Rooth/Hamblin alternative computation


1 Previously in LING 721...

1.1 In-situ Association with Focus

Recall: English association with focus involves F-marking on some constituent in the sentence. Operators c-commanding the F-marking can make use of the contribution of focus.

(1) a. I only introduced [Sue]₁ to Bill.
   b. I only introduced Sue to [Bill]₁.
   c. I only introduced [Sue]₁ to [Bill]₁.

(2) Semantics for only from Horn (1969):
    Only(x, f) presupposes f(x) and asserts \( \neg \exists y (y \neq x \land f(y)) \)

(1a) Presupposes: I introduced Sue to Bill. (=the prejacent)
    Asserts: \( \neg \exists y : y \neq \text{Sue} \) and I introduced y to Bill

1.2 Rooth's (1985) proposal for constituent only

Constituent only forms a constituent with the XP it precedes. Here this is the DP "John." Call this an "only-phrase."

(3) Rooth (1985), p. 28:
    \( \lambda x \lambda y [P(y) \rightarrow y = x] \)

    (4) \( S, \forall y [\text{come}'(y) \rightarrow y = j] \)
    \( \text{NP}, \forall y [P(y) \rightarrow y = j] \)
    \( \text{VP, come}' \)
    \( \text{only}, \text{John}, j \)
    \( \text{came} \)

The semantics should look pretty familiar. It's (sort of) a generalized quantifier denotation. With types:

(4) \( [\text{only}]_{(e, ((e,t), t))} = \lambda x_e \lambda P_{(e,t)} \forall y_e \cdot (P(y) \rightarrow y = x) \)
1.3 A covert movement approach to adverb only

One approach to adverb only is to turn it into a constituent only:

(5) **Rooth’s (1985)** “scope theory”:

Only is always a two-place operator, as in (4). Only covertly moves the F-marked constituent to become its first argument. The movement will introduce a lambda-binder on the sister of the only-phrase.

(6) John *only* studies [syntax]$_F$

![Diagram](diagram.png)

2 Association with Focus without movement

There are reasons to think that the movement analysis may not be right for adverb only.

2.1 Adverb only is not sensitive to islands

(7) **English adverb-only and adverb-even are not island-sensitive**

a. Dr. Svenson *only* rejected [the proposal that [John]$_F$ submitted]. (Rooth, 1996)

b. * [Which student]$_1$ did Dr. Svenson reject [the proposal that $t_1$ submitted]?  

(8) a. I don’t know anyone who grows bananas, I *only* know [a guy who smokes them].  

   (based on Anderson, 1972)

b. * What do you know [a guy who does $t$ with bananas]?
2.2 The weak crossover argument

Chomsky (1976) argues for a version of the movement analysis for constituent only based on data from weak crossover.

(9) The WCO configuration:
*Op_{i} ... pron_{i} ... t_{i}
(where pron_{i} and t_{i} do not c-command each other, Op_{i} c-commands both)

(10) a. Who_{i} t_{i} loves his, mother?
   b. ?? Who_{i} does his, mother love t_{i}?
   (bad on the reading: Who is such that his mother loves him?)
   (compare with: Who_{i} [t_{i} is loved [by his, mother]]?)

(11) a. Every man_{i} was betrayed by the woman he_{i} loved.
   b. ?? The woman he_{i} loved betrayed every man_{i}
   (bad on the reading: For each man x, the woman x loved betrayed x.)

(12) Adverb only and free focus appear to exhibit WCO effects (Chomsky, 1976)

   a. John_{F,i} was betrayed by the woman he_{i} loved.
   b. * The woman he_{i} loved betrayed John_{F,i}.

(13) a. We only expect John_{F,i} to be betrayed by the woman he_{i} loves.
   b. * We only expect the woman he_{i} loves to betray John_{F,i}.

Therefore, only seems to pattern with wh-phrases, which undergo overt movement, and with quantifiers, which we believe undergo covert movement.

Note that the same effect occurs with strong crossover, which yield a stronger judgment of unacceptability:

(14) Adverb only appears to exhibit SCO effects (Rooth, 1985, p. 70):

   a. We only expected [him_{j}]_{F} to claim that he_{i} is brilliant.
   b. * We only expected him_{i} to claim that [he_{j}]_{F} is brilliant.
   c. \forall z [we expected z to claim that z is brilliant \rightarrow z = g(i)]

Rooth (1985): the focused pronoun in (14) needs to take scope above the co-indexed pronoun. Movement inserts a \lambda-binder below the landing site, which is able to bind both instances of the pronoun, yielding the bound reading. This movement is independent of focus movement—it is necessary for binding purposes. But, movement in (14b) results in a crossover configuration and hence is blocked.

This is consistent with an in-situ theory of focus.

\footnote{A good question brought up by Bernhard in a previous class and which remains unresolved under this story is how we get binding in: “John only studied [French]_{F} because he likes it.”}
3 Rooth (1985, 1992): in-situ Association with Focus

The most common approach to Association with Focus in English.

What we want to capture is the following intuition:

(15) I only introduced Sue to Bill.
≈ ∃y : I introduced y to Bill → y = Sue
(16) I only introduced Sue to Bill.
≈ ∃y : I introduced Sue to y → y = Bill

(17) \[ \text{only}(e, (e, t)) = \lambda x_e \lambda y_e. (P(y) → y = x) \]

Next consider a sentence like (18), where only associates with an entire VP.

(18) He only swims.
≈ ∀Q(e, t) : He Q’s → Q = swim

Our current semantics for only (17) can’t be used in this case. This is a general issue with the denotation in (17) which has already come up in our discussion. We also can’t use it in case only associates with quantifiers, or adverbs, or PPs, etc.

Reverse-engineering the description of the meaning of (18), we can write a new lexical entry for only:

(19) \[ \text{only} = \lambda P(e, t). \lambda x_e. [ \forall Q(e, t) [ Q(x) & C(Q) ] → Q = P ] \]

“C is the characteristic function of a set of properties, which we think of as the relevant set of properties.” Rooth (1985), p. 43.

In the case of (18), the relevant set of properties in C must be other VP denotations. The sentence asserts that John has no relevant properties distinct from ‘swim.’

We can use the same kind of denotation for only in the case of examples (15–16).

(20) a. I only introduced Sue to Bill.
≈ I have no relevant properties other than introducing Sue to Bill.
The relevant properties: introducing Mary to Bill, introducing Jane to Bill, ...
b. I only introduced Sue to Bill.
≈ I have no relevant properties other than introducing Sue to Bill.
The relevant properties: introducing Sue to Mary, introducing Sue to Jane, ...

(So somehow the focus should determine the structure of the relevant properties.)
4 Alternative semantics

We are going to use the notation in Rooth (1992). Our goal is to build up the ‘relevant set of alternatives’ compositionally.

(21) Definitions:
   a. Each node $\phi$ has, in addition to its ordinary semantic value, a focus semantic value.
   b. We will use $\llbracket . \rrbracket^o$ (or: $\llbracket . \rrbracket$) to compute the ordinary semantic value of a node and $\llbracket . \rrbracket^f$ to compute the focus semantic value of a node.
   c. $\llbracket \phi \rrbracket^o$, the ordinary semantic value, is the value of $\phi$ that we know and love.
   d. $\llbracket \phi \rrbracket^f$, the focus semantic value, is the set of all ordinary semantic values obtained by substituting alternatives for any F-marked subparts of $\phi$.

Note: (if they are both defined) $\llbracket \alpha \rrbracket^o \in \llbracket \alpha \rrbracket^f$

Exercise: What are the ordinary and focus semantic value of the following formulas?

(22) a. $\llbracket John_f \text{ likes Mary} \rrbracket^o = \quad$ e. $\llbracket John [\text{likes Mary}]_f \rrbracket^o =$

  b. $\llbracket John_f \text{ likes Mary} \rrbracket^f = \quad$ f. $\llbracket John [\text{likes Mary}]_f \rrbracket^f =$

  c. $\llbracket ran \text{ quickly}_f \rrbracket^o = \quad$ g. $\llbracket Mary \rrbracket^o =$

  d. $\llbracket ran \text{ quickly}_f \rrbracket^f = \quad$ h. $\llbracket Mary \rrbracket^f =$

We can compute $\llbracket . \rrbracket^f$ compositionally:

(23) A recursive definition for the computation of focus-semantic values:
   Terminal nodes (TN):
   \[
   \llbracket \alpha_r \rrbracket^f = \begin{cases} 
   \{ \llbracket \alpha_r \rrbracket \} & \text{if } \alpha \text{ not F-marked} \\
   \text{a contextually-determined subset of } D_r & \text{if } \alpha \text{ F-marked}
   \end{cases}
   \]
   Pointwise functional application (PFA):
   \[
   \llbracket \begin{array}{c}
   \alpha_r \\
   \beta_{(\sigma, \tau)} \\
   \gamma_\alpha
   \end{array} \rrbracket^f = \begin{cases} 
   \{ b(g) \mid b \in \llbracket \beta \rrbracket^f, g \in \llbracket \gamma \rrbracket^f \} & \text{if } \alpha \text{ not F-marked} \\
   \text{a contextually-determined subset of } D_r & \text{if } \alpha \text{ F-marked}
   \end{cases}
   \]
**Exercise:** Compute the focus-semantic value of the following:

\[(24)\]

```
VP
   \{Mary\}
     Mary \{\lambda y.\lambda x.x \text{ likes } y\} \{\text{John, Chris, Bill}\}
       \text{likes} \quad \text{\textit{John}}_F
```

We now have a way of creating the ‘relevant set of alternatives’ that \textit{only} operates on.

\[(25)\]

```
\ensuremath{\left[\text{\textit{only}} \alpha\right] = 1 \iff \forall \phi \in \left[\alpha\right]' \left(\phi \neq \left[\alpha\right]^o \rightarrow \phi \text{ is false}\right)}
```

Presupposition: \(\left[\alpha\right]^o\) is true

\[(26)\] **A toy LF for in-situ focus association:**

```
only
   VP
     \{Mary\}
       Mary \{\lambda y.\lambda x.x \text{ likes } y\} \{\text{John, Chris, Bill}\}
         \text{likes} \quad \text{\textit{John}}_F
```

\[(27)\] **A more realistic LF for in-situ association:**

```
TP
   \{\text{Mary}\}
     \lambda z(T) \textit{only}
       \textit{VP}
         \textit{z} \quad \textit{only}
           \{\lambda y.\lambda x.x \text{ likes } y\} \{\text{John, Chris, Bill}\}
             \text{likes} \quad \text{\textit{John}}_F
```
5 Hamblin (1973): alternatives for in-situ questions

Hamblin (1973) argues quite similarly that alternatives can be used to compute the meaning of a question.\(^8\) Wh-phrases denote sets of individuals:

\[ (28) \]

a. **The semantics of who:**
- Ordinary semantic value: \([\text{who}]^o\) is undefined
- Focus-semantic value: \([\text{who}]^f = \{x_e : x \text{ is human}\}\)

b. **The semantics of what:**
- Ordinary semantic value: \([\text{what}]^o\) is undefined
- Focus-semantic value: \([\text{what}]^f = \{x_e : x \text{ is non-human}\}\)

“Although standard English word-order places the interrogative word or phrase (or the main one, if there is more than one), first, with inversion of the verb, there is no real need for an order difference from that appropriate to indicatives. So let us assume no special rules about word-order are needed.” (Hamblin, 1973, p. 48)

\[ (29) \] A toy LF of question interpretation via Rooth-Hamblin alternative computation:

\[ CP \]

\[ C \]

\( \{ \text{Alex likes Bobby,} \}
\{ \text{Alex likes Chris,} \}
\{ \text{Alex likes Dana} \} \)

\( \{\text{Alex}\} \)

\( \lambda x. x \text{ likes Bobby}, \)
\( \lambda x. x \text{ likes Chris}, \)
\( \lambda x. x \text{ likes Dana} \)

\( \{\text{λy.λx.x likes y}\} \)

\( \text{likes} \)

\( \text{who} \)

\[ (30) \] **Principle of Interpretability** (Beck, 2006, p. 16): An LF must have an ordinary semantic value.

\[ (31) \] **The semantics of interrogative C** (Beck and Kim, 2006, see also Shimoyama, 2001)

\[ [[C TP]]^o = [[TP]]^f \]

Historical note: Rooth (1985) was not aware of Hamblin (1973) when developing his proposal, see fn 7 in Rooth (1992).
C takes a sister that has a set of alternatives (and no ordinary semantic value) and returns the focus-semantic value of its sister as the ordinary semantic value of the question.

This gives us a set of propositions—the possible answers to the questions—as the denotation of the question.

If this approach to question semantics is correct for English, \(wh\)-movement is very mysterious. We would have to assume an EPP feature on interrogative C that is responsible for attracting a phrase with a \(wh\) feature to its specifier.

References