

Sluicing as Anaphora to Issues*

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Abstract Since Merchant (2001), it has been widely agreed that the licensing condition on Sluicing is at least partly semantic in nature. This paper argues that the relevant semantic condition is one of symmetric entailment over a semantics which includes not only *truth-conditional information*, but also *issues* in the sense of Groenendijk & Roelofsen (2009). One kind of evidence for the proposal comes from expressions like doubly-negated indefinites and implicit passive agents which do not license Sluicing despite truth-conditional equivalence to overt indefinites. In addition to these facts, the paper examines novel data which show that Sluicing is not licensed by even overt indefinites inside of appositive relative clauses, arguing that these facts (and related facts regarding VP-Ellipsis) follow from the account together with an independently motivated semantics for appositives.

Keywords: Sluicing, indefinites, negation, appositives, VP-ellipsis

1 Introduction

Sluicing is name given the ellipsis process seen in (1) whereby a TP is left unpronounced (i.e. is deleted) provided that the clause containing it is isomorphic to one in prior discourse. Since Merchant (2001), this isomorphy condition has been generally agreed upon to be at least partly semantic. In particular, Merchant argues that Sluicing is licit if and only if the existential closures of the would-be elided clause (henceforth, the ‘E’ clause) and the prior clause (‘A’ or antecedent clause) have the same truth conditions. Crucial to the grammaticality of (1) is the presence of the indefinite ‘something’ in the A clause, what Chung, Ladusaw & McCloskey (1995) term the ‘inner antecedent’.

(1) [John ate something]_A, but I don’t know [what ~~John ate~~]_E.

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The theory predicts, then, that all expressions with existential truth-conditions should be licit inner antecedents for Sluicing. We examine several cases where this truth-conditional entailment condition wrongly predicts Sluicing to be grammatical and argue that correctly ruling out such cases requires a richer semantics for overt indefinites. First, overt indefinites within the scope of double negation are not licit antecedents, despite having identical truth-conditions to their non-negated counterparts as seen in (2-3). Second, as noted by Merchant (2001), the implicit agent of a passive also surprisingly fails to license Sluicing as in (4).

- (2) * $[\text{It's not the case that no one left}]_A$, but I don't know $[\text{who left}]_E$.
 (3) * $[\text{It's not the case that John didn't meet with a student}]_A$, but Fred still wonders $[\text{who John met with}]_E$
 (4) a. A: $[\text{The cake was eaten}]_A$.
 b. B: * $[\text{Who ate the cake}]_E$?

In addition to these two puzzles, we introduce new data showing that even overt indefinites are not licit inner antecedents when they occur inside an appositive, as in (5). This is contrast to other ellipsis process which are operate freely to and from appositives (AnderBois, Brasoveanu & Henderson (to appear)).

- (5) #Joe, who once killed a man in cold blood, doesn't even remember who.

In this paper, we propose a solution to all three puzzles relying on a semantics that comprises not only truth-conditional *information*, but also *issues* in the sense of inquisitive semantics (e.g. Groenendijk & Roelofsen (2009), AnderBois (2010)). More specifically, an overt indefinite like ‘something’ in (1) not only contributes truth conditional information (roughly, that the set of things that John ate is non-empty), it also latently raises the issue of *what* John ate, highlighting it as a possible topic of future discussion. The logic also allows us to distinguish this *inquisitive* existential quantifier from a truth-conditionally equivalent, yet uninquisitive, *classical* indefinite. Since a question's sole semantic contribution is to raise an issue, only existentials which are inquisitive will be sufficiently similar to meet the semantic isomorphy condition for Sluicing.

The paper is structured as follows: §2 presents an inquisitive semantics for first-order predicate logic and shows that it solves the double negation puzzle and makes correct predictions regarding disjunctions; §3 extends the account to implicit passive agents; §4 shows that an independently motivated semantics for appositives correctly predicts the ungrammaticality of Sluicing and shows that it accounts for related effects in VP-ellipsis; §5 concludes.

2 Inquisitive alternatives and negation

Inquisitive semantics provides a particular way of putting together two separate theoretical notions. First, it draws on [Farkas & Bruce \(2010\)](#)'s conception of assertions as *proposals* to update the common ground. This conception of assertion is empirically supported by the availability of responses such as 'yes', 'no', and 'maybe'. Second, it takes from [Kratzer & Shimoyama \(2002\)](#) and others, the idea that one of the core semantic properties of ordinary indefinites is to evoke a set of alternatives. Putting the two together, sentences with widest-scope indefinites (or disjunctions) are multi-alternative proposals to update the common ground, which make salient the issue of which alternative(s) hold. In this framework, the alternatives an indefinite introduces are themselves part of the sentence's context change potential, not just an aspect of subsentential composition, as they are in [Kratzer & Shimoyama \(2002\)](#). Sluicing, then, consists of an indefinite or disjunction in the A clause which introduces an issue into the discourse and an interrogative E clause which anaphorically retrieves this issue.

2.1 The semantics of issues

By stressing the idea that assertions are *proposals* to update the common ground, we highlight the parallels between assertions and corresponding polar questions. As [Farkas & Bruce \(2010\)](#) argue, this is empirically reflected in the observation that the same responses that polar questions expect — 'yes', and 'no' — are also possible ways to respond to an assertion (at least in English). Building on [Groenendijk & Roelofsen \(2009\)](#)'s inquisitive semantics for propositional logic, we capture this parallelism formally by treating assertions and questions as being of the same semantic type: *stt*. For atomic formulas in **Sem1**, this will simply be the singleton set containing the classical denotation as its sole member.

Sem1: $\llbracket \varphi \rrbracket^{\mathcal{M},g,w} = \{ \{ w' \mid \varphi(w') \} \}$

Assuming both conjuncts are classical, conjunction too will return the singleton set containing the classical denotation as in **Sem2**.¹ Inside the brackets, the definition

¹ The definition is complicated by the fact that each conjunct potentially contains an inquisitive element. As stated, the definition passes up the alternatives of both disjuncts (see [Groenendijk & Roelofsen \(2009\)](#) for more detailed discussion). Empirically, however, it is unclear whether this result is correct. In terms of Sluicing, the crucial sentences are ones with an indefinite inside one conjunct of a coordinate structure. Experimental work by [Clifton & Frazier \(2005\)](#) has found such sentences to be somewhat degraded though not wholly ungrammatical (e.g. "Michael slept and studied, but he didn't tell me what."). Furthermore, their study finds that such sentences are found more acceptable if the indefinite is in the right conjunct than in the left. Given this empirical uncertainty, we leave these issues to future work.

collects all of the sets of worlds where both conjuncts hold. ALT is an ‘alternative closure operator’ which eliminates all sets of worlds in this collection which are non-maximal. Universal quantification, then, is defined as a conjunction of an unspecified number of conjuncts as in **Sem3**.

$$\mathbf{Sem2:} \llbracket \varphi \wedge \psi \rrbracket^{\mathcal{M},g,w} = \text{ALT}\{\alpha \subseteq \mathbf{W} \mid \exists \beta \in \llbracket \varphi \rrbracket^{\mathcal{M},g,w} : \alpha \subseteq \beta \text{ and } \exists \gamma \in \llbracket \psi \rrbracket^{\mathcal{M},g,w} : \alpha \subseteq \gamma\}$$

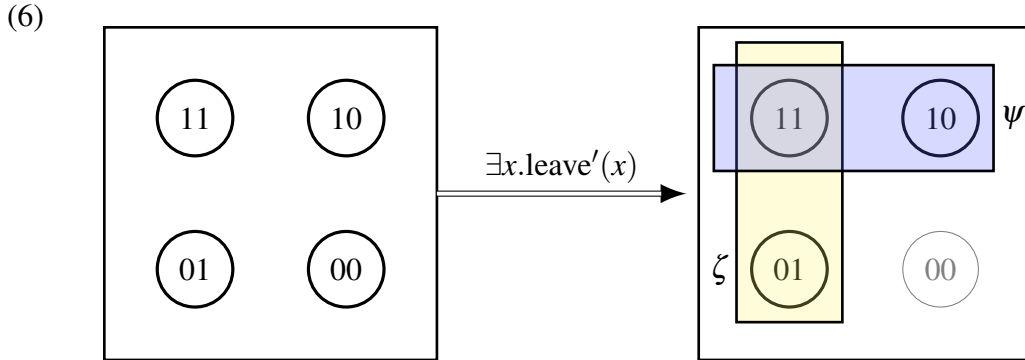
$$\mathbf{Sem3:} \llbracket \forall u \varphi \rrbracket^{\mathcal{M},g,w} = \text{ALT}\{\alpha \subseteq \mathbf{W} \mid \text{for all } d \in \mathcal{D}_e \text{ s.t. } \exists \beta \in \llbracket \varphi \rrbracket^{\mathcal{M},g[u/d],w} : \alpha \subseteq \beta\}$$

As in Hamblin semantics, the real work begins with expressions which introduce multiple alternatives: disjunctions and indefinites. The interpretive rule for disjunctions in **Sem4** collects all of the set of worlds which are in the denotation of either disjunct, with ALT again eliminating the non-maximal would-be alternatives. Again simplifying to the case where each disjunct is classical, the result is that a disjunction denotes a set containing two alternatives — one per disjunct. Existential quantification can be defined in a parallel fashion in **Sem5** essentially as a disjunction with an unspecified number of disjuncts (i.e. one whose cardinality is not determined by its linguistic form, but rather by the model itself). Since we deal only in finite models, we follow [AnderBois \(2010\)](#)’s simpler formulation of the semantic rule for \exists , avoiding the complications discussed by [Ciardelli \(2009\)](#) for non-finite models.

$$\mathbf{Sem4:} \llbracket \varphi \vee \psi \rrbracket^{\mathcal{M},g,w} = \text{ALT}\{\alpha \subseteq \mathbf{W} \mid \exists \beta \in \llbracket \varphi \rrbracket^{\mathcal{M},g,w} : \alpha \subseteq \beta \text{ or } \exists \gamma \in \llbracket \psi \rrbracket^{\mathcal{M},g,w} : \alpha \subseteq \gamma\}$$

$$\mathbf{Sem5:} \llbracket \exists u \varphi \rrbracket^{\mathcal{M},g,w} = \text{ALT}\{\alpha \subseteq \mathbf{W} \mid \text{there is some } d \in \mathcal{D}_e \text{ s.t. } \exists \beta \in \llbracket \varphi \rrbracket^{\mathcal{M},g[u/d],w} : \alpha \subseteq \beta\}$$

Since alternatives in this theory reside in the *interpretation* of the metalanguage rather than in the metalanguage *translation*, it is helpful to represent them pictorially as in (6). The circles in the diagrams represent possible worlds, the numbers indicates the truth values of two propositions, ψ and ζ in that world, and boxes indicate alternatives. A concrete example in a toy model with only two individuals: take the formula $\exists x.\text{leave}'(x)$, ψ to be $\text{leave}'(\text{john})$, and ζ to be $\text{leave}'(\text{mary})$.



Thus far, we would expect that any formula with a disjunction or existential quantifier would present multiple alternatives. Intuitively, however, this is only true if these elements take wide scope relative to all other operators. To capture this, certain operators, such as negation, ‘close off’ alternatives within the formula to which they apply by quantifying over them universally, as in **Sem6**.

Sem6: $\llbracket \neg \varphi \rrbracket^{\mathcal{M},s,w} = \text{ALT}\{\alpha \subseteq W \mid \text{every } \beta \in \llbracket \varphi \rrbracket^{\mathcal{M},s,w} \text{ is such that } \alpha \cap \beta = \emptyset\}$

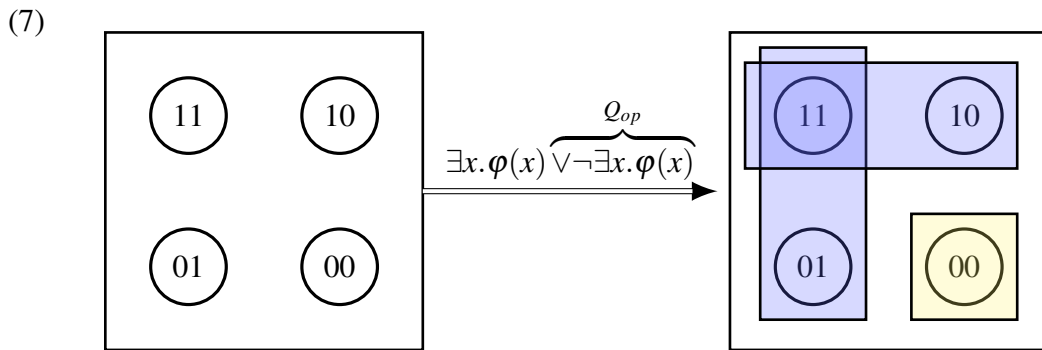
The negation of a formula φ takes a set of alternatives and gives back the maximal set of worlds that doesn’t overlap with any alternative in φ . It is this interaction between negation and alternatives that will allow us in §2.4 to solve the puzzle of why *double* negation in (2-3) blocks Sluicing despite preserving truth-conditions. Since this property of double negation will be useful to us in what follows, we follow [Groenendijk & Roelofsen \(2009\)](#) in defining a ‘non-inquisitive closure’ operator ! as shorthand for double negation.

2.2 Questions vs. Latent Issues

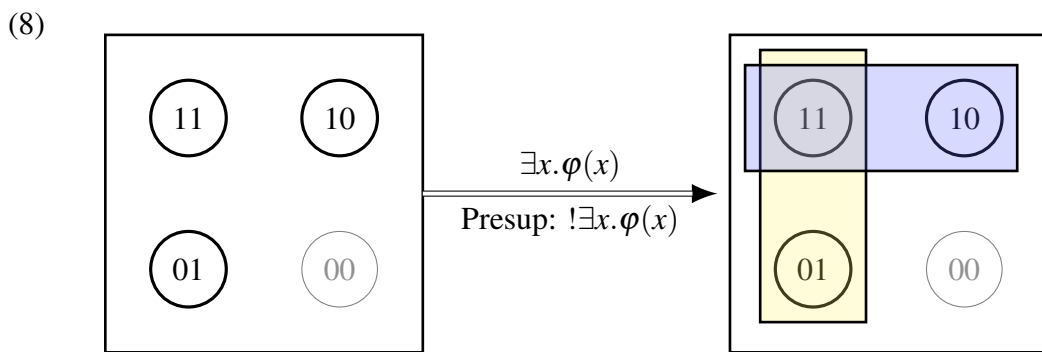
The semantics we have given to indefinites and disjunctions holds that their context change potential includes a question-like set of alternatives. An inquisitive assertion, however, crucially differs from a question in that it is also truth-conditionally *informative*. Specifically, a sentence with a widest-scope indefinite proposes to eliminate from the context set possible worlds where none of the alternatives holds. A question, on the other hand, proposes no new truth-conditional contribution; it simply directs the addressee’s attention to particular alternatives. Questions, then, can be roughly defined as those formulas which (i) denote non-singleton sets of alternatives, and (ii) are truth-conditionally uninformative.

There are two routes to uninformativity which have been explored previous literature, which we can term *absolute* uninformativity and uninformativity *relative*

to a question’s presuppositions. The first option is taken by [Groenendijk & Roelofsen \(2009\)](#) and yields something similar to [Groenendijk & Stokhof \(1984\)](#) question semantics. They propose a question operator which adds to the alternatives of a disjunction (or, given our first-order extension, an indefinite) the maximal alternative where none of its alternatives holds. This produces the denotation in (7) for a question like ‘Who left?’ (for a toy model with two individuals, φ represents the predicate ‘leave’).



The second option, which we adopt in what follows², is to posit question denotations which are uninformative only relative to the existential presupposition the question introduces. This option is pursued by [AnderBois \(2010\)](#) and yields essentially the same question denotations as [Hamblin \(1973\)](#). Pictorially, we can represent this as in (8), with grayed out circles indicating worlds which are ruled out by presupposition.



² This choice of question semantics does not seem to be crucial to the account, but it simplifies it considerably. Under [Groenendijk & Roelofsen \(2009\)](#)’s semantics, the account of Sluicing would require an addition operation to remove or ignore the ‘no one’ alternative that the question operator adds (e.g. by computing entailment over the clause minus the OP_Q).

2.3 Sluicing and semantic isomorphism

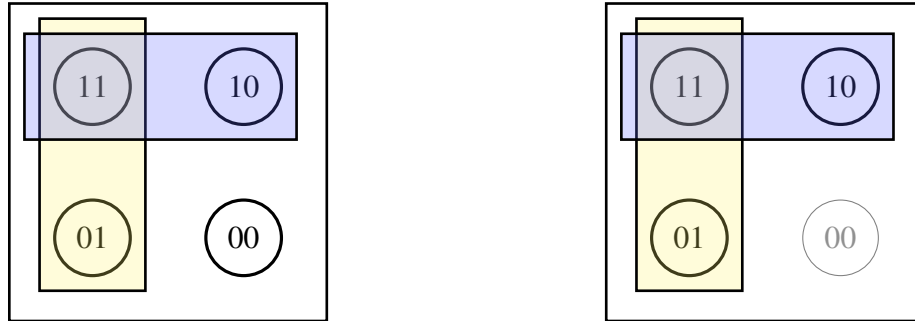
Comparing the question denotation we give in (8) to the indefinite in (6), we see that the two have identical at-issue components, differing only in their presuppositions. They not only contain the same truth-conditional *information*, but also make the same *inquisitive* contribution (i.e. raise the same *issues*). Sluicing, we claim, requires isomorphism over both kinds of semantic content, not just truth-conditions. For an interrogative E clause to be elided it must have identical truth conditions and inquisitive content as an A clause in previous discourse.

Formally, we achieve this by adopting Merchant (2001)'s symmetric entailment condition, but defining entailment over our inquisitive semantic denotations, as in (9). A formula φ entails another formula ψ iff every alternative in φ is a subset of some alternative in ψ . For formulas which denote singleton sets (i.e. those which are free of disjunctions and indefinites), this definition reduces to the standard notion of entailment. For elements which are inquisitive, the definition mirrors Groenendijk & Stokhof (1984)'s entailment for questions, the difference being that the alternatives are allowed to overlap, therefore not necessarily forming a *partition*.

(9) **Entailment:** $\varphi \models \psi$ iff $\forall \alpha \in \llbracket \varphi \rrbracket$ such that $\exists \beta \in \llbracket \psi \rrbracket$ such that $\alpha \subseteq \beta$

Since E clauses in Sluicing are interrogative, they necessarily make an at-issue contribution which is inquisitive. In order to symmetrically entail an inquisitive element, the antecedent too must be inquisitive. Inquisitiveness, then, is a necessary condition for an element to be a licit inner antecedent, a generalization which follows directly from the semantics of the interrogative E clause together with the symmetric entailment condition. For example, the fact that indefinites can serve as inner antecedents follows straightforwardly as seen in (10-12).

- (10) [Someone left]_A, but I don't know [who left]_E
 (11) a. (10)_A $\rightsquigarrow \exists x.\text{leave}'(x)$
 b. (10)_E $\rightsquigarrow \exists x.\text{leave}'(x)$ (Presupposes: $\neg \exists x.\text{leave}'(x)$)
 (12) $\llbracket (10)_A \rrbracket \quad \Leftrightarrow \quad \llbracket (10)_E \rrbracket$



It also follows straightforwardly that the class of inner antecedents include not only indefinites, but also disjunctions, as in (13-14). Like indefinites, disjunctions introduce a non-singleton set of alternatives, latently raising the issue of which alternative holds.

- (13) [(Either) John or Fred left]_A. Tell me [which (one) left]_E
 (14) a. 13_A $\rightsquigarrow \text{leave}'(j) \vee \text{leave}'(f)$
 b. 13_E $\rightsquigarrow \exists x.x \in \{j,f\} \wedge \text{leave}'(x)$ (Presupposes: $\neg \exists x.x \in \{j,f\} \wedge \text{leave}'(x)$)

Before tackling the main puzzles with which we started, it is worth comparing the approach to Merchant (2001)'s at this point. For indefinites, our account achieves isomorphy between the inner antecedent and the question because indefinites and questions receive interpretations which are deeply similar. The issue raising capacity of indefinites gives them a sufficiently question-like context change potential to allow for symmetric entailment of their at-issue content. Merchant's account, on the other hand relies less on the semantics of indefinites and questions, but rather on their LF syntax. While isomorphy is still computed semantically, the computation relies on particular syntactic assumptions about free variables, combined with an additional principle of existential closure over the two clauses.

While these are plausible assumptions for indefinites, they run into problems for disjunctions. Merchant's account (like previous syntactic accounts) would require us to posit for a disjunctions some sort of obligatory syntactic procedure (say, QR) which leaves behind a free variable which we can then existentially close. Worse yet, this procedure would also have to apply to disjunctions of non-arguments such

as (15). On the current account, (15) licenses Sluicing straightforwardly simply because the interpretation of its metalanguage translation highlights two alternatives. No particular assumptions about the LF-syntax of disjunction are required.

(15) John swam or ran laps, but I don't recall which

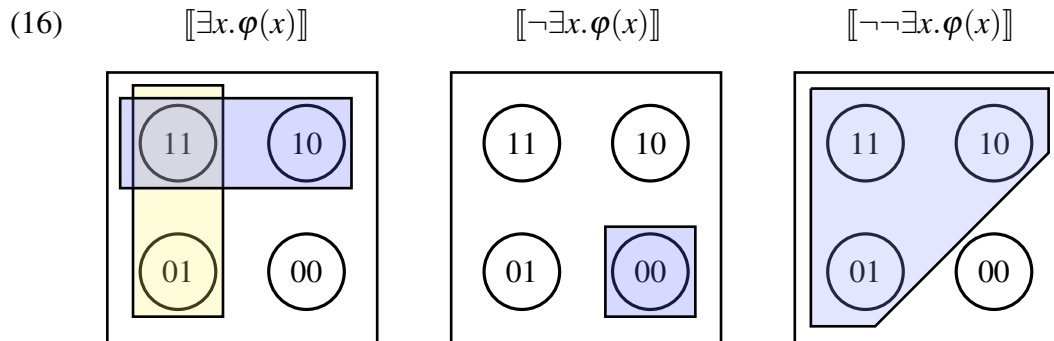
The preceding discussion highlights a real sense in which, while Merchant's account is a semantic one, the way it gets to this semantics is nonetheless through the LF-syntactic manipulations similar to those which underlie [Chung et al. \(1995\)](#) and syntactic isomorphy-based approaches (specifically, creating free variables in the right places at LF so that we can existentially bind them). In the present account, the independently motivated semantics of disjunction and indefinites itself provides the desired parallelism with no additional LF manipulations required. As we will see below, locating these alternatives in the metalanguage semantics also allows us to capture the puzzles we began with: double negation, implicit passive agents, and appositives.

2.4 Sluicing and double negation

In defining negation in **Sem6** (repeated below), we saw that negation had the effect of closing off alternatives by quantifying universally over them. The motivation for this was the intuition that indefinites and disjunction within the semantic scope of negation do not seem to raise an issue, even latently.

Sem6: $\llbracket \neg \varphi \rrbracket^{\mathcal{M},g,w} = \text{ALT}\{\alpha \subseteq W \mid \text{every } \beta \in \llbracket \varphi \rrbracket^{\mathcal{M},g,w} \text{ is such that } \alpha \cap \beta = \emptyset\}$

One consequence of this definition is that *double* negation is no longer semantically vacuous. While it preserves truth conditions, it nonetheless has a semantic effect: eliminating the inquisitive component of the formula to which it applies. We can see this visually in (16). The first negation (middle) looks at all of the alternatives of the indefinite (left) and returns the maximal alternative which has no overlap with any of them. The second negation looks at this necessarily singleton set and returns the maximal set with no overlap with that single alternative. The resulting set contains a single alternative comprising all of the worlds which were members of some alternative or other in $\llbracket \exists x. \varphi(x) \rrbracket$. That is, double negation preserves the truth-conditions of the formulas to which it applies, but eliminates the potential for inquisitiveness.



Returning to Sluicing, we are now able to understand one of major puzzles we began with: why indefinites under double negation cannot serve as inner antecedents as in (17-18). The A clause receives the interpretation schematized in the right-hand picture above, while the question is still, of course, inquisitive, receiving the at-issue meaning in the left picture.

- (17) * $\llbracket \text{It's not the case that no one left} \rrbracket_A$, but I don't know $\llbracket \text{who left} \rrbracket_E$.
- (18) * $\llbracket \text{It's not the case that John didn't meet with a student} \rrbracket_A$, but Fred still wonders $\llbracket \text{who John met with} \rrbracket_E$

Applying our symmetric entailment condition, then, we see that the E clause does indeed entail the A clause since each alternative in it finds some alternative (the single alternative) in the A clause which is a superset of it. In the other direction, however, we find that the single alternative in the doubly negated A clause does not find any alternative in the E clause which contains it. Since symmetric entailment fails, we correctly predict that double negation should block Sluicing. This is the case even though some such examples (e.g. (18)) do license cross-sentential anaphora. This asymmetry between Sluicing and anaphora to individuals demonstrates that even symmetric entailment over semantic representations which were suitably dynamic would not be sufficiently stringent to capture the Sluicing facts (the data from appositives in §4 make the same point).

3 Implicit passive agents

As noted by Merchant (2001), an implicit passive agent cannot serve as the inner antecedent to sluicing as in (19). As Merchant (2007) argues, this plainly cannot be due to *truth-conditional* semantics. A sentence with an implicit passive agent entails the existence of a causer/agent, unlike an inchoatives, (20), which plausibly does not.

- (19) * $[\text{The cake was eaten}]_A$, and I want to find out $[\text{who ate the cake}]_E$
 (20) * $[\text{The vase broke}]_A$, and I want to find out $[\text{who broke the vase}]_E$.

Since the ungrammaticality of (19) cannot be due to truth-conditional semantics, Merchant (2007) concludes that it must be due to syntax. We explore a third option: that this pattern is a semantic difference, not of truth conditions, but of *issues*. The passive voice is notorious for evading discussion of the agent/causer/subject of the event being described as in (21). This property, however, does not intuitively hold of active sentences, (22), or even of passive sentences with the causer/agent realized overtly in a *by*-phrase, (23).

- (21) The vase was broken.
 (22) Someone broke the vase.
 (23) The vase was broken by someone.

Although the truth-conditional content of (21) is identical to that of (23), the overt indefinites in (22-23) make another contribution: they *raise the issue* of what individual broke the vase. Inquisitive semantics holds that this contribution has a semantic basis — the highlighting of various alternative individuals. Given the intuitive issue-suppressing of many implicit passive agents, we propose that they are translated not with an inquisitive existential, but rather with a non-inquisitive, classical existential as in (24-25) (recall that ! is shorthand for double negation).

- (24) The vase was broken $\rightsquigarrow !\exists x. \text{break}'(x, \text{vase})$
 (25) The vase was broken by someone $\rightsquigarrow \exists x. \text{break}'(x, \text{vase})$

While this semantics is at its core, the feeling that the speaker seeks to avoid discussion of the identity of the causer/agent is nonetheless an implicature³. This implicature arises because a speaker of (24) could have instead uttered an inquisitive form such as (25), which would better satisfy the maxim of quantity since it asymmetrically entails (24). Assuming the speaker to be cooperative, the hearer reasons that the speaker must have had a reason for violating the maxim of quantity, in particular, that he/she deems the issue of who the agent is to be irrelevant to present conversational goals, i.e. he/she is attempting to steer the conversation away from this matter. Being an implicature, this inference is, of course, cancelable. One way it might be canceled is if the addressee simply believes that the speaker opted to omit

³ Thanks to Ivano Caponigro for helpful discussion of this point.

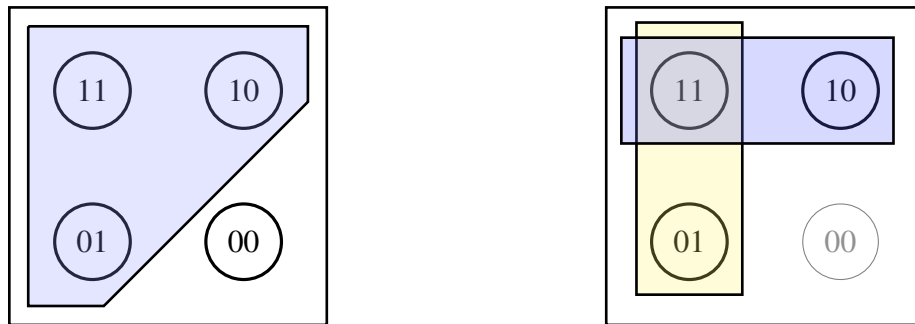
the *by*-phrase in order to better meet the maxim of manner. Another way it might be cancelled is if the issue of the agent’s identity is already settled. In this case, the implicit passive is a means of better satisfying the (inquisitive) maxim of quality by only raising issues about which one is sincerely inquisitive (see Groenendijk & Roelofsen (2009), Büring (2003), and references therein for discussion of inquisitive sincerity and its relationship to the maxim of Quality).

Motivated independently by the intuitive effects of the implicit passive agent, this semantics straightforwardly predicts implicit passive agents to not be licit inner antecedents for Sluicing. Indeed, this is exactly what we find in (26-28): the implicit passive agent does not allow Sluicing while overt indefinites do, regardless of whether the sentence is in passive or active voice.

- (26) * $[\text{The cake was eaten}]_A$, and I want to find out $[\text{who ate the cake}]_E$
- (27) $[\text{The cake was eaten by someone}]_A$, and I want to find out $[\text{who the cake was eaten by}]_E$
- (28) $[\text{Someone ate the cake}]_A$, and I want to find out $[\text{who ate the cake}]_E$

Since we assigned (27)_A the same semantics as (28)_A, we correctly predict the sluice in (27) to be grammatical. The implicit passive agent, on the other hand, is predicted not to license Sluicing as seen in (29-31).

- (29) * $[\text{The cake was eaten}]_A$, but I don’t know $[\text{who ate the cake}]_E$
- (30) a. $[[29_A]] = !\exists x.\text{eat}'(x, \text{cake})$
 b. $[[29_E]] = \text{Presupposes: } !\exists x.\text{eat}'(x, \text{cake}), \text{At-issue: } \exists x.\text{eat}'(x, \text{cake})$
- (31) $[[29_A]] \not\equiv [[29_E]]$



While the account captures the fundamental asymmetry between implicit agents and overt indefinites, there do remain two kinds of voice mismatches which we do not rule out semantically. First, a sentence like (32) with an active A clause and a passive E clause is predicted to be semantically well-formed since the two clauses

have identical truth conditions and both are inquisitive. Second, a sentence with a passive A clause with an overt indefinite agent is predicted to license Sluicing not only with a passive E clause, but also with a active E clause. This proves problematic in languages such as German and Greek where case facts indicate that the E clause in such examples can only be passive (i.e. the wh-remnant in the E clause cannot bear nominative case).⁴.

- (32) *[Someone ate the cake]_A, and I want to find out [who ~~the cake was eaten~~ by]_E
- (33) *Peter wurde von jemandem ermordet, aber sie wissen nicht wer_{NOM}
 ‘Peter was murdered by someone and I want to find out who_{NOM}’.

It is not clear how either of these kinds of examples can be solved semantically, nor even that they should be. They are, however, readily accounted for by combining the present semantic account with a ‘hybrid’ approach such as Chung (2006) where Sluicing is subject both to a requirement of semantic isomorphy and a low-level lexical or morphological identity requirement. Any plausible such lexical/morphological requirement would be sufficient to rule out (32-33).

4 Ellipsis and apposition

Since Potts (2005), it has been widely agreed upon that the content of appositives is, in some way, separate from at-issue assertions. Recent work, however, has shown that this separation does not extend to anaphora in general (Nouwen (2007), Amaral, Roberts & Smith (2007)) or to ellipsis more specifically (AnderBois et al. (to appear)). For example, VP-ellipsis can operate more or less freely across the at-issue/appositive boundary as in (34). While ellipsis in general can freely cross the at-issue/appositive boundary, indefinites inside of appositives cannot serve as inner antecedents to Sluicing, as seen in (35). Before tackling these facts in detail in §4.2, we present and independently motivate a semantics for appositives in §4.1.

- (34) Mary, who doesn’t help her sister, told Jane to ~~help her sister~~ instead.
- (35) *Joe, who once killed a man in cold blood, doesn’t even remember who.

4.1 A (non-)inquisitive semantics for appositives

Recent work on the nature of assertion by Farkas & Bruce (2010) has highlighted the sense in which at-issue assertions are *proposals* to update the common ground.

⁴ Thanks to Jason Merchant for discussion of the German and Greek data and their significance. Thanks also to Judith Fiedler for discussion of the German data.

Empirically, this view of at-issue content by the fact that assertions *allow* for the responses that polar questions *expect* (e.g. *yes, no, maybe*). Appositives, however, do not intuitively *propose* updates to the common ground, they *impose*⁵ them. Empirically, we see this reflected by the fact that they do not readily allow for such responses, as in (36a-36b):

- (36) A: Sonia, who is a terrible housemate, left the door unlocked last night.
 a. B: Yeah, but she is still a good housemate.
 b. B: No, but she *is* a terrible housemate.

The observation that at-issue assertions, like questions, *propose* ways of updating the common ground fits naturally in inquisitive semantics, since both are modeled as being of the same semantic type, *stt*. To capture the observation that appositives *impose* rather *propose*, then, they ought to be the type of classical assertions — *st* — rather than questions. As we have seen in §2, however, being of type *stt* is also the exact feature of the logic that allows for *inquisitiveness*. This is because inquisitiveness arises because a formula denotes a set consisting of multiple alternative sets of possible worlds. Since appositives are not proposals, it follows, then, that they cannot be inquisitive; the two are inextricably linked. Compositionally, we arrive at this result by applying the COMMA operator in (37) to appositives.

$$(37) \quad \llbracket \text{COMMA}(\varphi) \rrbracket = \{w \mid \text{there is some } \alpha \in \llbracket \varphi \rrbracket \text{ s.t. } w \in \alpha \}$$

4.2 Sluicing and appositives

Returning to Sluicing, we see that unlike other ellipsis processes, it cannot freely cross the appositive/at-issue boundary. More specifically, Sluicing is ungrammatical whenever the would-be A clause occurs in an appositive relative clause as in (38-40). As the (b) examples show, this restriction does not seem to be due to some independent source; it is the ellipsis itself which is ill-formed. Furthermore, since we've already seen in (34) that VPE can find its antecedent VP inside an appositive, this sluicing data cannot be due to discourse parallelism constraints on ellipsis of the sort discussed by Hardt & Romero (2004) and Frazier & Clifton (2006), which affect both VPE and Sluicing.

- (38) a. *Joe, who once killed a man in cold blood, doesn't even remember who.
 b. Joe, who once killed a man in cold blood, doesn't even remember who he killed.

⁵ Thanks to Floris Roelofsen for suggesting this term.

- (39) a. *The valiant knight, who defeated a masked enemy, still wonders who.
 b. The valiant knight, who defeated a masked enemy, still wonders who he killed.
- (40) a. *Amy, who coined a new word last night, forgot what.
 b. Amy, who coined a new word last night, forgot what word she coined.

This contrast is further supported by naturally occurring examples like (41) (from the [Davies \(2008-\)](#)'s Corpus of Contemporary American English) which become infelicitous if we remove 'it was'.

- (41) My sister did not kill herself, which means someone else must have done it, and I intend to discover who *(it was).

We see the same contrast in examples where the clause containing the indefinite is embedded within the appositive as in (42). Such examples are important because the prospective A and E clauses in them are identical in every respect: lexically, syntactically, and truth-conditionally. They differ only in that the A clause occurs inside an appositive relative clause.

- (42) Elizabeth, who thinks that Joe murdered a man in cold blood, wants to find out who *(it was).

In §4.1, we motivated a semantics of appositives as purely informational updates imposed on the common ground. We achieved this in the logic by positing a semantics for comma intonation which collapses all the alternatives in the formula to which it applies into a single classical proposition (i.e. a set of worlds). Since the antecedent clause, as it has entered the common ground, doesn't possess inquisitive alternatives, it is unable to entail the inquisitive E clause.⁶ Since symmetric entailment fails, Sluicing is correctly predicted to be ungrammatical as demonstrated for (43) in (44-45).

- (43) *Joe [, who once killed a man in cold blood,]_A, doesn't even remember [who ~~he killed in cold blood~~]_E.
- (44) a. $\llbracket 43_A \rrbracket = \text{COMMA}(\exists x. \text{kill}'(\text{Joe}, x))$
 b. $\llbracket 43_E \rrbracket = \text{Presupposes: } !\exists x. \text{kill}'(\text{Joe}, x), \text{ At-issue: } \exists x. \text{kill}'(\text{Joe}, x)$
- (45) $\text{COMMA}(\exists x. \text{kill}'(\text{Joe}, x)) \not\Rightarrow \exists x. \text{kill}'(\text{Joe}, x)$

⁶ In a technical sense, entailment as defined in (9) is not even defined for appositives since they are of different types. We can fix this by defining entailment for elements of type *st* in terms of the entailment properties of the singleton sets containing them.

These examples make clear that the proposed condition on Sluicing is in essence a condition on the anaphoric *retrieval* of the issue which the inner antecedent introduces. To determine whether the E clause can be elided, we must examine the representation of prior conversation and try to find a suitable antecedent which entails it symmetrically. As such, the restriction on Sluicing across the appositive/at-issue boundary is predicted to be an asymmetric one. Since issues *within* the scope of a COMMA operator do not exhibit any special behavior (e.g. there are embedded questions within appositives), we expect that Sluicing with an at-issue A clause and an appositive E clause should be well-formed. This is exactly what we find in examples like (46):

- (46) [Someone left the door open]_A. Jamie, who wants to find out who [~~left the door open~~]_E, is interrogating the likely culprits.

4.3 VP-Ellipsis and appositives

In the preceding section, we saw that our independently motivated semantics for appositives correctly predicts the ungrammaticality of Sluicing from an antecedent A clause inside of an appositive relative clause. The account given, however, made only indirect reference to Sluicing by referring directly to symmetric entailment over *inquisitive* content. Since the clause to be elided in Sluicing is necessarily interrogative, this means that Sluicing will always be ill-formed. It also, however, predicts that other ellipsis processes such as VPE cannot contain inquisitive content when their antecedents are inside of appositives. That is, we predict that the indefinite in a case of VPE like (47), unlike ordinary overt indefinites, ought to not be inquisitive.⁷

- (47) Joe, who [murdered a man in cold blood]_A, convinced Bill to [~~murder a man in cold blood~~]_E too.

Since the antecedent VP is inside an appositive, we predict it should enter the conversation via a purely informational update, subject to the COMMA operator. At the ellipsis site, then, the conversational record should contain only a VP with the semantics in (48a), devoid of inquisitive alternatives (recall that ‘!’ is the non-inquisitive closure operator).

- (48) a. $\llbracket 47_E \rrbracket = \lambda y. !\exists x. \text{murder}'(y, x)$ \Leftarrow Predicted
 b. $\llbracket 47_E \rrbracket = \lambda y. \exists x. \text{murder}'(y, x)$

⁷ Thanks to Jeroen van Craenenbroeck for insightful discussion of the data and ideas in this subsection.

Looking at our intuitions alone, it is not clear whether the elided indefinite in (47) is inquisitive. Whereas the E clause in Sluicing is necessarily inquisitive, the elided VP in VPE need not be. However, there are at least two pieces of evidence confirming the predicted semantics in (48a). First, we can force the elided VP to be inquisitive by having it occur in an clause which is itself interrogative. As we see in (49-50), such examples are quite clearly ungrammatical.

- (49) *Joe, who once killed a man in cold blood, doesn't even remember who he did.
- (50) *The valiant knight, who will defeat a masked enemy at sunrise, is trying to figure out who he will.

With these examples, one might object that sentences parallel to (49-50), but without an appositive, are also ungrammatical, as in (51). However, the generally accepted explanation (Takahashi & Fox (2005) *et seq.*) for the ungrammaticality of such examples is that Sluicing would have been possible instead, and a general principle, MaxElide, rules out VPE in (51) because more material could have been elided. In the cases with appositives in (49-50), however, MaxElide does not seem to be a possible explanation since Sluicing itself is ungrammatical.

- (51) *Joe once killed a man in cold blood and he doesn't even remember who he did.

The second way to show that the elided VP in (47) is not inquisitive is by testing if the indefinite inside it can serve as the inner antecedent. Before we can see this, we first show in (52) that an indefinite inside an elided VP is, in principle, a possible inner antecedent for Sluicing. That is, (52) has a reading where Jane can't remember who *she* met with, i.e. where the A clause is 'Jane did ~~meet with a student~~ yesterday.'

- (52) John met with a student yesterday. Jane_i did too, but she can't remember who [~~she_i met with yesterday~~].

In contrast, if the antecedent of the VPE is inside an appositive, the clause containing the elided VP can no longer serve as antecedent to Sluicing, as in (53).

- (53) *John, who met with a student yesterday, convinced Jane to too, but she can't remember who [~~she met with yesterday~~].

Both of these observations confirm that VPE is subject to the same inquisitive entailment condition as Sluicing. From this general condition, it follows that Sluicing

from an appositive is never grammatical, since the E clause is interrogative and the A clause is not. Since VPs need not be inquisitive, VPE from appositives is generally permitted, but only when the interpretation of the elided clause is non-inquisitive.

Summing up, we see that the appositive data highlights the sense in which ellipsis is truly an *anaphoric process*. An account which simply compares the logical form of the antecedent to the elided clause, whether syntactically or semantically, would be unable to account for such facts. The content of the A clause itself is not what determines the ungrammaticality of these examples. Rather, it is the fact that their material entered the conversational record via an appositive (i.e. subject to the COMMA operator) which derives their ungrammaticality.

5 Conclusion

We have argued that Sluicing and VPE are subject to a condition of symmetric entailment condition over semantic representations which comprise not only truth conditions, but also *issues*. Empirically, this allows us to understand why the class of inner antecedents for Sluicing includes overt indefinites (and disjunctions), but does not include doubly-negated indefinites and the implicit agent in passives. While they potentially have identical truth conditions, they differ in that only the former highlight a set of alternatives as part of their semantics. We have also seen that this approach allows us a way of understanding novel facts regarding the ungrammaticality of Sluicing to otherwise licit inner antecedents inside of appositive relative clauses. Given the crucial role of inquisitiveness, Sluicing emerges as an empirical diagnostic for latent *issues*, thus demonstrating that highlighting a set of alternatives must be part of the *context change potential* of indefinites and disjunctions. At the same time, this raises an interesting question for future work: how to reconcile this need for an inquisitive antecedent with what Chung et al. (1995) term ‘Sprouting’, i.e. instances of Sluicing where the wh-remnant is an adjunct or optional argument with no corresponding inner antecedent in the A clause.

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