



### 1.3 Modeling propositions

Propositions are **sets of worlds** that satisfy certain truth conditions:

- (6)  $\llbracket \text{Mary ran} \rrbracket^o = \lambda w. \text{Mary ran in } w$   
 $\sim$  the collection of all of the worlds in which Mary ran.

We can define a **union operation** over propositions:  $\cup$

- (7)  $\llbracket \text{Mary ran} \rrbracket^o$  or  $\llbracket \text{Sue ran} \rrbracket^o =$   
 $\llbracket \lambda w. \text{Mary ran in } w \rrbracket \cup \llbracket \lambda w. \text{Sue ran in } w \rrbracket$   
 $\sim$  the collection of all of the worlds in which either Mary ran or Sue ran (or both).

### 1.4 A brief summary

- Sentences have *ordinary* and *focus semantic values*.
- A focus semantic value is a **set of propositions**.
- A question also denotes a **set of propositions**.
- A proposition is a **set of worlds** that satisfy certain truth-conditions.
- We can define operations on these sets, such as  $\cup$ .

## 2 Spelling out the proposal

- (8) **Proposal:**  
 Sluicing may apply in  $CP_E$  provided
- $CP_E$  has a salient antecedent,  $CP_A$ , and
  - the set of worlds used to construct the alternatives in  $\llbracket CP_E \rrbracket^f \leftrightarrow$  the set of worlds used to construct the alternatives in  $\llbracket CP_A \rrbracket^f$ .

- For our purposes today, amounts to the following:<sup>5</sup>  
 $\cup \llbracket CP_A \rrbracket^f \leftrightarrow \cup \llbracket CP_E \rrbracket^f$

In other words, sluicing is possible provided the **antecedent and sluice have the same focus-theoretic propositional content**.

### 2.1 Simple sluices

Let's begin by looking at a simple example with an indefinite correlate:

- (9)  $\llbracket CP_A \text{ Mary called someone} \rrbracket, \text{BIDK} \llbracket CP_E \text{ who Mary called} \rrbracket. \quad (=1)$

- Condition (a) of our proposal is met:  $CP_E$  has a salient antecedent  $CP_A$ .
- Sluiced clause  $CP_E$ : who<sub>i</sub> Mary called  $t_i$
  - Antecedent clause  $CP_A$ : Mary called someone

<sup>5</sup>Things are more complex in two cases: when discussing contrast sluicing (see e.g. Merchant 2001) and when discussing multiple sluicing (e.g. Lasnik 2011; Kotek and Barros to appear). In those cases, we will need to apply the union operation *twice*.

- Condition (b) of our proposal is also met:  $\cup \llbracket CP_A \rrbracket^f \leftrightarrow \cup \llbracket CP_E \rrbracket^f$

- $\llbracket \llbracket CP_E \text{ Who Mary called} \rrbracket \rrbracket^f = \lambda p. \exists x (p = \lambda w. \text{Mary called } x \text{ in } w)$
- $\cup \llbracket \llbracket CP_E \text{ Who Mary called} \rrbracket \rrbracket^f = \lambda w. \exists x (\text{Mary called } x \text{ in } w)$
- $\cup \llbracket \llbracket CP_A \text{ Mary called someone} \rrbracket \rrbracket^f = \lambda w. \exists x (\text{Mary called } x \text{ in } w)$
- (9b)  $\leftrightarrow$  (9c)

### 2.2 Sprouting

**Sprouting:** When the **remnant** lacks an explicit linguistic correlate

- (10) Jack ate, but I don't know **what**.

- (11) Jack left, but I don't know  $\left\{ \begin{array}{l} \text{when} \\ \text{with whom} \\ \text{in which car} \\ \text{why} \\ \text{how} \\ \text{where to} \\ \dots \end{array} \right\}$ .

- Our proposal licenses adjunct sprouting:

- (12)  $\llbracket CP_A \text{ Jack left} \rrbracket, \text{BIDK} \llbracket CP_E \text{ when Jack left} \rrbracket$ .
- $\llbracket \llbracket \text{When Jack left} \rrbracket \rrbracket^f = \lambda p. \exists t (p = \lambda w. \text{Jack left at time } t \text{ in } w)$
  - $\cup \llbracket \llbracket \text{When Jack left} \rrbracket \rrbracket^f = \lambda w. \exists t (\text{Jack left at time } t \text{ in } w)$
  - $\cup \llbracket \llbracket \text{Jack left} \rrbracket \rrbracket^f = \lambda w. \text{Jack left in } w$
  - (12b)  $\leftrightarrow$  (12c)

The trick: If Jack left in  $w$ , then Jack left at a certain time  $t$  in  $w$ .

- Our proposal also licenses argument sprouting:

- (13)  $\llbracket CP_A \text{ Jack ate} \rrbracket, \text{BIDK} \llbracket CP_E \text{ what Jack ate} \rrbracket$ .
- $\llbracket \llbracket \text{what Jack ate} \rrbracket \rrbracket^f = \lambda p. \exists x (p = \lambda w. \text{Jack ate } x \text{ in } w)$
  - $\cup \llbracket \llbracket \text{what Jack ate} \rrbracket \rrbracket^f = \lambda w. \exists x (\text{Jack ate } x \text{ in } w)$
  - $\cup \llbracket \llbracket \text{Jack ate} \rrbracket \rrbracket^f = \lambda w. \text{Jack ate in } w$
  - (13b)  $\leftrightarrow$  (13c)

The trick: If Jack ate in  $w$ , then Jack ate a certain thing  $x$  in  $w$ .

- **Summary:** A focus-based account

Sluicing is possible provided the **antecedent and sluice have the same focus-theoretic propositional content**.

### 3 Against Q-equivalence

#### 3.1 Background: Q-equivalence approaches

**The intuition:** antecedents with expressions like indefinites and disjunctions implicitly raise questions as to which alternative holds.

- (14) Someone left  $\leadsto$  Who left?
- (15) Abby or Betty left  $\leadsto$  Which one left?

Sluicing is possible when the sluice is equivalent to the question raised by the antecedent (Ginzburg and Sag 2000; AnderBois 2011; Barros 2014; Weir 2014; Kotek and Barros to appear).

#### Q: How do we determine precisely what question is raised?

- ▶ **AnderBois 2011:** the question raised by the antecedent is its Inquisitive-Semantic inquisitive denotation (called an *issue*)
- ▶ **Algorithmic approaches:** heuristically arrive at a Question under Discussion (QuD), in the sense of Roberts 1996/2012 (Büring 2003; Barros 2012, 2014).

- (16) **The algorithm in Barros 2014:**
  - a. Replace the indefinite/disjunction with the corresponding *wh*-phrase.
  - b. Front the *wh*-phrase.
  - c. The result is the QuD raised by the antecedent.

#### 3.2 Which QuD?

Sprouting is famously flexible.

For Q-equivalence approaches, different *issues* or *QuDs* must be available for the antecedent to license ellipsis in each case.

- (17) a. Jack met someone,  $\text{BIDK} \{ \text{who/when} \}$ .
- b. Jack left,  $\text{BIDK} \{ \text{when/how/in which car/why/where to, ...} \}$

- ▶ **To what extent is the antecedent responsible for raising any particular issue/QuD at all?**

**Our answer: It is, in fact, the sluice that is responsible for determining the relevant issue.**<sup>6</sup>

<sup>6</sup>Although it's clearly *possible* for antecedents to raise issues. We simply argue that they *need not* necessarily be responsible for raising the relevant issue. Further, the issue raised by the sluice is certainly "constrained" by the antecedent in some way — perhaps because of the semantic identity condition.

#### 3.2.1 Non-issue antecedents

- ① Explicit *non-issues* can be sluiced/sprouted.
- (18) Someone, anyone, needs to make sure the plants get watered daily, **it doesn't matter {who, when}**.
- (19) There's going to be another faculty meeting, but **no one cares what about**.  
(Lucas Champollion p.c.)

Issues/QuDs are discourse moves, accepted by conversational participants, who have agreed to collaboratively address the issue. But,

- In (18), does the antecedent really raise a *who* question?
- In (19), we have to accommodate that the antecedent raises a *what about* issue —i.e., that *what about* matters, despite our explicit denial.<sup>7</sup>

#### 3.2.2 The answer ban

- ② **The answer ban:** Sluicing antecedents cannot address, or even partially address the issue raised by the sluice (Barker 2013).
- (20) \*Chris knows that Jack left, but Sally doesn't know who left.

Barros 2013 claims that the answer ban follows from Q-equivalence:

- QuDs/Issues only obtain when they are unanswered.<sup>8</sup>
- The sluice in (20) simply lacks an antecedent QuD/Issue.
- This correctly rules sluicing out.

However, the Answer Ban is stated as a constraint on *antecedents*, while QuDs/Issues are *discourse objects* — an ontological problem.

- ▶ Moreover, contrary to the predictions of Q-equivalence approaches, it is possible to sluice an "answered question":<sup>9</sup>

- (21) Bill left at 5 PM, so we know both *that* he left, and *when* he left.
- (22) Bill left at 5 PM, so we know both *that* someone left at 5 PM, and *who* left at 5 PM.

Under Barros's 2013 reasoning, it is unclear why it matters whether it's the antecedent or the context that answers the sluice's question.<sup>10</sup>

<sup>7</sup>Here one might argue that the issues are salient, even if the speaker explicitly opts out. However, it's not obvious how this would be implemented in any existing QuD account.

<sup>8</sup>Once they are answered they are "popped off" a push-down stack in Roberts's 2012 system.

<sup>9</sup>Crucially, provided the antecedent doesn't answer the sluice.

<sup>10</sup>See also Collins et al. 2015 for another argument against Q-equivalence accounts of the Answer Ban.

- Under our approach, the Answer Ban follows from the fact that  $\cup[[\text{antecedent}]]^f \neq \cup[[\text{sluice}]]^f$  whenever the antecedent answers the sluice.

- (23) \* Jack left, but Sally doesn't know who left.  
 $\cup[[\text{Jack left}]]^f = \lambda w. \text{Jack left in } w$   
 $\cup[[\text{who left}]]^f = \lambda w. \exists x(x \text{ left in } w)$

In (22) the sluice and antecedent are equivalent in our terms:

- (22) Bill left at 5 PM, so we know both  $[_{CP_A} \text{ that someone left at 5 PM}]$ ,  
and  $[_{CP_E} \text{ who left at 5 PM}]$ .

### 3.2.3 Antecedent sharing

- ③ Cases that we dub **Antecedent Sharing** raise further challenges.

- (24) Jack met someone, but I know who he met, or when he met them.

Q-equivalence accounts undergenerate:

- Such cases require that antecedents be associated with multiple issues simultaneously (one for each sluice).
- Current proposals don't allow for more than one question/issue at a time — since it's the antecedent that must raise the question/issue.
- Under our approach, antecedent sharing is no different than any other case of sluicing/sprouting.

- (24) Jack met someone, but I know who he met, or when he met them.  
a.  $\cup[[\text{Jack met someone}]]^f = \lambda w. \exists x(\text{Jack met } x \text{ in } w)$   
b.  $\cup[[\text{who Jack met}]]^f = \lambda w. \exists x(\text{Jack met } x \text{ in } w)$   
c.  $\cup[[\text{when Jack met (them)}]]^f = \lambda w. \exists t \exists x(\text{Jack met } x \text{ at } t \text{ in } w)$

Equivalence holds, given that meeting  $x$  in  $w$  necessitates meeting  $x$  at time  $t$  in  $w$  (cf 12).

### 3.2.4 Summary

- This challenges Q-equivalence on **principled explanatory grounds**.
- Q-equivalence approaches attribute ellipsis licensing to QuDs/Issues **raised by the antecedent**. But...
  - In **sprouting**, the question is intuitively accommodated posthoc, once the sprout is uttered.
  - **Non-issue antecedents** can license sluicing.
  - Resolved questions can license sluicing (**the answer ban**).
  - A single antecedent can license multiple sluices (**antecedent sharing**).
- ...It is the **sluice** that guides the choice of issue.

We shouldn't necessarily place the burden of raising the issue on the antecedent, contra the very foundation of Q-equivalence approaches.

## 4 e-GIVENness reconsidered

Our approach, like Merchant's 2001 influential proposal, is a focus-theoretic one.

- We consider whether a return to Merchant's proposal is warranted...
- ...and conclude that this is not possible.

- (25) **Merchant's 2001 focus condition on ellipsis:**  
A constituent,  $XP_E$  may be elided iff it is **e-GIVEN**.
- (26) A constituent,  $XP_E$  counts as e-GIVEN iff  $XP_E$  has a salient antecedent,  $XP_A$ , and, modulo  $\exists$ -type shifting,  
a.  $XP_A$  entails F-clo( $XP_E$ ), and  
b.  $XP_E$  entails F-clo( $XP_A$ )
- (27) **F-clo(XP)** is the result of replacing focused parts of XP with existentially bound variables of the same type as XP.

An illustration of e-GIVENness at work:

- (28)  $[_{TP_A} \text{ Someone left } ]$ , but I don't know who  $[_{TP_E} \text{ left } ]$ .  
a.  $\text{F-clo}(TP_E) = \lambda w. \exists x(x \text{ left in } w)$   
b.  $\text{F-clo}(TP_A) = \lambda w. \exists x(x \text{ left in } w)$   
c.  $TP_A \models \text{F-clo}(TP_E)$   
d.  $TP_E \models \text{F-clo}(TP_A)$   
→ e-GIVENness is met, sluicing correctly predicted to be possible

- Taking the union of the Roothian focus-semantic value of some XP comes very close to Merchant's appeal to Existential Focus Closure.

– (See Weir 2014 for this observation with Fragment Answers.)

- (29) a.  $\cup[[\text{Who left?}]]^f = \lambda w. \exists x(x \text{ left in } w)$   
b.  $\text{F-clo}(\text{Who left?}) = \lambda w. \exists x(x \text{ left in } w)$

For the most part, e-GIVENness will achieve what our account has so far, unlike of Q-equivalence approaches.

However, e-GIVENness falls short for sluices with quantified correlates.

**Multiple sluicing** (sluicing with more than one remnant), may involve quantified NPs as correlates (Lasnik 2011; Kotek and Barros to appear).

- (30) Everyone was dancing with someone, but I can't recall who with whom.

The sluiced issue here is, intuitively, a "pair-list" question, seeking which pairs of individuals were dancing together.

- e-GIVENness is not met, however.

(31)  $[\text{TP}_A$  Everyone was dancing with someone],  
but I can't recall who  $[\text{TP}_E \text{ was dancing}]$  with whom.

- a.  $\text{TP}_A = \text{F-clo}(\text{TP}_A) = \forall x(\text{person}(x) \rightarrow \exists y(\text{person}(y) \wedge \text{dancing-with}(x, y)))$
- b.  $\text{TP}_E = \text{F-clo}(\text{TP}_E) = \exists x \exists y(\text{person}(x) \wedge \text{person}(y) \wedge \text{dancing-with}(x, y))$

- c.  $\text{TP}_A \models \text{F-clo}(\text{TP}_E)$ , but
- d.  $\text{TP}_E \not\models \text{F-clo}(\text{TP}_A)$

→ e-GIVENness is not met, sluicing incorrectly predicted to be impossible.

This extends beyond multiple sluicing, to sluices with unambiguously quantificational correlates:

(32) She read most of the books, but we don't know which ones she read.

- a.  $\text{TP}_A$  entails  $\text{F-clo}(\text{TP}_E)$  (there are books that Sally read), but
- b. but  $\text{TP}_E$  does not entail  $\text{F-clo}(\text{TP}_A)$ .

→ e-GIVENness is not met, sluicing incorrectly predicted to be impossible.

► Under our approach the multiple sluicing facts and those with quantified correlates are predicted.

- We adopt the approach to pair-list Questions in Dayal 1996.
- Pair-list Qs denote a set of exhaustive pairings of individuals in the domain. In a toy model with 4 individuals:

(31) Everyone was dancing with someone, but I can't recall who ~~was dancing~~ with whom.

(33)  $\llbracket \text{Who was dancing with whom} \rrbracket^o = \left\{ \begin{array}{l} a \text{ and } b \text{ danced and } c \text{ and } d \text{ danced,} \\ a \text{ and } c \text{ danced and } b \text{ and } d \text{ danced,} \\ a \text{ and } d \text{ danced and } b \text{ and } c \text{ danced} \end{array} \right\}$

Each alternative is a graph of the "dance with" relation.

The union of the multiple sluice meaning, then, is the proposition "everyone danced with someone":

(34)  $\cup \left\{ \begin{array}{l} a \text{ and } b \text{ danced and } c \text{ and } d \text{ danced, } a \text{ and } c \text{ danced and } \\ b \text{ and } d \text{ danced, } a \text{ and } d \text{ danced and } b \text{ and } c \text{ danced} \end{array} \right\}$

- This is the set of worlds where  $a, b, c,$  and  $d$  danced with someone.
- This is equivalent to  $\cup \llbracket \text{Everyone danced with someone} \rrbracket^f$ .<sup>11</sup>

<sup>11</sup>For cases of quantificational correlates such as (32), alternatives must be "most of the books" alternatives (with different choices of books). This can be achieved via global accommodation, given the antecedent's context-change potential and its effect on the context when the sluice happens.

## 5 Beyond sluicing

Q-equivalence approaches imply a conceptually unattractive conclusion about identity in ellipsis:

- VP ellipsis and NP ellipsis are subject to independent semantic equivalence conditions on licensing than sluicing (Chung et al. 1995, 2010; AnderBois 2011).

On the other hand, e-GIVENness in Merchant 2001 had broad empirical coverage deriving VP, NP, and TP ellipsis.<sup>12</sup>

► We show how to extend our proposal to achieve similar coverage, and in fact improve on e-GIVENness.

Hartman 2009 points out a set of cases where, for VP ellipsis, e-GIVENness overpredicts identity when *relational opposites* are involved.

(35) \*Mary will  $[\text{VP}_A$  beat someone at chess, and John will  $[\text{VP}_E$  lose to someone at chess] (too).

- a.  $\text{VP}_A = \text{F-clo}(\text{VP}_A) = \exists x, y(x \text{ will beat } y \text{ at chess})$
- b.  $\text{VP}_E = \text{F-clo}(\text{VP}_E) = \exists x, y(x \text{ will lose to } y \text{ at chess})$

→ e-GIVENness is met, sluicing incorrectly predicted to be possible.

Hartman appeals to *semantic equivalence* to prevent these cases. (See Hartman 2009 for details.)

- $\text{VP}_A = \lambda x. x \text{ won at chess}$
- $\text{VP}_E = \lambda x. x \text{ lost at chess}$
- $\text{VP}_A \neq \text{VP}_E$

► In an important way, our proposal is in this spirit.

By making reference to the propositional content of the focus semantic values of antecedent and sluice, we come close to Hartman's intuition.

Our approach can be generalized to cover VPE in the same way as Hartman's proposal.

(36) **Our Proposal Generalized Beyond Sluicing**

$\text{XP}_E$  may be elided provided it has a salient antecedent,  $\text{XP}_A$ , and  $\cup \llbracket \text{XP}_E \rrbracket^f = \cup \llbracket \text{XP}_A \rrbracket^f$ .

- (37) a.  $\cup \llbracket [\text{VP}_E \text{ lost at chess}] \rrbracket^f = \cup \{ \lambda x. x \text{ lost at chess} \} = \lambda x. x \text{ lost at chess}$
- b.  $\cup \llbracket [\text{VP}_E \text{ won at chess}] \rrbracket^f = \cup \{ \lambda x. x \text{ won at chess} \} = \lambda x. x \text{ won at chess}$

Since these are not equivalent, our generalized condition achieves Hartman's goal just the same.

► This proposal achieves the same coverage as e-GIVENness — and improves on it by dealing with relational opposites, by virtue of making reference to non-propositional content.

<sup>12</sup>Merchant 2004 shows that this approach also works for fragment answers as a form of TP ellipsis.

► Can we go even further?

**Observation:** Hartman 2009’s problem goes beyond VP-ellipsis, and also affects deaccenting.

(38) \*Mary will beat someone at chess, and John will lose to someone at chess.

We conclude that this points to a **unified condition for ellipsis and deaccenting**, along the lines of Fox 2000.

## 6 Conclusion

► Ellipsis represents a radical mismatch between PF and LF. How is it licensed?

- ① **Proposal:** The propositional content of the focus semantic value of the antecedent must be equivalent to that of the sluice:  $\cup[[CP_A]]' \leftrightarrow \cup[[CP_E]]'$ .
- ② This proposal accounts for simple cases of sluicing, and also for:
  - sprouting
  - antecedent sharing
  - the answer ban
  - non-issues as antecedents
- ③ Challenges for Q-equivalence approaches and for e-GIVENness.
  - antecedents shouldn’t be responsible for raising issues
  - sluicing with quantified correlates; relational opposites
- ④ Generalizing beyond sluicing:
  - VP ellipsis
  - (Ongoing work: deaccenting)

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