = equivalence, so that semantic identity is satisfied when ⟦QUD⟧ = ⟦Sluiced Q⟧. For concreteness, we adopt a standard Hamblin/Karttunen semantics for questions (Hamblin 1973, Karttunen 1977), where a question denotes the set of possible answers to the question. In a model with just two individuals, Mary and Bill, the question *Who is Sally dating?* would denote the set of propositions {that Sally is dating Mary, that Sally is dating Bill}.[19]

With this much in place, we return to the motivations behind Grebenyova's (2009) syntactic proposal. Grebenyova observes that, even though (for some speakers) Russian multiple *wh*-questions are insensitive to superiority, remnants in sluiced multiple *wh*-questions must match the superiority of their correlates in the antecedent ((4), repeated in (29)).

(29) *Superiority in Russian sluicing: Correlates must match remnants*
   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 know {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}

In the preceding section, we reviewed challenges that LF identity approaches face in accounting for this pattern. Here, as an alternative, we capitalize on the established observation that hierarchical relations between *wh*-phrases in a multiple *wh*-question have consequences for the question's meaning (e.g., Comorovski 1989, Dayal 1996, 2002, Fox 2012a,b, Kotek 2014). This fact allows for an alternative explanation of the Russian sluicing data and of parallel English data, couched in semantic identity (QUD equivalence) and not subject to the pitfalls of syntactic identity.

In short, we claim that the antecedent in (29a) raises a distinct QUD from the one raised by the sluiced question in (29b), ensuring that the identity condition on sluicing is not met and therefore correctly ruling sluices like that in (29b) out, given antecedents like that in (29a).

3.2.2 The Interpretation of Pair-List Multiple Wh-*Questions, and QUD Equivalence* Before illustrating how QUD equivalence captures the facts in examples like (29), we review some crucial properties of pair-list multiple *wh*-questions. First, note that the multiple *wh*-question in (30) has two readings: the single-pair reading, which asks for the identity of the relevant boy and the relevant girl in the *like* relation, and the pair-list reading, which asks for a list of boy-girl pairs in the *like* relation.

[19] For simplicity, we show extensional types here, although a more accurate description of the set would require it to be intensional. We use intensions only when they are relevant for our purposes, in section 3.2.4.

(30) *Single-pair and pair-list answers to a multiple* wh*-question*
Which boy likes which girl?
a. Mark likes Sarah. single-pair
b. Mark likes Sarah, and Bill likes Maria. pair-list

Multiple *wh*-questions under a pair-list interpretation have two important presuppositions sensitive to the relative hierarchical prominence of the *wh*-phrases in the structure (e.g., Comorovski 1989, Dayal 1996, 2002, Fox 2012a, Kotek 2014). These presuppositions are described in (31)–(32), and their salience is illustrated with examples from Fox 2012a, designed to show that the questions are infelicitous in contexts that do not support the presuppositions.[20] (The same facts hold true for Russian, according to our language consultants.)

(31) *The presuppositions of a pair-list multiple* wh*-question: 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.)

(32) *The presuppositions of a pair-list multiple wh-question: 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.)

Following Fox (2012a), Nicolae (2013), and Kotek (2014), among others (cf. Büring 2003, Roberts 1996/2012), we assume that pair-list multiple *wh*-questions denote a "family of questions" (a set of (sub)questions). The presuppositions of question (30b) require that the entities that the higher *wh*-phrase quantifies over be exhaustively paired in a one-to-one relation with entities quantified over by the lower *wh*-phrase in a pair-list multiple *wh*-question. In other words, it is required that the subquestions be "sorted" by the restriction of the highest *wh*-phrase in that question. We refer to this higher *wh*-phrase as the *sorting key* for the question.[21]

[20] See Kotek 2014 for a derivation of these presuppositions in an interrogative framework that is consistent with the assumptions we have made here.

[21] We adopt here the standard assumption that (covert) *wh*-movement in English, as in Russian, targets the left periphery (Pesetsky 2000, Cable 2007, Kotek 2014). We note that Lasnik (2014) assumes that covert *wh*-movement in English is in fact heavy-NP shift to the right, instead of movement to the left. This seems problematic, for a variety of reasons. First, it makes English no longer parallel to Russian. As a result, one account will be needed for the facts in Russian, but a different one for the quite similar facts in English. A consequence for Fox and Lasnik's (2003) LF parallelism account is that QR will have to be assumed to be movement to the right, as well. Lasnik's account will also have to rule out the derivation of English multiple *wh*-questions in (ib), which would falsely predict Superiority violations in English multiple sluicing to be possible. The derivation in (ia) would be maintained. Notice, however, that both derivations are predicted to have the same PF form.

Under its pair-list interpretation, the question in (30) denotes a family of questions wherein each subquestion is a question about a particular boy—namely, which girl likes that boy—as illustrated in (33). Assuming a model with two boys, b_1 and b_2, and two girls, g_1 and g_2, this family of questions can be spelled out as in the second line of (33), assuming again that the meaning of a question is the set of possible answers to that question.

(33) *Family of questions for* Which boy likes which girl? *sorted by boy*
$[\![(30)]\!]$ = {{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}}

With this background established, we can turn our attention back to Grebenyova's (2009) paradigm and ask which QUD the antecedent makes salient.

(29) *Superiority in Russian sluicing: Correlates must match remnants*
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 know {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}

The surface scope antecedent in (29a) sets up a discourse where, for each inviter, there is some invitee he or she invited. This raises a QUD asking, for each inviter, which invitee he or she invited.[22] Such a QUD receives the family-of-questions denotation in (34). (We use a model with two inviters (v) and two invitees (i).)[23]

(i) *A licit derivation and a banned derivation of an English multiple* wh*-question under Lasnik's (2014) rightward-movement analysis*
a. [$_{CP}$ Wh$_1$ [$_{CP}$ [$_{TP}$ t_1 . . . t_2] Wh$_2$]] Superiority-obeying
b. *[$_{CP}$ [$_{CP}$ Wh$_1$ [$_{TP}$ t_1 . . . t_2]] Wh$_2$] Superiority-violating

We do not immediately see how such a derivation can be blocked. See the above-cited works for additional arguments in favor of the traditional movement-to-the-left account.

[22] An important question is how this QUD arises from such quantified statements. We take this to be a deep question whose principled answer goes beyond the scope of this article. Informally, we can imagine that in order for a speaker to continue a quantified statement with a sluice, some contextually determined set of individuals must be in the common ground, to be quantified over by the universal quantifier (perhaps along the lines seen more explicitly in *wh*-quantification, as in Kratzer and Shimoyama 2002, for example). With this domain, we can now imagine that an $\forall > \exists$ statement raises a set of inquisitive questions about each member of the set quantified over by the universal quantifier in the same way that a single question would be raised by a simpler statement with an existential quantifier and an individual. For instance, in a context with three boys, b_{1-3}, *Every boy likes some girl* implies that "b_1 likes some girl, b_2 likes some girl, and b_3 likes some girl." Each conjunct then inquisitively raises a distinct subquestion about which girl b_n likes. We leave a more precise formulation of this idea to future work.

[23] In (33), we illustrated the family-of-questions denotation of multiple *wh*-questions using D-linked *wh*-phrases with distinct restrictions (i.e., boys and girls). Depending on the higher *wh*-phrase in the question, there are consequences for

(34) *Family-of-questions meaning for the QUD in (29a) sorted by inviters*
$[\![(29a)]\!]$ = {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]}
(= QUD for (29a))

This QUD matches that of the sluice in (29a), where the agent *wh*-remnant (inviters) precedes (and, we assume, is more hierarchically prominent than) the patient *wh*-remnant (invitees). However, the switched word order for remnants in (29b) comes with a different question meaning for the sluiced question, given in (35). Specifically, this question is sorted by *invitees*, not *inviters*, unlike question (29a). QUD equivalence approaches therefore correctly rule out sluices like those in (29b) given antecedents like those in (29a).

(35) *Family-of-questions meaning for the sluice in (29b) sorted by invitees*
$[\![(29b)]\!]$ = {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}}
(= question meaning for sluice in (29b), $\neq$ antecedent's QUD in (29a))

Finally, scrambling of the correlates in the antecedent, as in (29c), rearranges their position in the syntactic structure. We assume that such antecedents raise QUDs distinct from those raised by unscrambled ones, namely, ones where the sorting key corresponds to the scrambled and hence hierarchically prominent argument. The QUD raised by the scrambled antecedent in (29c), then, is one sorted by invitees, with a meaning equivalent to the one computed in (35). A sluice like that in (29a) is therefore correctly predicted to be unacceptable, since it would have the family-of-questions meaning in (34). On the other hand, a similarly scrambled, Superiority-violating sluice, like that in (29b), is predicted to be acceptable, since both the antecedent's QUD and the sluice's meaning are identical.

The QUD equivalence approach thus captures Grebenyova's (2009) paradigm. The interpretation of multiple *wh*-questions is sensitive to syntactic hierarchy, which allows semantic identity approaches to achieve the empirical coverage of syntactic patterns in multiple sluices in a manner similar to syntactic/LF identity approaches, but without the pitfalls of LF identity covered in section 2.

3.2.3 Supporting Evidence from English A paradigm similar to the one reported in Russian also exists in English, for those speakers who accept multiple sluicing. Much of the literature on multiple sluicing claims that it is only marginally acceptable in English (Takahashi 1994, Nishigauchi 1998, Merchant 2001, Hoyt and Teodorescu 2012, Takahashi and Lin 2012, Lasnik 2014). To our knowledge, the most systematic investigation of the English facts is found is Lasnik

---

the question's meaning in terms of the sorting key for the question. In Grebenyova's example (29), however, we are dealing with *wh*-pronouns quantifying over humans, so that the NP restriction in question for both *wh*-phrases is simply a restriction to humans. Nonetheless, we capitalize on the intuitive notion that humans are sorted in such questions: the higher *wh*-phrase in a question like *Who invited whom?* is contextually restricted to inviters, and not invitees, allowing us to treat such pair-list multiple *wh*-questions along the same lines as D-linked *wh*-questions with explicit NP restrictions.

2014:app. B, where the results of an informal judgment task experiment are reported, supporting the conclusion that multiple sluicing is a "real phenomenon" in English.

However, Lasnik (2014) reports pooled data, which may obscure interspeaker variation. In our own informal investigations, we have identified two sorts of L1 English speakers: a substantial number who find multiple sluicing in English unimpeachable (i.e., not just "marginally acceptable," but fully acceptable), alongside others who find it unacceptable to marginal at best.[24] For those speakers who have multiple sluicing as a productive strategy in English, there is a contrast in acceptability between examples like (36a) and (36b), where (36b) is reported as anywhere from mildly degraded to unacceptable in comparison to (36a).

(36) *English multiple sluicing paradigm*
   a. Every boy likes some girl, but I don't know which boy which girl.
   b. *Some boy likes every girl, but I don't know which boy which girl.

Unlike the variety of Russian reported by Grebenyova (2009), English readily allows inverse scope readings of quantified assertions. In (36a), a surface scope reading of the antecedent sets up a discourse where, for each boy, there is some girl he likes. Such a discourse intuitively makes salient a QUD asking, for each boy, which girl he likes (a QUD sorted by boys). Such a QUD would have the same meaning as the sluiced multiple *wh*-question under its pair-list reading (the relevant reading of the sluice in (36a)). QUD equivalence approaches would therefore capture the acceptability of the sluice in (36a). The family-of-questions meaning for both the QUD raised by the antecedent in (36a) and the corresponding sluice (with *which boy* hierarchically more prominent than *which girl*) is given in (37) (assuming a toy model with two boys, b_1 and b_2, and two girls, g_1 and g_2).

(37) *QUD and sluice meanings in (36a)*
$$[\![(36a)]\!] = \{\text{which girl does } b_1 \text{ like?, which girl does } b_2 \text{ like?}\}$$
$$= \{\{b_1 \text{ likes } g_1,\ b_1 \text{ likes } g_2\},\ \{b_2 \text{ likes } g_1,\ b_2 \text{ likes } g_2\}\}$$

A widest scope existential interpretation for either antecedent in (36) fails to set up a discourse that licenses a pair-list question (sluiced or unsluiced).[25] Under such an interpretation, both the sluice in (36b) and its unsluiced counterpart *which boy likes which girl* are ruled out. However, like the surface scope reading of the antecedent in (36a), an inverse scope reading of the antecedent in (36b) sets up a discourse where there are pairs of boys and girls in the *like* relation, so that a pair-list question should be licensed that asks for the identities of the pairings. Indeed, the unsluiced version of the multiple *wh*-question in (36b) is (perhaps unsurprisingly) acceptable, so that whatever causes difficulties in (36b) must be specific to sluicing.

[24] Another dimension of variation exists among speakers who accept multiple sluicing in English: ⟨DP,DP⟩ remnant pairs are unacceptable to some and fully acceptable to others (see footnote 17). Here, we report judgments for those speakers who accept ⟨DP,DP⟩ multiple sluices. We will not speculate further about the microvariation found in English with respect to the acceptability of (subtypes of) multiple sluicing, surely an interesting area for future investigation.

[25] This would be an inverse scope reading for the antecedent in (36a), where there is some girl that all the boys like, and a surface scope reading for the antecedent in (36b), where there is some boy that likes all the girls.

(38) *The unsluiced version of (36b) is acceptable*
Some boy likes every girl, but I don't know which boy likes which girl.

QUD equivalence approaches to identity account for these facts. Consider again how the antecedent in (36a) sets up the discourse, and the nature of the QUD it makes salient. In (36a), under a surface scope reading of the antecedent, we are left with a QUD sorted by boys, as in (37). On the other hand, under the inverse scope reading of the antecedent in (36b), we are left with a discourse in which, for each girl, there is some boy that likes her, intuitively making salient a QUD asking, for each girl, which boy it is that likes her. This is a QUD sorted by girls. The generalization is that the universally quantified correlate in the antecedent contributes the sorting key for the QUD.

(39) *QUD meaning in (36b) (≠ sluice meaning in (36a), (36b), (37))*
$[\![(36b)]\!] = \{\text{which boy likes } g_1?, \text{ which boy likes } g_2?\}$
$= \{\{b_1 \text{ likes } g_1, b_2 \text{ likes } g_1\}, \{b_1 \text{ likes } g_2, b_2 \text{ likes } g_2\}\}$

Importantly, the sluice is the same in both (36a) and (36b), having the meaning in (37), which is not identical to (39)—the former questions are sorted by boys, and the latter by girls. Consequently, QUD equivalence approaches correctly rule out multiple sluicing in (36b), while allowing sluicing in (36a).

Additionally, since the identity condition is specific to sluicing, QUD equivalence approaches correctly leave room for the acceptability of examples like (38) in the absence of sluicing.[26] Hence, we see here the importance of this condition as specifically arising from constraints on ellipsis licensing—these may be more stringent than the conditions governing the distribution of similar sentences lacking ellipsis.

The challenges for LF identity in accounting for the Russian patterns noted by Grebenyova (2009) also apply in the case of the English examples (36a–b). In order for LF identity to be met in English, both correlates in (36a) must scope outside of TP, so that variables bound by each correlate are bound from positions parallel to the *wh*-remnants in the corresponding sluice. However, this runs afoul of Fox's (1999) Scope Economy constraint against "Super-QR." QUD equivalence approaches avoid such issues and capture the English facts just as they do the Russian ones.

Like the QUD approach entertained here, LF identity approaches also promise to rule out examples like (36b), since the sluicing remnants are hierarchically ordered differently from their correlates in the antecedent's LF. Recall that in order to license a pair-list question at all in subsequent discourse, the antecedent in (36b) must have an inverse scope interpretation, with *every girl* scoping over *some boy.* The sluicing remnants, however, are hierarchically ordered differently.

However, it remains puzzling for both approaches that, at least for some speakers, the contrast in acceptability between (36a) and (36b) is very subtle. This fact will remain challenging for LF identity accounts, but we will now show how variation in the intensity of (36b)'s unacceptability finds an explanation in the QUD equivalence approach.

[26] But see sections 3.2.4 and 3.3 for other conditions affecting the grammaticality of such examples.

3.2.4 (Inverse) Scope and Superiority in Russian and English As mentioned in the preceding section, some English speakers who accept multiple sluicing find examples like (36b), with an inverse scope reading of the antecedent, degraded to varying degrees compared with examples like (36a), with some reporting only a subtle contrast. As it stands, the QUD equivalence approach we defend here does not lead us to expect such variation. If sluicing is licensed only when the sluice and the QUD are identical in meaning, then we should expect examples like (36b) to be categorically unacceptable, since the antecedent's QUD and the sluice have distinct sorting keys.

To account for this pattern, we appeal to accommodation. We assume that the QUD's meaning and the sluiced question's meaning can be manipulated in context in order to achieve semantic identity. We assume this accommodation process is costly, accounting for the more or less degraded status of examples like (36b).

We start by examining examples like (38), repeated here, which is the unsluiced version of (36b) and is perfectly acceptable even to speakers who find sluicing in (36b) strongly unacceptable.

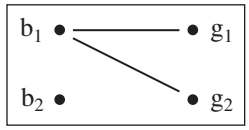
(38) *The unsluiced version of (36b) is acceptable*
Some boy likes every girl, but I don't know which boy likes which girl.

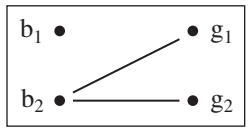
Our claim about the QUD made salient by the antecedent in (36b) is that the universally quantified correlate *every girl* supplies the QUD's sorting key, whereas the sorting key for the multiple *wh*-question is supplied by the more prominent *wh*-phrase *which boy.* These assumptions raise the question, what sorts of context can satisfy the distinct presuppositions of the QUD and the explicit multiple *wh*-question?

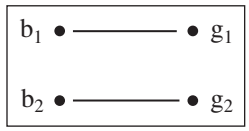
The QUD presupposes that the set of girls in context is exhaustively mapped injectively into the set of boys. In such a context, there may be boys that are unmapped-to (i.e., boys that are not in the *like* relation with any girl).

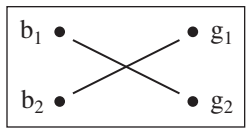
On the other hand, the explicit multiple *wh*-question presupposes that the set of boys is exhaustively mapped injectively into the set of girls. In such a context, there may be *girls* that are unmapped-to (i.e., girls that are not in the *like* relation with any boy). The graphics in (40)–(41) illustrate the possible contexts that satisfy each question's presuppositions with regard to the *like* relation.

(40) *Contexts satisfying QUD's presuppositions in (38)*

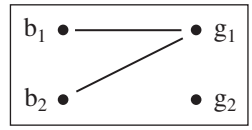
a.


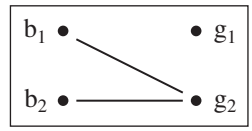
b.


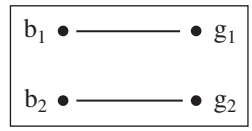
c.


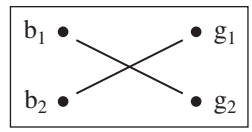
d.


(41) *Contexts satisfying multiple* wh-*question's presuppositions in (38)*

a.


b.


c.


d.


Only contexts like (c) and (d), in which boys are mapped surjectively onto girls and vice versa (i.e., a bijection), satisfy the presuppositions of both the QUD and the multiple *wh*-question. This is unlike cases like (36a), where the QUD and the multiple *wh*-question are identical. In (36a), any of the contexts in (41) would satisfy both questions' presuppositions (but neither (40a) nor (40b) would do so).

Of course, even in contexts like (c) and (d), the QUD's meaning and the multiple *wh*-question's meaning (repeated in (42)) are distinct. Under the QUD equivalence approach, sluicing should be impossible, predicting perhaps stronger unacceptability for examples like (36b).

(42) *QUD meaning in (42b) ≠ sluice meaning in (42a)*

a. ⟦which boy likes which girl?⟧ = ≠ (42b)
{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}}

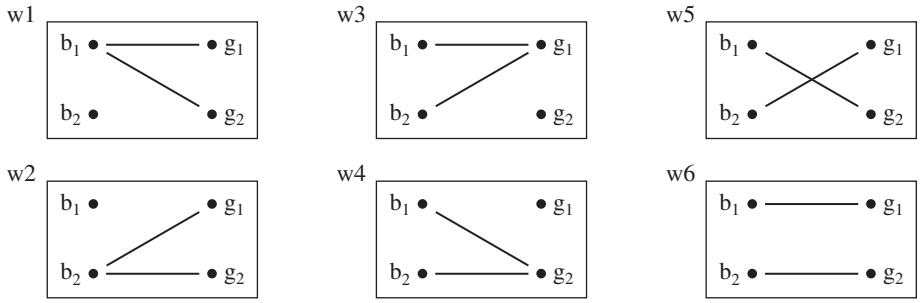
b. ⟦QUD⟧ = ≠ (42a)
{which boy likes g_1?, which boy likes g_2?}
= {{b_1 likes g_1, b_2 likes g_1}, {b_1 likes g_2, b_2 likes g_2}}

To account for this, we assume that equivalence may nonetheless be achieved via an accommodation process, predicting that sluicing is allowed in examples like (36b), but that this process is costly (militating against full acceptability). We assume that in these cases, accommodation involves removing from consideration those worlds or situations where the presuppositions of

either question are not met. This pruning of worlds from consideration will then have consequences for the alternative propositions in each question's meaning, resulting in equivalence.

To illustrate how this works, we adopt the more fine-grained representation in (43) for propositions, specifically as sets of worlds. We flesh out our toy model with a set of worlds, each instantiating a distinct possible *like* relation. It will be sufficient for our purposes to consider only the worlds or situations we have already entertained in (40) and (41), giving us the six possible (sets of) worlds w1–w6.[27]

(43) *Six different (sets of) possible worlds for (40)–(41)*



The question meanings in (42) are repeated in (44), but with propositions represented as distinct sets of worlds on the third line. Accommodation is represented as "pruning" those worlds in which the presuppositions of either question are not met, resulting in the removal of worlds 1–4 from consideration and yielding the sets of alternatives in (45). As the reader can verify, this renders the meanings of the QUD and the multiple *wh*-question identical.

(44) *Unpruned QUD and multiple* wh*-question meanings: Equivalence is not met*

a. ⟦which boy likes which girl?⟧ = ≠ (44b)
{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}}
= {{{w1, w3, w6}, {w1, w4, w5}}, {{w2, w3, w5}, {w2, w4, w6}}}

b. ⟦QUD⟧ = ≠ (44a)
{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}}
= {{{w1, w3, w6}, {w2, w3, w5}}, {{w1, w4, w5}, {w2, w4, w6}}}

(45) *Pruned QUD and multiple* wh*-question meanings: Equivalence is met*

a. ⟦which boy likes which girl?⟧ = = (45b)
{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}}
= {{{w6}, {w5}}, {{w5}, {w6}}}

[27] We set aside worlds where neither question's presuppositions are met (e.g., 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 individuals to themselves).

b. $[\![\text{QUD}]\!]$ = = (45a)
{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}}
= {{{w6}, {w5}}, {{w5}, {w6}}}

In other words, after accommodation/pruning, both the QUD and the multiple *wh*-question are reduced to a question about which of the bijective worlds, w5 or w6, instantiates the state of affairs in the actual world. Provided accommodation is successful, QUD equivalence is satisfied, allowing sluicing in examples like (36b), although with more work than in cases like (36a).[28]

Finally, one might wonder whether the problem with (36b) in English can be fixed by switching the order of remnants. It is possible to violate Superiority in multiple *wh*-questions with D-linked *wh*-phrases in English, as in (46b) (Pesetsky 2000). If this were possible, *which girl* would act as the sorting key for the multiple sluice, which would then have the same meaning as the QUD that is keyed on girls in (36b). However, as (46a) shows, Superiority may not be violated in multiple sluicing in English.

(46) *No Superiority violations in English multiple sluicing*
Some boy likes every girl,
a. * . . . but I don't know which girl which boy.
b. . . . but I don't know which girl which boy likes.

There are independent factors preventing Superiority violations in English multiple sluicing. In short, Superiority-violating multiple *wh*-questions like (46b) do not involve the evacuation of both *wh*-phrases from TP (Pesetsky 2000). Instead, only the object moves to Spec,CP, over the subject, which remains in Spec,TP. As a result, *which boy* is trapped inside the ellipsis site and is predicted to be elided along with TP. In other words, there is no possible derivation that can yield (46a). (See Abels and Dayal 2016 for recent discussion of Superiority violations in English multiple sluicing.)

3.3 How QUDs Are Computed

Above, we appealed to intuitions about the QUDs that antecedents raise given their contribution to the discourse. In (36a), the antecedent sets up a discourse where for each boy, there is some girl he likes, raising a QUD asking which *girl* that is, whereas in (36b), the antecedent sets up a discourse where for each girl, there is some boy that likes her, raising a QUD asking which *boy* that is. However, an important question is where our intuitions about this particular characterization of the antecedent's meaning, and the corresponding QUD it raises, come from. We will show that the implicatures of the antecedent play a crucial role in determining the QUD.

[28] The availability of this sort of accommodation raises the question of why it should not be available for the sorts of data discussed by Grebenyova (2009). One might expect to see variation among Russian speakers with respect to the relative unacceptability of examples like (29b), just as for examples like (36b) in English. We have nothing to say about this crosslinguistic difference here, though it is possible that further collection of relevant Russian data would uncover just such interspeaker variation; we leave this aside for future work.

Consider the following puzzle: both of the antecedents in (36) may be true in a context where the uniqueness presupposition of the QUD that is needed in order to license sluicing is not met. For concreteness, take the antecedent in (36a), *Every boy likes some girl.* This sentence may be true in a context where one or more of the boys likes more than one girl, including, for example, the context in (47a). This context entails the antecedent in (47b); nonetheless, the sluiced continuation is unacceptable in that context. (Our native-speaker consultants report the same intuition in Russian.)

(47) *The antecedent of (36a) is true even though uniqueness is not satisfied (sluicing unacceptable)*
   a. Context: Every boy likes two girls.
   b. #Every boy likes some girl, but I don't know which boy which girl.

Crucially, the sluiced question's uniqueness presupposition requires that for every boy, there is exactly one girl that he likes. However, the context in (47a) explicitly contradicts this presupposition, thus blocking the QUD *Which boy likes which girl?* from being accessible for licensing the sluiced continuation in (47b). Note that this context *does* allow multiple sluicing—as well as a nonsluiced continuation—but only when each boy is mapped to a *group* of two girls.

(48) *Grammatical multiple sluicing based on (47a)*
   a. Every boy likes two girls, but I don't know which boy (likes) which (two) girls.
   b. Každyj malčik ljubit dvux devoček, no ja ne znaju kakoj malčik kakix (dvux) devoček.
      every boy likes two girls but I not know which boy which (two) girls

Similar considerations apply to the antecedent in (36b). This antecedent, *Some boy likes every girl*, may be true in a context where for each girl, there is *exactly* one boy that likes her. But it may also be true when more than one boy likes a given girl. Nonetheless, the intuitive QUD for the antecedent in (36b) is *For each girl, which boy likes her?*, requiring a context where exactly one boy likes each girl.

The question, therefore, is how to ensure that the right QUD is raised by the antecedent, and how to prevent the wrong QUD from being raised. To answer this question, we will appeal to the calculation of scalar implicatures.

Consider first the antecedent *Every boy likes some girl* for the sluice in (36a). We propose that the singular *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, as we illustrated in (33), licenses the sluice in (36a). For concreteness, we might assume that this strengthened meaning is the result of a silent EXH operator that operates on the antecedent (e.g., Groenendijk and Stokhof 1984, Sauerland 2001, Fox 2007, 2009, Spector 2007, Chierchia, Fox, and Spector 2012), although nothing hinges on this assumption.[29] If this exhaustification process is obligatory whenever possible, this would block potential QUDs such as *Which boy likes which girls?* from being accessible.

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

Indeed, as this proposal predicts, the examples in (49) with a sluice that would be licensed by such a QUD are unacceptable.

(49) *Unacceptable sluice with a nonexhaustified QUD*
a. *Every boy likes some girl, but I don't know which boy which girl or which girls.
b. *Every boy likes some girl, but I don't know which boy which girls.
c. *Každyj malčik ljubit kakuju-to devočku, no ja ne znaju kakoj malčik kakuju
every boy likes some girl but I not know which boy which
devočku ili kakix devoček.
girl or which girls
d. *Každyj malčik ljubit kakuju-to devočku, no ja ne znaju kakoj malčik kakix
every boy likes some girl but I not know which boy which
devoček.
girls

Similar considerations would lead us to propose that the context in (47), *Every boy likes two girls*, gives rise to the implicature *Every boy likes exactly two girls.* This, in turn, blocks QUDs like *Which boy likes which girl?*, which presupposes that each boy likes exactly one girl, explaining the unacceptability of (47b). Instead, the QUD raised by this antecedent is *Which boy likes which two girls?*, licensing the sluicing observed in (48).[30]

It is also possible to explicitly suspend the implicature not by using context, as we have done in (47), but by changing the antecedent to block exhaustification. In such cases, as expected, a sluiced continuation that is based on an exhaustified QUD is unacceptable.

(50) *A nonexhaustified antecedent is unacceptable with a multiple sluice*
a. *Every boy likes one or more girls, but I don't know which boy which girl.
b. *Každyj malčik ljubit odnu ili bolše devoček, no ja ne znaju kakoj malčik
every boy likes one or more girls but I not know which boy
kakuju devočku.
which girl

Importantly, exhaustification of the antecedent must be possible independently of sluicing in order to satisfy the uniqueness presupposition of the multiple *wh*-question. Examples such as (36a) are also acceptable in the absence of sluicing, but only in a context in which every boy likes *exactly one* girl. In a context in which it is explicitly known that some boys may like more than one girl, the antecedent cannot be interpreted exhaustively and the presuppositions of the multiple *wh*-question cannot be met.

(51) *Scalar implicature is also calculated in the absence of sluicing*
Every boy likes some girl, but I don't know 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.

[30] Note that in the sluiced part of (48), *two*/*dvux* is optional. This appears to follow from a general preference of many speakers to avoid repetition and redundancy in sluicing when possible.

To summarize, we argue that both the semantics and the pragmatic implicatures of the antecedent are important for the purposes of determining the QUD that the antecedent makes salient, and for determining QUD equivalence in ellipsis licensing. Within the QUD equivalence approach to sluicing that we pursue here, QUDs are crucially computed after the antecedent's contribution to the common ground of the discourse has been computed—taking into consideration any (scalar) implicatures that the antecedent gives rise to. Antecedents that set up discourses that fail to satisfy the presuppositions of the multiple *wh*-question lead to infelicity. However, the sluicing cases carry an extra requirement that is not imposed on nonelliptical sentences: that the sluice be identical to a QUD raised by an antecedent. As we have shown, this explains the English and Russian patterns discussed above. It is unclear how an LF identity approach could countenance these facts.

4 Conclusion

We have shown that antecedents with quantified correlates raise many challenges for syntactic/LF identity approaches. We entertained the mechanism of Super-QR as a possible solution, but it ran into various problems, including its lack of independent motivation. Additionally, Super-QR would run afoul of Fox's (1999) Scope Economy, incorrectly predicting that QR can be motivated solely to satisfy LF parallelism for ellipsis licensing.[31]

With regard to semantic approaches, we have shown that Merchant's (2001) influential Focus Condition on Ellipsis is unable to account for the data we have examined here. In particular, the FCE undergenerates in that it does not predict any pair-list sluices with quantified antecedents to be possible. These results add to arguments in the literature showing that the FCE *over*generates certain cases. As a result, we have argued that characterizing the semantic identity condition on sluicing in terms of truth-conditional mutual entailment is untenable.

Instead, we have argued in favor of QUD equivalence approaches, under which the sluiced question must be equivalent to a QUD raised by the antecedent, in line with other recent work on sluicing (see AnderBois 2014, Barros 2014, Weir 2014). However, we have shown that additional assumptions must be adopted in order to correctly predict the data patterns discussed above.

QUDs cannot be computed on the basis of the truth-conditional content of the antecedents alone. Instead, they must be computed at a stage at which (scalar) implicatures have already been calculated and added to the common ground. The context of utterance must also be taken into account. This is in line with Roberts's (1996/2012) intended understanding of QUDs as semantico-pragmatic objects, shaped by speaker intentions/nonlinguistic goals, world knowledge, the com-

[31] 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, and Lipták 2015 for discussion of how this might be achieved, and AnderBois 2011 and 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 discussed for such approaches here.

mon ground and context set at the time of utterance, and so on. More precisely formulating how QUDs should be calculated is a task we leave for future work.[32]

References

Abels, Klaus, and Veneeta Dayal. 2016. On the syntax of multiple sluicing. Paper presented at NELS 47, University of Massachusetts, Amherst.

Agüero-Bautista, Calixto. 2007. Diagnosing cyclicity in sluicing. *Linguistic Inquiry* 38:413–443.

AnderBois, Scott. 2011. Issues and alternatives. Doctoral dissertation, University of California, Santa Cruz.

AnderBois, Scott. 2014. The semantics of sluicing: Beyond truth conditions. *Language* 90:887–926.

Antonyuk, Svitlana. 2015. Quantifier scope and scope freezing in Russian. Doctoral dissertation, Stony Brook University, Stony Brook, NY.

Bailyn, Frederick. 2012. *The syntax of Russian.* Cambridge: Cambridge University Press.

Barker, Chris. 2014. Scopability and sluicing. *Linguistics and Philosophy* 36:187–223.

Barros, Matthew. 2014. Sluicing and identity in ellipsis. Doctoral dissertation, Rutgers University, New Brunswick, NJ.

Bošković, Željko. 1998. Multiple *wh*-fronting and economy of derivation. In *WCCFL 16: Proceedings of the Sixteenth West Coast Conference on Formal Linguistics*, ed. by Emily Curtis, James Lyle, and Gabriel Webster, 49–63. Stanford, CA: CSLI Publications.

Bošković, Željko. 2007. A note on *wh* typology. In *Linguistic investigations into formal description of Slavic linguistics: Contributions of the Sixth European Conference held at Potsdam University*, ed. by Peter Kosta and Lilia Schürcks, 159–170. Frankfurt am Main: Peter Lang.

Büring, Daniel. 2003. On d-trees, beans, and B-accents. *Linguistics and Philosophy* 26:511–545.

Cable, Seth. 2007. The grammar of Q: Q-particles and the nature of *wh*-fronting, as revealed by the *wh*-questions of Tlingit. Doctoral dissertation, MIT, Cambridge, MA.

Chierchia, Gennaro, Danny Fox, and Benjamin Spector. 2012. The grammatical view of scalar implicatures and the relationship between semantics and pragmatics. In *Semantics: An international handbook of natural language meaning*, ed. by Claudia Maienborn, Klaus von Heusinger, and Paul Portner, 3: 2297–2332. Berlin: Mouton de Gruyter.

Chung, Sandra. 2006. Sluicing and the lexicon: The point of no return. In *BLS 31: General Session and Parasession on Prosodic Variation and Change*, ed. by Rebecca T. Cover and Yuni Kim, 73–91. Berkeley: University of California, Berkeley Linguistics Society.

Chung, Sandra. 2013. Syntactic identity in sluicing: How much and why. *Linguistic Inquiry* 44:1–44.

Chung, Sandra, William Ladusaw, and James McCloskey. 1995. Sluicing and Logical Form. *Natural Language Semantics* 3:239–282.

Collins, James N., Daria Popova, Ivan A. Sag, and Thomas Wasow. 2015. Sluicing and the inquisitive potential of appositives. In *Parenthesis and ellipsis: Cross-linguistic and theoretical perspectives*, ed. by Marlies Kluck, Dennis Ott, and Mark de Vries, 47–73. Berlin: de Gruyter.

Comorovski, Ileana. 1989. Discourse and the syntax of multiple constituent questions. Doctoral dissertation, Cornell University, Ithaca, NY.

[32] We note, however, that our findings cast doubt on the feasibility of mechanical algorithms for the calculation of QUDs such as the ones proposed in Büring 2003 and Barros 2014. They also cast doubt on the inquisitive semantics approach in AnderBois 2014, all else being equal. All these approaches fail to predict that any multiply quantified statement should license a pair-list multiple sluice.

Culicover, Peter, and Ray Jackendoff. 2005. *Simpler syntax.* Oxford: Oxford University Press.
Dayal, Veneeta. 1996. *Locality in* wh *quantification: Questions and relative clauses in Hindi.* Dordrecht: Kluwer.
Dayal, Veneeta. 2002. Single-pair versus multiple-pair answers: *Wh*-in-situ and scope. *Linguistic Inquiry* 33:512–520.
Elliott, Patrick, Andreea Nicolae, and Yasutada Sudo. 2016. The sticky reading: VP ellipsis without parallel binding. In *Proceedings of SALT 24*, ed. by Todd Snider, Sarah D'Antonio, and Mia Weigand, 640–655. https://journals.linguisticsociety.org/proceedings/index.php/SALT/issue/view/54.
Fiengo, Robert, and Robert May. 1994. *Indices and identity.* Cambridge, MA: MIT Press.
Fox, Danny. 1995. Economy and scope. *Natural Language Semantics* 3:283–341.
Fox, Danny. 1998. Economy and semantic interpretation: A study of scope and variable binding. Doctoral dissertation, MIT, Cambridge, MA.
Fox, Danny. 1999. Focus, parallelism and accommodation. In *Proceedings of SALT 9*, ed. by Tanya Matthews and Devon Strolovitch, 70–90. https://journals.linguisticsociety.org/proceedings/index.php/SALT/issue/view/100.
Fox, Danny. 2002. Antecedent-contained deletion and the copy theory of movement. *Linguistic Inquiry* 33: 63–96.
Fox, Danny. 2007. Free choice disjunction and the theory of scalar implicatures. In *Presupposition and implicature in compositional semantics*, ed. by Uli Sauerland and Penka Stateva, 71–120. New York: Palgrave Macmillan.
Fox, Danny. 2009. Too many alternatives: Density, symmetry, and other predicaments. In *Proceedings of SALT 17*, ed. by Tova Friedman and Edward Gibson, 89–111. https://journals.linguisticsociety.org/proceedings/index.php/SALT/issue/view/92.
Fox, Danny. 2012a. Multiple *wh*-questions: Uniqueness, pair-list and second order questions. http://lingphil.mit.edu/papers/fox/uniqueness-pair-list.pdf.
Fox, Danny. 2012b. Possible ramifications for Superiority. http://lingphil.mit.edu/papers/fox/Superiority.pdf.
Fox, Danny, and Howard Lasnik. 2003. Successive-cyclic movement and island repair: The difference between sluicing and VP-ellipsis. *Linguistic Inquiry* 34:143–154.
Friedmann, Naama, Adriana Belletti, and Luigi Rizzi. 2009. Relativized relatives: Types of intervention in the acquisition of A-bar dependencies. *Lingua* 119:67–88.
Garraffa, Maria, and Nino Grillo. 2008. Canonicity effects as grammatical phenomena. *Journal of Neurolinguistics* 21:177–197.
Ginzburg, Jonathan, and Ivan Sag. 2000. *Interrogative investigations: The form, meaning and use of English interrogatives.* Stanford, CA: CSLI Publications.
Grebenyova, Lydia. 2009. Sluicing and multiple *wh*-fronting. Linguistics, 2. http://engagedscholarship.csuohio.edu/ling_facpub/2.
Griffiths, James, and Anikó Lipták. 2014. Contrast and island sensitivity in fragments. *Syntax* 17:189–234.
Grillo, Nino. 2008. Generalized minimality. Doctoral dissertation, Institute of Linguistics OTS, Utrecht.
Groenendijk, Jeroen, and Martin Stokhof. 1984. Studies on the semantics of questions and the pragmatics of answers. Doctoral dissertation, University of Amsterdam.
Hamblin, C. L. 1973. Questions in Montague English. *Foundations of Language* 10:41–53.
Hankamer, Jorge, and Ivan Sag. 1976. Deep and surface anaphora. *Linguistic Inquiry* 7:391–428.
Hartman, Jeremy. 2009. When e-GIVENness over-predicts identity. Handout presented at the Fourth Brussels Conference on Generative Linguistics (BCGL 4), Ellipsis Workshop. Hogeschool-Universiteit Brussel.
Heim, Irene, and Angelika Kratzer. 1998. *Semantics in generative grammar.* Oxford: Blackwell.

Hoyt, Frederick, and Alexandra Teodorescu. 2012. How many kinds of sluicing and why? Single and multiple sluicing in Romanian, English, and Japanese. In *Sluicing: Crosslinguistic perspectives*, ed. by Jason Merchant and Andrew Simpson, 83–103. Oxford: Oxford University Press.

Ionin, Tania, and Tatiana Luchkina. 2015. One reading for every word order: Revisiting Russian scope. In *WCCFL 32: Proceedings of the 32nd West Coast Conference on Formal Linguistics*, ed. by Ulrike Steindl, Thomas Borer, Huilin Fang, Alfredo García Pardo, Peter Guekguezian, Brian Hsu, Charlie O'Hara, and Iris Chuoying Ouyang, 21–30. Somerville, MA: Cascadilla Proceedings Project.

Jacobson, Pauline. 2016. The short answer: Implications for direct compositionality. *Language* 92:331–375.

Karttunen, Lauri. 1977. Syntax and semantics of questions. *Linguistics and Philosophy* 1:3–44.

Kotek, Hadas. 2014. Composing questions. Doctoral dissertation, MIT, Cambridge, MA.

Kratzer, Angelika. 1998. Scope or pseudoscope? Are there wide scope indefinites? In *Events in grammar*, ed. by Susan Rothstein, 163–196. Dordrecht: Kluwer.

Kratzer, Angelika, and Junko Shimoyama. 2002. Indeterminate pronouns: The view from Japanese. In *Proceedings of the 3rd Tokyo Conference on Psycholinguistics*, ed. by Yukio Otsu, 1–25. Tokyo: Hituzi Syobo.

Lasnik, Howard. 2014. Multiple sluicing in English? *Syntax* 17:1–20.

Lipták, Anikó. 2015. Identity in ellipsis: An introduction. *Lingua* 166:155–171.

Lobeck, Anne. 1995. *Ellipsis: Functional heads, licensing, and identification.* New York: Oxford University Press.

Merchant, Jason. 2001. *The syntax of silence: Sluicing, islands, and the theory of ellipsis.* Oxford: Oxford University Press.

Merchant, Jason. 2004. Fragments and ellipsis. *Linguistics and Philosophy* 27:661–738.

Merchant, Jason. 2010. Three kinds of ellipsis. In *Context-dependence, perspective, and relativity*, ed. by François Recanati, 141–192. Berlin: Walter de Gruyter.

Messick, Troy, and Gary Thoms. 2016. Ellipsis, economy, and the (non)uniformity of traces. *Linguistic Inquiry* 47:306–332.

Nicolae, Andreea. 2013. Any questions? Doctoral dissertation, Harvard University, Cambridge, MA.

Nishigauchi, Taisuke. 1998. Multiple sluicing in Japanese and the functional nature of *wh*-phrases. *Journal of East Asian Linguistics* 7:121–152.

Nissenbaum, Jon. 2000. Investigations of covert phrase movement. Doctoral dissertation, MIT, Cambridge, MA.

Pesetsky, David. 2000. *Phrasal movement and its kin.* Cambridge, MA: MIT Press.

Reich, Ingo. 2007. Toward a uniform analysis of short answers and gapping. In *On information structure, meaning and form*, ed. by Kerstin Schwabe and Susanne Winkler, 467–484. Amsterdam: John Benjamins.

Reinhart, Tanya. 1997. Quantifer-scope: How labor is divided between QR and choice functions. *Linguistics and Philosophy* 20:335–397.

Richards, Norvin. 1997. What moves where when in which language? Doctoral dissertation, MIT, Cambridge, MA.

Richards, Norvin. 1998. In full pursuit of the unspeakable. In *NELS 28*, ed. by Pius Tamanji and Kiyomi Kusumoto, 153–168. Amherst: University of Massachusetts, Graduate Linguistic Student Association.

Rizzi, Luigi. 1997. The fine structure of the left periphery. In *Elements of grammar*, ed. by Liliane Haegeman, 281–337. Dordrecht: Kluwer.

Roberts, Craige. 1996. Information structure in discourse: Towards an integrated formal theory of pragmatics. In *Papers in semantics*, ed. by Jae-Hak Yoon and Andreas Kathol, 91–136. Columbus: The Ohio State University, Department of Linguistics. https://linguistics.osu.edu/sites/linguistics.osu.edu/files/workingpapers/osu_wpl_49.pdf.

Roberts, Craige. 2012. Information structure in discourse: Towards an integrated formal theory of pragmatics. *Semantics and Pragmatics* 5:1–69.

Rodrigues, Cilene, Andrew Nevins, and Luis Vicente. 2009. Cleaving the interactions between sluicing and P-stranding. In *Romance Languages and Linguistic Theory 2006*, ed. by Danièle Torck and W. Leo Wetzels, 175–198. Amsterdam: John Benjamins.

Romero, Maribel. 1998. Focus and reconstruction effects in *wh*-phrases. Doctoral dissertation, University of Massachusetts, Amherst.

Rooth, Mats. 1992a. Ellipsis redundancy and reduction redundancy. In *Proceedings of the Stuttgart Ellipsis Workshop*, ed. by Steve Berman and Arild Hestvik. Arbeitspapiere des Sonderforschungsbereichs 340, Bericht Nr. 29. Heidelberg: IBM Germany.

Rooth, Mats. 1992b. A theory of focus interpretation. *Natural Language Semantics* 1:75–116.

Ross, John R. 1969. Guess who? In *Papers from the 5th regional meeting of the Chicago Linguistic Society*, ed. by Robert Binnick, Alice Davison, Georgia Green, and Jerry Morgan, 252–286. Chicago: University of Chicago, Chicago Linguistic Society.

Rudin, Catherine. 1988. On multiple questions and multiple *wh*-fronting. *Natural Language and Linguistic Theory* 6:445–501.

Sauerland, Uli. 2001. On the computation of conversational implicatures. In *Proceedings of SALT 11*, ed. by Rachel Hastings, Brendan Jackson, and Zsofia Zvolenszky, 388–403. https://journals.linguisticsociety.org/proceedings/index.php/SALT/issue/view/98.

Schwarzschild, Roger. 1999. GIVENness, AvoidF, and other constraints on the placement of accent. *Natural Language Semantics* 7:141–177.

Scott, Tatiana. 2012. Whoever doesn't HOP must be superior: The Russian left periphery and the emergence of superiority. Doctoral dissertation, Stony Brook University, Stony Brook, NY.

Spector, Benjamin. 2007. Aspects of the pragmatics of plural morphology: On higher-order implicatures. In *Presupposition and implicature in compositional semantics*, ed. by Uli Sauerland and Penka Stateva, 243–281. New York: Palgrave Macmillan.

Stepanov, Arthur. 1998. On *wh*-fronting in Russian. In *NELS 28*, ed. by Pius Tamanji and Kiyomi Kusumoto, 453–467. Amherst: University of Massachusetts, Graduate Linguistic Student Association.

Stjepanović, Sandra. 2003. Multiple *wh*-fronting in Serbo-Croatian matrix questions and the matrix sluicing construction. In *Multiple* wh-*fronting*, ed. by Cedric Boeckx and Kleanthes Grohmann, 255–284. Amsterdam: John Benjamins.

Takahashi, Daiko. 1994. Sluicing in Japanese. *Journal of East Asian Linguistics* 3:265–300.

Takahashi, Shoichi, and Danny Fox. 2005. MaxElide and the re-binding problem. In *Proceedings of SALT 15*, ed. by Efthymia Georgala and Jonathan Howell, 223–240. https://journals.linguisticsociety.org/proceedings/index.php/SALT/issue/view/94.

Takahashi, Shoichi, and Sarah Hulsey. 2009. Wholesale late merger. Beyond the A/Ā distinction. *Linguistic Inquiry* 40:387–426.

Takahashi, Daiko, and Sichao Lin. 2012. Two notes on multiple sluicing in Chinese and Japanese. *Nanzan Linguistics* 8:128–145.

Tancredi, Christopher. 1992. Deletion, deaccenting, and presupposition. Doctoral dissertation, MIT, Cambridge, MA.

Thoms, Gary. 2011. 'Verb floating' and VP ellipsis: Towards a movement account of ellipsis licensing. *Linguistic Variation Yearbook*, 252–297.

Thoms, Gary. 2015. Lexical mismatches in ellipsis and the identity condition. *Lingua* 166:260–293.

Vicente, Luis. 2014. Sluicing and its subtypes. Ms., University of Potsdam.

Weir, Andrew. 2014. Fragments and clausal ellipsis. Doctoral dissertation, University of Massachusetts, Amherst.

Wurmbrand, Susanne. 2018. The cost of raising quantifiers. *Glossa* 3(1):19. http://doi.org/10.5334/gjgl.329.

Yoshida, Masaya. 2010. "Antecedent-contained" sluicing. *Linguistic Inquiry* 41:348–356.

(Kotek)
Department of Linguistics
New York University
10 Washington Place
New York, NY 10003

hkotek@alum.mit.edu

(Barros)
Yale University
Department of Linguistics
Dow Hall (370 Temple St.), Room 204
PO Box 208366
New Haven, CT 06520-8366

matthew.barros@yale.edu