A Grammatical View of Exhaustification with Focus Movement: Evidence from NPI[1]

Yimei Xiang, Harvard University

yxiang@fas.harvard.edu

1. INTRODUCTION

- Weak NPIs like *any* can be licensed in downward-entailing (DE) contexts.

  (1) a. John didn't read any paper.

      b. * John read any paper.

  (2) a. Every student who has read any paper passed the exam.

      b. *Some student who has read any paper passed the exam.

The driving question: The NPI *any* can also be licensed within the c-commanding domain of *only*, iff any part of the *any*P is NOT focused.

    (3) a. Mary only gave any funding to JOHN$_F$.

      b. *John read only ANY$_F$ paper.

      c. *John read only [any PAPER]$_F$, (he didn't read every book).

      d. *John read only any PAPER$_F$, (he didn't read any book).

- Both the *F(ocus)-movement theory* (Wagner 2006) and the *G(rammatical)-view of exhaustification* (Krifka 1995, Lahiri 1998, Chierchia 2006 a.o.) have difficulties in accounting for the NPI-licensing effect of *only*.

  I argue to overcome those difficulties via incorporating F-movement into the G-view.

2. THE F-MOVEMENT THEORY

2.1. The SDE condition

- von Fintel (1999): An NPI is only grammatical if it is in the scope of f s.t. $\llbracket f \rrbracket$ is *S(trawson) DE*.

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[1]I thank Gennaro Chierchia, Noah Constant, Michael Erlewine, Danny Fox, Martin Hackl, Andreea Nicolae, Hedde Zeijlstra, and the audience at GLOW 37 and LFRG at MIT for helpful suggestions and discussions. All errors in this work are my own responsibility.

(4) A function f of type $<\sigma, \tau>$ is SDE iff for all x and y of type σ s.t. $x \Rightarrow y$ and $f(x)$ is defined: $f(y) \Rightarrow f(x)$.

Only is SDE: if the prejacent presupposition is true, the complement of *only* is DE.

(5) Kale is a vegetable. $x \Rightarrow y$
John ate kale for breakfast. $f(x)$ is defined
Only John ate vegetables for breakfast. $f(y)$
∴ Only John ate kale for breakfast   ∴ $f(x)$

2.2. Wagner (2006): F-movement

Wagner (2006) adopts SDE and proposes an F-movement.
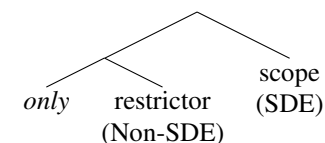
1. *Only* is SDE in its scope but not in its syntactic restrictor.

(6) a. Only JOHN$_F$ ate *vegs*.   (7) a. Only *STUDENTS$_F$* ate kale.

    b. John ate kale.   b. Smart students ate kale

    c. → Only JOHN$_F$ ate *kale*.   c. ↛ Only [*smart students*]$_F$ ate kale.

    d. $\forall x[$ eat-$\underline{veg}(x) \rightarrow j \subseteq x]$ d. $\forall x[$ eat-kale$(x) \rightarrow \underline{student} \subseteq x]$

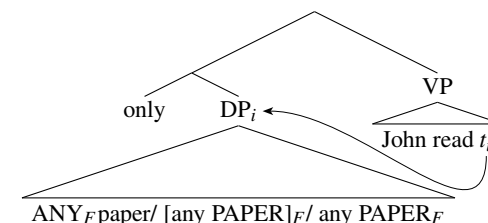2. The focused constituent moves covertly to the syntactic restrictor of *only*.

2.3. Advantages of Wagner (2006)

- Wagner (2006) predicts that the NPI *any* isn't licensed by *only* if it is moved as (part of) the restrictor. This prediction is fully compatible with the facts in (3).
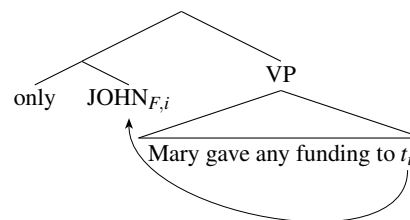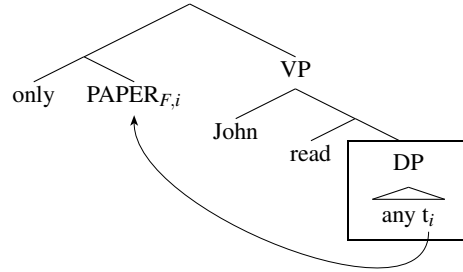
(8) a. *Licensed in (3a)*   b. *Not licensed in (3b-d)*

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Since *any* is a phase head, its complement can't be moved alone. [2]

(9) (×)

2.4. Problems of Wagner (2006)

- **P1 [The main problem !]**

  Wagner (2006) doesn't explain why NPI *any* is bad in non-DE contexts.

  Saying that the NPI *any* is licensed in an (S)DE context is still descriptive.

- **P2**, SDE is neither necessary nor sufficient.

  1. The SDE condition isn't necessary.

  E.g. *exactly two* is non-monotonic; it is neither presuppositional nor SDE. However, it licenses weak NPIs in the same way as *only* does. (Crnič 2011)

  (10) Exactly two students did any reading at all.

  2. The SDE condition isn't sufficient.

  E.g. DPs like *the student* and *both students* are SDE, but they do not license *any*. (Gajewski 2011, Chierchia 2013)

  (11) a. * The student who had any linguistics did well.
       i. Presupposition: $|\,\text{students}_w\,| = 1$
       ii. Assertion: $\text{students}_w \subseteq \text{did well}_w$
       b. * Both students who had any linguistics did well.
       i. Presupposition: $|\,\text{students}_w\,| = 2$
       ii. Assertion: $\text{students}_w \subseteq \text{did well}_w$

- **P3**, F-movement isn't well-motivated.

  Wagner (2006) assumes that F-movement is used to strengthen the $\exists$-presupposition of *only*.

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[2] Abels (2003): (As a consequence of the *Anti-locality Constraint* and the *Phase Impenetrability Condition*), complements of phasal heads can't move by themselves, stranding their embedding phrase head, but must always pied-pipe that phrase head.

(12) Without F-movement:
   a. John only [played basketball]$_F$.   b. $\exists$-Pres.: $\exists x$. John x-ed.

(13) With F-movement: $\Uparrow$
   a. John only played basketball$_F$.   b. $\exists$-Pres.: $\exists x$. John played x.

This goal, however, can be achieved simply by stress or other F-mark.

(14) John only played BASKETBALL$_F$

- **P4**, associating *only* into an island yields an overly strong reading.

  E.g. in (15), the Left-Branch Extraction Constraint requests *JOHN's advisors* to move as a whole. The F-movement theory predicts the overly strong reading in (15b).

  (15) Sue only invited $\ulcorner$ JOHN$_F$'s advisors $\urcorner$.
       a. $\rightarrow$ Sue didn't invite **anyone's advisors** except John's.
       b. $\nrightarrow$ Sue didn't invite **anyone** except John's advisors.

- **P5**, it doesn't explain the ungrammaticality of (16).

  (16) *John only [$_{VP}$ CUT$_F$ any vegetables].

  Wagner (2006) argues that *CUT* can't take F-movement alone, and hence that the whole VP, including the *any*-phrase, moves to the complement/restrictor of *only*.

  However, the *any*P should be allowed to vacate the VP, and the remnant VP subsequently associate with *only* (J. Gajewski p.c. to Wagner).

- **P6**, in absence of *any*, F-association has no island effect. (Rooth 1992, 1996)

  Associating *only* into an island:

  (17) a. Dr. Smith only rejected the proposal that JOHN$_F$ submitted.
       b. Dr. Smith only complains when BILL$_F$ leaves the lights on.

  Multi-foci in a single island associated with different operators:

  (18) We only recovered the diary entries that Marilyn made about John.
       We also$_1$ only$_2$ recovered the diary entries that MARILYN$_{F2}$ made about BOBBY$_{F1}$.

- **P7**, moving focus to the complement of *only* violates the *Extension Condition*.

  (19) **Extension Condition** (Chomsky 1995):
       All movement operations extend the root of the structure that they apply to.

3. THE G-VIEW OF EXHAUSTIFICATION

3.1. The G-view of scalar implicatures

- Propositions containing scalar items are associated with a set of alternatives. A covert exhaustivity operator O affirms the prejacent and negates non-entailed alternatives.[3]

  (20) Some of the students came. $\rightsquigarrow$ Not all of the students came.
     a. $\mathscr{A}lt(\phi_{\text{SOME}}) = \{\phi_{\text{SOME}}, \phi_{\text{ALL}}\}$
     b. $O(p) = p \wedge \forall q \in \mathscr{A}lt(p)[p \not\subseteq q \rightarrow \neg q]$
     c. $O(\phi_{\text{SOME}}) = \phi_{\text{SOME}} \wedge \neg\phi_{\text{ALL}}$

3.2. The G-view of NPIs

- Chierchia (2006, 2013) offers an explanation to the licensing condition of *any* with assumptions compatible with Alternative Semantics (Rooth 1985) and the standard DE condition.

- *Any* has a [D] feature that activates D(omain)-alternatives and must agree with a c-commanding exhaustivity operator O_D. This O_D affirms the prejacent and negates all the non-entailed D-alternatives.

- In a <u>non-DE context</u> like (21), assessing [D] with O_D negates all the subdomain alternatives, yielding (21d). (21d) contradicts to the assertion (21b).

  (21) *John read any paper.
     a. O_D [John read any$_D$ paper]
     b. Assertion: $\exists x \in D[P(x) \wedge R(j,x)]$
     c. D-ALT $= \{\exists x \in D'[P(x) \wedge R(j,x)] \mid D' \subseteq D\}$
     d. $\forall D'[D' \subset D \rightarrow \neg\exists x \in D'[P(x) \wedge R(j,x)]]$
     e. $[\![(21a)]\!] = [\![(21b)]\!] \wedge [\![(21d)]\!] = \bot$
        (# "John read some paper in D, but he didn't read any paper in any proper sub-domain D'")

  $$D = \{p_1, p_2\} \quad D\text{-ALT} = \{\{p_1, p_2\}, \{\mathbf{p_1}\}, \{\mathbf{p_2}\}\} \quad (p_1 \vee p_2) \wedge \neg p_1 \wedge \neg p_2 = \bot$$

- In contrast, if *any* occurs in a <u>DE context</u>, all the D-alternatives are entailed and not excludable. Hence, O_D is semantically vacuous, and doesn't lead to a contradiction.

  (22) John didn't read any paper.
     a. O_D [John didn't read any$_D$ paper]
     b. Assertion: $\neg\exists x \in D[P(x) \wedge R(j,x)]$
     c. D-ALT $= \{\neg\exists x \in D'[P(x) \wedge R(j,x)] \mid D' \subseteq D\}$
     d. $[\![(22a)]\!] = \neg\exists x \in D[P(x) \wedge R(j,x)]$
        ("There is no paper in D that John read.")

3.3. Extending the G-view to *only*

- Krifka (1995), Lahiri (1998), Chierchia (2006) a.o. extends the G-view to *only*.

  (23) Only JOHN$_F$ read any paper.
     a. O_D [only [JOHN$_F$ read any$_D$ paper]]
     b. Presupposition: $\exists x \in D[P(x) \wedge R(j,x)]$ Irrelevant
     c. Assertion: $\forall y \exists x \in D[\underline{P(x) \wedge R(y,x)} \rightarrow y = j]$ DE
     d. D-ALT $= \{$ only [JOHN$_F$ read any$_{D'}$ paper] $: D' \subseteq D \}$

- The presupposition is irrelevant for weak NPI-licensing (Gajewski 2011).[4]

- The assertion creates a DE context in the unfocused part and licenses *any*.

3.4. Advantages of the G-view

- The G-view of exhaustification overcomes **P1-2**.

  > $\sqrt{}$ **P1:** Why is that the NPI *any* is bad in non-DE contexts?
  > *Computing D-ALTs in a non-DE context yields a contradiction.*
  >
  > $\sqrt{}$ **P2:** The SDE condition is insufficient and unnecessary.
  > *The G-view is independent from the SDE condition.*

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[3]This O negates all non-entailed alternatives unselectively, differing from the one proposed by Fox (2007), which negates only the alternatives that can be negated consistently (i.e. "innocently excludable alternatives").

[4]Presuppositions and implicatures are relevant to strong NPI-licensing. Compare, *only* doesn't license strong NPIs (e.g. "*Only JOHN came in years"), because applying O_D to check off the D-alternatives within the prejacent yields a contradiction. (See details in Chierchia 2013)

3.5. Problems with the G-view

- **P8 [The main problem!]**

In the G-view, a successor of Alternative Semantics, alternatives are propositional.

(24) $\text{Only}(p) = \forall q \in ALT(p)[q \rightarrow p \subseteq \boxed{q}]$

But to capture the NPI-licensing effect of *only*, the quantificational domain of *only* cannot be written as a proposition set, because the position for $\boxed{q}$ in (24) isn't DE.

Hence in (23c), the G-view has to give up its own standard, and writes the quantificational domain of *only* as a set of individuals.

(23) Only JOHN read any paper.
  c. Assertion: $\forall y \exists x \in D[P(x) \land R(y,x) \rightarrow j \subseteq y]$

- The F-movement theory is lack of an explanation to the NPI-licensing condition.
- The G-view has an explanation to the licensing condition, but this explanation relies on a syntactic operation (i.e. F-movement) which can split the c-commanding part of *only* into focused and unfocused part.

⇒ The F-movement theory and the G-view need each other!

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4. MY PROPOSAL

- My proposal incorporates features of both the F-movement theory and the G-view:

  The requirement of avoiding contradictions motivates F-movement.

4.1. Case 1: F-movement is motivated

- In (25) (= 3a) and (26) (= 23), if the focus were interpreted in-situ, then due to **P8**, [D] is assessed in a non-DE context, yielding a contradiction.

(25) Mary only gave any funding to JOHN$_F$.

(26) Only JOHN$_F$ read any paper.

To avoid contradictions, I assume that the focus moves to the spec of *only*.
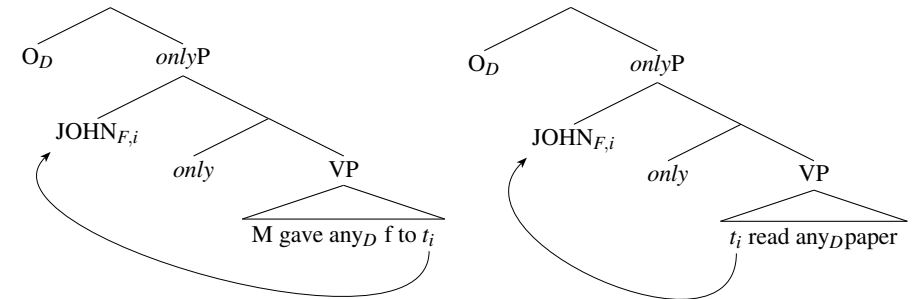
√ **P3**: What is the motivation of F-movement?
The requirement of avoiding contradictions.

√ **P7**: Moving focus to the complement of *only* violates the Extension Condition.
Focus moves to the spec of onlyP.

(**P7** is a minor problem. I'm not stick to this assumption. Crnič (2014) argues that moving focus to the complement of *only* captures more facts on focus interpretation than moving focus to the spec of *only*P.)

√ **P8**: To license *any*, the focus alternatives can't be propositional.
The operation of F-movement splits the c-commanding part of 'only', making the alternatives non-propositional. (See more details in section 4.5)

4.2. Case 2: F-movement is NOT motivated

- If interpreting focus in-situ doesn't yield a contradiction, focus doesn't move.

E.g. in (27), *any* can be licensed in-situ by negation,

(27) a. Mary only didn't give any$_D$ funding to JOHN$_F$

  b. Only O$_D$ **not** [Mary gave any$_D$ funding to JOHN$_F$]   √

√ **P6**: Sentences in (17) and (18) do not show island effects.

(17) a. Dr. Smith only rejected the proposal that JOHN$_F$ submitted.

  b. Dr. Smith only complains when BILL$_F$ leaves the lights on.

(18) We only recovered the diary entries that Marilyn made about John. We also$_1$ only$_2$ recovered the diary entries that MARILYN$_{F2}$ made about BOBBY$_{F1}$.

F-movement isn't motivated, and hence there is no island effect.

4.3. Case 3: F-movement is unhelpful

- If a contradiction can't be salvaged by F-movement, then NPI *any* isn't licensed.

  (3)   b.   *John read only ANY_F paper.

         c.   *John read only [any PAPER]$_F$.

- Take (3c) for example: all the possible LFs yield a contradiction.

Type 1: [D] is assessed by O_D

Whether *any*P is interpreted in-situ or with F-movement, [D] is assessed in a non-DE context (boxed). Applying O_D yields a contradiction.

(28)   **In-situ**: O_D [only [John read [any$_D$ PAPER]$_F$]]

      Assertion: $\forall q \in ALT(p)[q \rightarrow \boxed{\exists x \in D[P(x) \land R(j,x)]} \subseteq q]$

                    where $ALT(p) = \{Q(\lambda x.R(j,x)) \mid Q \in D_{<et,t>}\}$

(29)   **F-movement**: O_D [$_{onlyP}$ [any$_D$ PAPER]$_{F,i}$ only [John read t_i]]

      Assertion: $\forall Q_{<et,t>}[Q[\lambda y.R(j,y)] \rightarrow \boxed{\lambda S.\exists x \in D[P(x) \land S(x)]} \subseteq Q]$

Type 2: [D] is assessed by *only*

Whether *any*P is interpreted in-situ or with F-movement, the assertion (exhaustivity inference) negates all the proper sub-domain alternatives, yielding an inference contradicting to the prejacent presupposition.

(30)   **In-situ**: Only [John read [any$_D$ PAPER]$_F$]

      a. $ALT_F = \{Q[\lambda x.R(j,x)] \mid Q \in D_{<et,t>}\}$

      b. $ALT_D = \{\exists x \in D'[P(x) \land R(j,x)] \mid D' \subseteq D\}$

      c.   Presupposition: $\exists x \in D[P(x) \land R(j,x)]$

      d.   Assertion: $\forall q \in ALT_{F,D}[\exists x \in D[P(x) \land R(j,x)] \not\subseteq q \rightarrow \neg q]$

                             $\Downarrow$

      e. $\forall D'[D' \subset D \rightarrow \neg \exists x \in D'[P(x) \land R(j,x)]]$ Contradicts to (30c)

$$\boxed{\begin{array}{ll} D = \{p_1, p_2\} & \text{Presupposition: } p_1 \lor p_2 \\ D\text{-ALT} = \{\{p_1,p_2\},\{p_1\},\{p_2\}\} & \text{Assertion entails: } \neg p_1 \land \neg p_2 \end{array}}$$

(31)   **F-movement**: [$_{onlyP}$ [any$_D$ PAPER]$_{F,i}$ only [John read t_i]]

- This analysis can easily extends to cases with **island effects.**

  (3)   d.   *John read only any PAPER$_F$.

In (3d), the *any*P, as an island, can only be moved as a whole. Moving the whole *any*P to the spec of *only*P yields an LF that is also contradictory, leaving *any* unlicensed.

4.4. Other cases

$\sqrt{}$ **P5**: Why is (16) ungrammatical?

      (16)   *John only CUT any vegetables.

      In (16), the only syntactically well-formed way to move the anyP is as follows.
      Interpreting anyP under the immediate scope of O_D still yields a contradiction.

(32)
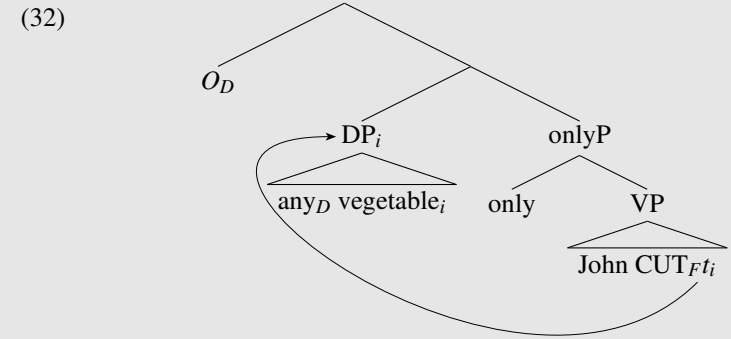
- Cf. *any* is licensed in (33), where (16) is uttered as the antecedent of a conditional.

  (33)   If John only CUT any vegs (and didn't STEAM any vegs),
          his wife would be unhappy.

- Cf. *any* is NOT licensed in (34): (i) the *any*P moves as a whole, ruling out (35a); (ii) the focused NP prevents the *any*P from raising over *only*,[5] ruling out (35b).

  (34)   *If John only invited [anyone's ADVISORS$_F$],
          the students would be unhappy.

  (35)   a.   ($\times$) If John only invited $\boxed{\text{anyone's}}$ ADVISORS$_F$

          b.   ($\times$) If John only invited $\boxed{\text{anyone's ADVISORS}_F}$

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[5]Tancredi (1990): the focus associated with *only* cannot be moved away from the c-commanding part of *only*.

4.5. Focus interpretation

I assume that the quantificational domain of *only* equals to <u>the focus value</u> of

(i) the c-commanding domain, if focus is in-situ (à la Rooth 1985).

(ii) the moved phrase, if focus is moved.

- **A cross-categorical definition of *only*:**[6]

(36) $[\![only]\!] = \lambda f_{<\alpha,t>}.\lambda g_\alpha.\forall g' \in [\![g]\!]_f [f(g') \to [\![g]\!]_0 \subseteq g']$

$\quad\quad\quad\quad\quad\quad\quad\quad\quad \uparrow \quad\quad\quad\quad \uparrow$

$\quad\quad\quad\quad\quad\quad\quad$ Focus value $\quad$ Ordinary value

√ **P4**, moving *JOHN's advisors* in (15) predicts the overly strong reading in (15b).

(15) Sue only invited ⌜ JOHN$_F$'s advisors ⌟.

  a. → Sue didn't invite anyone's advisors except John's.

  b. ↛ Sue didn't invite anyone except John's advisors.

The focus in (15) is interpreted in-situ, as schematized in (37).

(37) a. $[\![\text{Sue invited JOHN's advisor}]\!]_0 = I[s, A(j)]$

  b. $[\![\text{Sue invited JOHN's advisor}]\!]_f = \{I[s, A(x)] \mid x \in D_e\}$

  c. $[\![(15)]\!] = \forall q \in \{I[s, A(x)] \mid x \in D_e\}[q \to I[s, A(j)] \subseteq q]$
  ("For any true proposition q in the form of 'Sue invited x's advisors', q is entailed by the proposition that 'Sue invited John's advisors.")

Cf. (38) has F-movement. The quantificational domain of *only* is $[\![\text{JOHN}_F\text{'s advisors}]\!]_f$.

(38) Mary only gave any$_D$ funding to JOHN$_F$'s advisors.

  a. $[\![\text{JOHN}_F\text{'s advisors}]\!]_f = \{A(x) : x \in D_e\}$

  b. $[\![\text{JOHN}_F\text{'s advisors}]\!]_0 = A(j)$

  c. $[\![(38)]\!] = \forall y \in \{A(x) : x \in D_e\}[I(s, y) \to A(j) \subseteq y]$
  ("For anyone's advisors y, if Sue invited y, then y is/are John's advisors."

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[6]Here '$\subseteq$' is defined cross-categorically. In particular, for any a and a' of type e, $a \subseteq a' = \lambda P.P(a) \subseteq \lambda P.P(a')$.

√ **P8**, the quantificational domain of *only* in (23c) can't be written as a set of propositions like in (24), because the position for $\boxed{q}$ in (24) isn't DE.

(23) Only JOHN read any paper.

  c. Assertion: $\forall y \exists x \in D[P(x) \land R(y,x) \to y = j]$

(24) $Only(p) = \forall q \in ALT(p)[q \to p \subseteq \boxed{q}]$

(23) has F-movement. The quantificational domain is the focus value of JOHN.
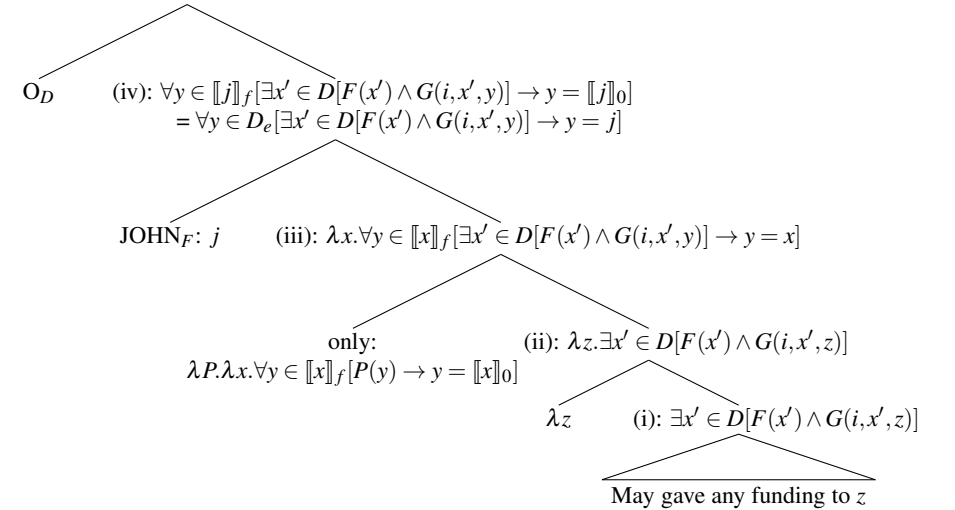
5. CONCLUSIONS

- The weak NPI *any* can be licensed in the c-commanding position of *only* iff any part of the *any*P is not associated with *only*.
- To explain this licensing-effect, I propose to incorporate F-movement into the G-view of exhaustification: F-movement is used to avoid contradictions.

APPENDIX

- An example of semantic composition:[7]

(39) Mary only gave any funding to JOHN$_F$.

(v): $\forall y \in D_e[\exists x' \in D[F(x') \land G(i,x',y)] \to y = j]$

O$_D$ $\quad$ (iv): $\forall y \in [\![j]\!]_f [\exists x' \in D[F(x') \land G(i,x',y)] \to y = [\![j]\!]_0]$
$\quad\quad\quad = \forall y \in D_e[\exists x' \in D[F(x') \land G(i,x',y)] \to y = j]$

JOHN$_F$: j $\quad$ (iii): $\lambda x.\forall y \in [\![x]\!]_f [\exists x' \in D[F(x') \land G(i,x',y)] \to y = x]$

only: $\quad$ (ii): $\lambda z.\exists x' \in D[F(x') \land G(i,x',z)]$
$\lambda P.\lambda x.\forall y \in [\![x]\!]_f [P(y) \to y = [\![x]\!]_0]$

λz $\quad$ (i): $\exists x' \in D[F(x') \land G(i,x',z)]$

May gave any funding to z

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[7]A minor issue is to justify the λ-abstractor (λz). Here the moved constituent *JOHN* is isolated from the λ-abstractor. One possibility, p.c. by G. Chierchia, is that *only* is co-indexed with the focused constituent at its spec. The index on *only* is interpreted as the λ-abstractor on the VP, while the index on the focused constituent is vacuous.

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