The syntax and semantics of focus particles

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Linguistics Summer School in the Indian Mountains (LISSIM) 11, May–June 2018

Contents

1 The plan

In this course we'll study the cross-linguistic syntax and semantics of focus particles — items like *only*, *also*, *even*.

Why focus particles?

- Still relatively understudied
  - What meanings are lexicalized in different languages? Are there universals?
  - What are these things, syntactically?
- Raises architectural questions
  - Semantics and prosody — mediated through F-marking?
  - Syntax and semantics — reference to "focus" features?
  - Semantics and pragmatics — where do alternatives come from? Are they always questions under discussion?

The plan:

Five classes:

1. Introduction, background

2–3. Alternative Semantics, patterns of association, case studies

4. More on particle meanings
5. *Wh*-quantification

Requirements:

- Ask a question
- Present at workshop

2 Focus: An introduction

2.1 Effects of focus

(1) a. I introduced SUE to Mary.

b. I introduced Sue to MARY.

The sentences in (1) convey the same information, but seem to differ in "what is emphasized." We call the emphasized part the *focus*. The choice of focus has clear, observable differences:

(2) *Who did you introduce to Mary?*

a. I introduced SUE to Mary.

b. # I introduced Sue to MARY.

(3) *Who did you introduce Sue to?*

a. # I introduced SUE to Mary.

b. I introduced Sue to MARY.

(4) Halliday (1967):

a. Dogs must be CARRIED.

b. DOGS must be carried. (cf "Shoes must be worn.)

(5) Rooth (1985):

a. MARY always takes John to the movies.

b. Mary always takes JOHN to the movies.

(6) Jackendoff (1972) citing a John Bowers (1969) manuscript:

a. Of the three men, John hates BILL the most.

b. Of the three men, JOHN hates Bill the most.

(7) Jackendoff (1972):

a. Maxwell didn't kill the judge with a silver HAMMER.

b. Maxwell didn't kill the JUDGE with a silver hammer.

(8) "Focus indicates the presence of *alternatives* that are relevant for the interpretation of linguistic expressions." — Krifka (2006)

2.2 Focus particles

The subject of this course will be *focus particles* such as *only*, *even*, *also*.

(9) Alex $\left\{ \begin{array}{c} \text{only} \\ \text{even} \\ \text{also} \end{array} \right\}$ took the TURTLE to school.

(10) Alex $\left\{ \begin{array}{c} \text{only} \\ \text{even} \\ \text{also} \end{array} \right\}$ took the turtle to SCHOOL.

These operators *quantify over alternatives which vary in the focused position*.

(11) **Analyzing (9):**

The sentence without the particle: Alex took the TURTLE to school.

The *prejacent* sentence: Alex took the turtle to school.

Focused constituent: turtle

Contextual alternatives to "turtle": frog, pig...

Alternative sentences: Alex took the *frog* to school, Alex took the *pig* to school...

(sentences based on the prejacent, but with the focus replaced by its alternatives)

(12) **Rough paraphrases for the meanings in (9):**

a. *only*:

i. the prejacent "Alex took the turtle to school" is true

ii. all the alternative propositions ("Alex took the frog to school," "Alex took the pig to school"...) are false

b. *even*:

i. the prejacent "Alex took the turtle to school" is true

ii. the prejacent proposition "Alex took the turtle to school" was less likely than the alternative propositions, e.g. "Alex took the frog to school," "Alex took the pig to school"...

c. *also*:

i. the prejacent "Alex took the turtle to school" is true

ii. at least one of the alternative propositions ("Alex took the frog to school," "Alex took the pig to school"...) is true

Jackendoff (1972) and Rooth (1985) say that *only*, *even*, and *also* *"associate with (the) focus."* This dependency is often referred to as *Association With Focus*.

Note: The "particles" in (9–10) seem to be VP adverbs, but *only* and *even* can also adjoin closer to their focus. We discuss the position and syntax of focus particles in more detail later.

(13) Alex took $\left\{ \begin{array}{c} \text{only} \\ \text{even} \\ \text{*also} \end{array} \right\}$ the TURTLE to school. (=9)

(14) Alex took the turtle $\left\{ \begin{array}{c} \text{only} \\ \text{even} \\ ^{??}\text{also} \end{array} \right\}$ to SCHOOL. (=10)

2.3 Focus and prosody

The relationship between the position of focus and the position of prosodic prominence is indirect. Jackendoff (1972) proposed that the focus is a constituent with the abstract feature F; also called *F-marking*. We can determine the F-marked constituent through an utterance's semantics/pragmatics:

(15) *What did Mary eat this morning?*
Mary ate [a SANDWICH]$_F$.

(16) *What did Mary do this morning?*
Mary [ate a SANDWICH]$_F$.

(17) *Wait, what happened??*
[Mary ate a SANDWICH]$_F$!

(18) *Who ate a sandwich this morning?*
[MARY]$_F$ ate a sandwich.

► Notice that (15–17) can be pronounced identically, but vary in the logical position of focus. In contrast, the pitch accent in (18) clearly indicates that the subject is F-marked. Although the relationship between focus and prosody is indirect, prosody still serves a function to communicate the position of focus.

- In English and many other languages, every F-marked constituent bears a pitch accent; see e.g. Selkirk 1984 §5.3.2.

  The placement of the pitch accent within the focused constituent is complicated. In many cases, pitch accent goes on the rightmost word in the focus, explaining the pitch accents in (15–18). But indefinites and pronouns appear to avoid pitch accents:

  (19) *Wait, what happened??* [Mary ATE something]$_F$!

  Given material also seems to avoid focus; see Schwarzschild (1999); Wagner (2006b, 2012).

- Some languages apparently have no prosodic cues which reflect F-marking. See e.g. Zerbian (2007) on Northern Sotho (Bantu):

  > "The production study tested if Northern Sotho native speakers produce prosodic differences which are correlated to diverging focus structures. Target sentences were prepared in such a way as to allow tonal as well as durational changes. Question/answer-pairs that were controlled for different focus conditions were recorded from native speakers. A phonetic analysis of the data with respect to fundamental frequency and duration showed no systematic prosodic expression of focus. A follow-up perception study showed that the existing prosodic differences were not interpreted with respect to focus. Neither did any other prosodic cue emerge as relevant for the encoding of focus in Northern Sotho." (p. 75)

  The position of focus is instead indicated morphosyntactically; e.g. through the use of focus particles or movement, or by eliding/pronominalizing non-focused parts.

Architectural point: This system requires arbitrary constituents to be given an [F] feature in the syntax, which is then interpreted semantically and phonologically.

- This seems to violate the Inclusiveness Condition — the idea that new features not in the lexicon cannot be added during the derivation (Chomsky, 2000).
- Could the [F] feature be a lexical item? Is there any language where [F] itself is realized morphologically, other than prosodically?

  Büring (2009) suggests that Chickasaw may be such a language:

  (20) a. hat:ak-at koni(ã) pisa.
  man-SUB skunk sees
  'The man sees the skunk.'

  b. hat:ak-**akot** koni(ã) pisa.
  man-FOC.SUBJ skunk sees
  '[The man]$_F$ sees the skunk.'

  c. hat:ak-at koni-**akõ:** pisa.
  man-SUBJ skunk-FOC.OBJ sees
  'The man sees [the skunk]$_F$.'

  ...but I am skeptical.

- See Daniel Büring's recent work on "unalternative semantics" for an approach to focus semantics which does away with F-marking: e.g. Büring 2015.

3 Background: Describing and computing meaning

3.1 Truth conditions and entailment

- We think of the meaning of a declarative sentence as its *truth conditions*: what needs to be true in the world for the sentence to be judged true.

(21) a. John likes Mary.
b. Mary likes John.
c. John and Mary like each other.

If (21c) is true, (21a) and (21b) must both be true. (21c) *entails* (21a) and (21b).

(22) a. (21c) $\Rightarrow$ (21a)
b. (21c) $\Rightarrow$ (21b)

Entailments cannot be *cancelled*. We can confirm that (21a) is a non-cancellable conclusion of (21c) because "(21c) and/but not (21a)" is judged as a *contradiction*:

(23) # John and Mary like each other and/but John does not like Mary.

Given a particular model/world, a sentence is either true (1) or false (0):

(24) $[\![$John likes Mary$]\!] = 1$ iff John likes Mary

3.2 Entailment vs presupposition

Presuppositions are background information which must be true in order to evaluate a sentence as true or false. Like entailments, they are not cancellable, but they behave differently under embedding.

(25) **Testing for presupposition by embedding (Chierchia and McConnell-Ginet, 1990):**
Sentence A requires B. We want to know whether B is a presupposition or not.
Consider the following sentences, which embed A:
a. *Negation:* It is not the case that A.
b. *Yes/no question:* Is it the case that A?
c. *Possibility modal:* It might be the case that A.
d. *Conditional:* If A, then ...
If such sentences also require B, B is a presupposition of A.

(26) **Another test for presupposition: "Hey, wait a minute!" (von Fintel, 2004)**
If B is a presupposition of A, another speaker can reply to A with "Hey, wait a minute! I didn't know that B!"

Recall that *Alex only took the TURTLE to school* expresses (i) that Alex took the turtle to school (the prejacent is true) and (ii) that Alex didn't take other things to school.

- Horn (1969) claims the (i) meaning is a presupposition, whereas the (ii) meanings are asserted (truth-conditional). This is motivated by data like (27):

(27) It's *not* the case that [Alex *only* took [the turtle]$_F$ to school].

a. # ...he didn't take the turtle to school.

b. ✓ ...he also took the PIG to school.

The negation in (27) only negated the (ii) meaning. So (27) roughly means:

(27′) i. Alex took the turtle to school, ← *unaffected by the negation!*

ii. It's not the case that [Alex did not take the {pig, dog,...} to school].
$\iff$ Alex did take one of the {pig, dog,...} to school.

3.3 Computing meaning

(28) ***The Principle of Compositionality:*** The meaning of a linguistic expression is built of the meaning of its constituent parts, in a systematic fashion.

Every linguistic expression has a *semantic type*:

- Individuals are type e and in D_e e.g. proper names
- Truth values are type t and in $D_t = \{0, 1\}$ e.g. sentences
- A function from type τ to σ is type $\langle \tau, \sigma \rangle$ and in $D_{\langle \tau, \sigma \rangle}$

We will use *λ notation* for defining functions:

(29) $f = \lambda x \,.\, x + 1$

For example, $f(5) = [\lambda x \,.\, x + 1](5) = 5 + 1 = 6$. Applying a function to an argument means "replacing" instances of the *outermost* λ variable with the argument (5) in the value description. We should be more specific and clarify that arguments of f need to be in D_n:

(30) $f = \lambda x : x \in D_n \,.\, x + 1$ $\qquad$ $f = \lambda \underbrace{x}_{\text{argument variable}} : \underbrace{x \in D_n}_{\text{domain condition}} \,.\, \underbrace{x + 1}_{\text{value description}}$

If the domain condition is not met, the result is undefined. For example, $f(\text{John})$ is undefined because John $\notin D_n$. We can also use this notation for functions like (31):

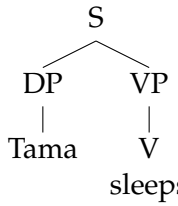
(31) $[\![\text{sleep}]\!] = \lambda x : x \in D_e \,.\, (1 \text{ iff } x \text{ sleeps})$

$[\![\text{sleep}]\!]$ takes an argument of type e and returns a value of type t, so $[\![\text{sleep}]\!]$ is type $\langle e, t \rangle$.

(32) ***Functional Application (FA):***

If α is a branching node, $\{\beta, \gamma\}$ is the set of α's daughters, and $[\![\beta]\!]$ is a function whose domain contains $[\![\gamma]\!]$, then $[\![\alpha]\!] = [\![\beta]\!]([\![\gamma]\!])$.

(33)



$[\![\text{S}]\!] = [\![\text{sleep}]\!]([\![\text{Tama}]\!])$ by FA

$= \underbrace{[\lambda x : x \in D_e \,.\, (1 \text{ iff } x \text{ sleeps})]}_{\text{function}} \underbrace{(\text{Tama})}_{\text{argument}}$

$= 1$ iff Tama sleeps

3.4 Notes on notation

Four shortcuts people often take with λ notation:

1. If the function returns a truth value, instead of writing "1 iff [condition]," just write "[condition]": $[\![\text{sleep}]\!] = \lambda x : x \in D_e \,.\, x$ sleeps
   But important: $[\![\text{Tama sleeps}]\!] = [\lambda x : x \in D_e \,.\, x \text{ sleeps}](\text{Tama}) = 1$ iff Tama sleeps
   In other words, the "1 iff" *reappears* when describing the resulting truth value of type t.
   This part can be confusing — it's discussed in Heim and Kratzer 1998 pages 36–37.
2. If the domain condition is of the form $x \in ...$, then just add it to the argument variable: $[\![\text{sleep}]\!] = \lambda x \in D_e \,.\, x$ sleeps
3. If the domain condition is of the form $x \in D_e$, just leave it off. The default type for arguments is type e: $[\![\text{sleep}]\!] = \lambda x \,.\, x$ sleeps
4. If the domain condition is of the form $x \in D_\tau$, then just add the type as a subscript $_\tau$ to the variable: $[\![\text{sleep}]\!] = \lambda x_e \,.\, x$ sleeps
   H&K does *not* use this last shortcut, but you see it in the literature.

Some mathy notation which is often used:

- $\in$ *member of (a set)*
- $\subseteq$ *subset*
- $\rightarrow$ *if...then...*
- $\forall$ *for all...*
- $\exists$ *there exists...*

3.5 Quantifiers

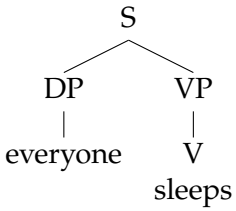
(34) a. $[\![\text{everyone}]\!] = \lambda Q_{\langle e,t\rangle} \,.\, \forall x \in D_e \,[x \text{ is animate} \rightarrow Q(x) = 1]$

b. $[\![\text{someone}]\!] = \lambda Q_{\langle e,t\rangle} \,.\, \exists x \in D_e \,[x \text{ is animate and } Q(x) = 1]$

c. $[\![\text{no one}]\!] = \lambda Q_{\langle e,t\rangle} \,.\, \nexists x \in D_e \,[x \text{ is animate and } Q(x) = 1]$

Quantificational DPs are type $\langle\langle e,t\rangle,t\rangle$. In other words, they take the VP as their argument.

(35)



$[\![S]\!] = [\![\text{everyone}]\!]\,([\![\text{sleep}]\!])$ by FA

$= \underbrace{\left[\lambda Q_{\langle e,t\rangle} \,.\, \forall y \in D_e \,[y \text{ is animate} \rightarrow Q(y) = 1]\right]}_{\text{function}} \underbrace{(\lambda x : x \in D_e \,.\, (1 \text{ iff } x \text{ sleeps}))}_{\text{argument}}$

$= 1 \text{ iff } \forall y \in D_e \;\; [y \text{ is animate} \rightarrow [\lambda x : x \in D_e \,.\, (1 \text{ iff } x \text{ sleeps})]\,(y)]$

$= 1 \text{ iff } \forall y \in D_e \,[y \text{ is animate} \rightarrow y \text{ sleeps}]$

3.6 Movement

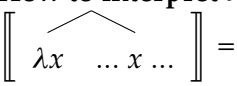
(36) **The interpretation of movement:**

Pick an arbitrary variable, such as x.

a. The base position of movement is replaced with a *trace*; $[\![t]\!] = x$, type e.

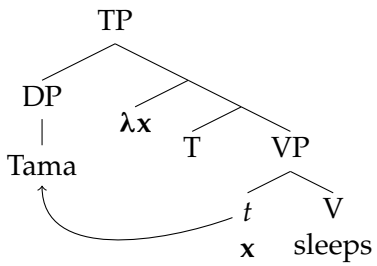
b. A *λ-binder* λx is adjoined right under the target position of the movement chain.

(37) **How to interpret λs in trees:**



$= \lambda x \,.\, \ldots x \ldots$

(38) **A more realistic syntax for *Tama sleeps*:**



where $[\![T]\!] = \lambda v_t \,.\, v$ (an identity function)

3.7 Movement and scope

(39) a. It is required that no student sleep. (required > no)

1 iff it must be true that $\underbrace{\left[\not\exists x \in D_e \ \underbrace{[x \text{ is animate and } x \text{ sleeps (during class)}]}_{\text{scope of } no}\right]}_{\text{scope of } required}$

b. No student is required to sleep. (no > required)

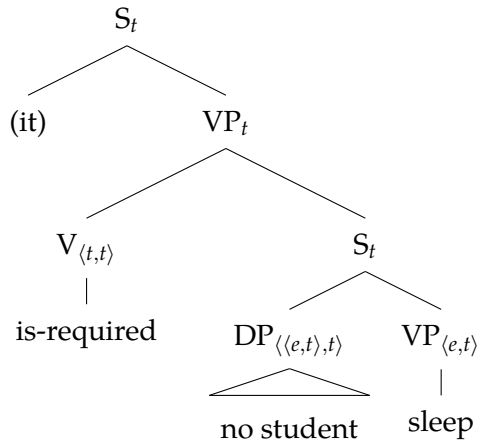
1 iff $\not\exists x \in D_e \ \underbrace{\left[x \text{ is animate and it must be true that } \underbrace{[x \text{ sleeps (during class)}]}_{\text{scope of } required}\right]}_{\text{scope of } no}$

Consider the overly simplistic $\langle t, t\rangle$ lexical entry for "is required," where "is required" takes a proposition (type t) and requires that it be true:

(40) $[\![\text{is-required}]\!]_{\langle t,t\rangle} = \lambda p_t$. it must be true that p

Assume the following simplified syntactic structure for (39), where *it* is uninterpreted:

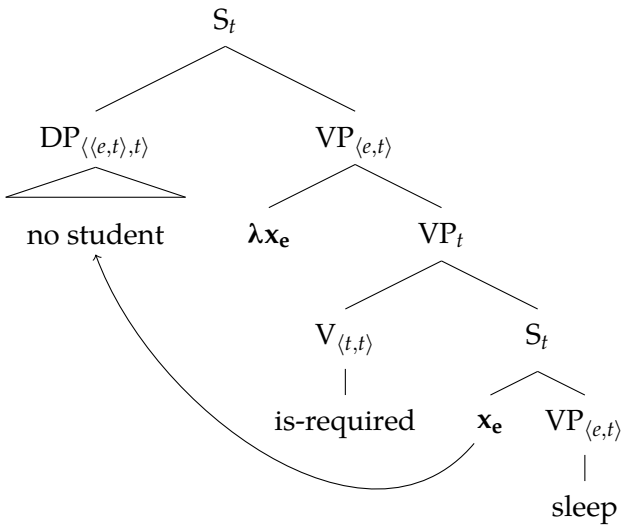
(41)



(42) $[\![\text{no student}]\!] = \lambda Q_{\langle e,t\rangle}$. $\not\exists x \in D_e$ [x is a student and $Q(x) = 1$]

Raising the subject to a position above *required* changes the interpretation in a predictable way:

(43)



Movement can also account for *scope ambiguities*:

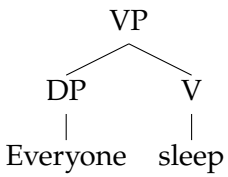
(44) Everyone does not sleep (during class).

a. 1 iff $\forall x \in D_e$ $\underbrace{\left[x \text{ is animate} \rightarrow \text{it's false that } \underbrace{[x \text{ sleeps (during class)}]}_{\text{scope of } not} \right]}_{\text{scope of } \forall}$ ($\forall > not$)

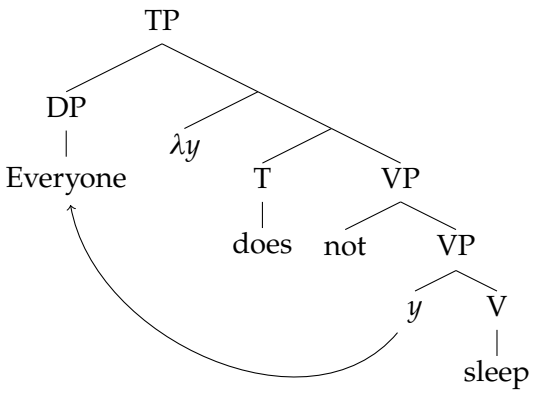
b. 1 iff it's false that $\underbrace{\left[\forall x \in D_e \ \underbrace{[x \text{ is animate} \rightarrow x \text{ sleeps (during class)}]}_{\text{scope of } \forall} \right]}_{\text{scope of } not}$ ($not > \forall$)

Following the VP-internal subject hypothesis, assume that the subject started lower and moved to Spec,TP:

Step 1: Build subject in Spec,VP



Step 2: Add *not* + T, move subject DP to Spec,TP

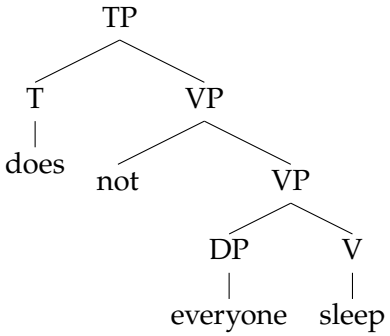


(45) $[\![\text{not}]\!] = \lambda v_t \, . \, v = 0$

If we interpret this structure directly, we yield the *surface scope* reading: $\forall > not$ (44a).

How do we get reading (44b)? One option: *pretend the movement didn't take place*.

At Logical Form (LF): Pretend the movement didn't happen



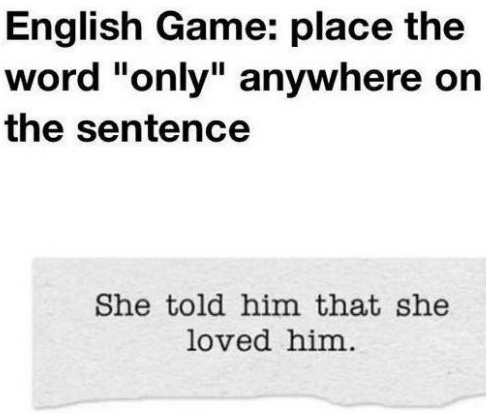
Exercise: Interpret this tree.

This yields the *inverse scope* interpretation. The process of "ignoring" movement at LF is called *syntactic reconstruction*.

LFs can also vary from the surface structure in having movements which are not reflected in the surface form, which is often called *Quantifier Raising (QR)*.

4 The geometry of focus association

Here's a minor meme from the mid-2000's internet (tumblr):



(46) **Questions to ask in the focus particle game:**

a. Where can the focus particles go?

b. Where can its *focus associate* be?[1]

c. What scope can the focus particle take?

d. (And not a geometry question, but: What meaning does the focus particle contribute?)

These are excellent questions to look at for your workshop presentations. We'll start with questions (a) and (b).

4.1 Two English *only*s and the c-command requirement

English *only* comes in two types, which I call "sentential" and "constituent" (in analogy with sentential vs constituent negation):

(47) a. I **only** [$_{VP}$ introduced [Sue]$_F$ to Mary. *sentential only*

b. I introduced **only** [$_{DP}$ Sue]$_F$ to Mary. *constituent only*

Claims:

- *Only* is adjoined to the clausal spine (e.g. *v*P) in (a) but to a DP in (b).
- (47a) and (47b) are semantically equivalent. (But we discuss scope possibilities in §5.2.)

[1] "Focus associate" here is a noun — the focused constituent that a focus particle "associates" with.

Jackendoff (1972) shows that, given a fixed position of *only*, the possible constituents it can associate with vary greatly between these two types of *only*s: (Exx based on his ex 6.89–6.92)

(48) **Possible associates of sentential *only*:**

a. * JOHN had *only* given his daughter a new bicycle.
b. ✓ GIVEN
c. ✓ HIS
d. ✓ DAUGHTER
e. ✓ NEW
f. ✓ BICYCLE

(49) **Some positions for constituent *only*:**

a. ✓ *Only* JOHN had given his daughter a new bicycle.
b. * GIVEN
c. * HIS
d. * DAUGHTER
e. * NEW
f. * BICYCLE

(50) a. * JOHN had given *only* his daughter a new bicycle.
b. * GIVEN
c. ✓ HIS
d. ✓ DAUGHTER
e. * NEW
f. * BICYCLE

(51) a. * JOHN had given his daughter *only* a new bicycle.
b. * GIVEN
c. * HIS
d. * DAUGHTER
e. ✓ NEW
f. ✓ BICYCLE

► Both sentential and constituent *only* can associate with any focused constituent in its sister (or the entire sister).

(52) ***The c-command requirement*** **on association with focus:** (Jackendoff, 1972; Rooth, 1985; Tancredi, 1990; Aoun and Li, 1993; McCawley, 1996; Bayer, 1996, a.o.)
A focus particle must c-command its associate.

There are good semantic reasons (§5.1) why focus association requires c-command (at least for sentential particles). However, there are also some (apparent) exceptions.

4.2 Association with moved material

English sentential *even* and *also* can associate with material which has moved out of its scope.

(53) **Association with a topicalized phrase:**

a. * [John]$_F$, they *only* consider ___ intelligent.

b. ✓ [John]$_F$, they *even* consider ___ intelligent. (Kayne, 1998, fn. 75)

c. ✓ [John]$_F$, they *also* consider ___ intelligent.

Jackendoff (1972) noted that *even* but not *only* can associate with a leftward subject:

(54) **Association with a leftward subject:**

a. * A [professor]$_F$ will *only* come to the party.

b. ✓ A [professor]$_F$ will *even/also* come to the party.

With the VP-internal subject hypothesis, (54) can be unified with (53).

(55) **Leftward association across raising vs control:**

a. ✓ A [professor]$_F$ seems to *even* be at the party. *raising*

b. * A [professor]$_F$ wants to *even* be at the party. *control*

This contrast is explained under the common view that raising involves a movement chain, but the control construction does not:

(56) a. ✓ [A [professor]$_F$] seems to *even* [[a [professor]$_F$] be at the party]. *raising*

b. * [A [professor]$_F$]$_i$ wants to *even* [PRO$_i$ be at the party]. *control*

Contrasts such as (55) form an argument that it is not the case that *even* (and *also*) can freely associate with focused constituents outside of their scope (contra Krifka 1998): *Even* and *also* can associate with material which originated within their scope.[2]

- **Erlewine (2014a,b):** Adopt the Copy Theory of movement (Chomsky, 1993). When a focus particle seems to associate with a constituent which has moved out of its scope, it is actually associating with the F-marked material in the lower copy of the movement chain, which may be unpronounced. The resulting meaning is interpretable in the case of *even* and *also*, but ungrammatical in the case of *only*.

[2] It turns out that there are subtle differences between association with *even* and *also*; see the appendix to chapter 5 in Erlewine 2014b.

4.3 "Association from within"

There are some examples where a focus particle is (or appears to be) properly contained within its focus associate:

(57) **Japanese (Kotani, 2008):**

Ano kin-medarisuto-wa UTA-**sae** dashi-ta.
that gold-medalist-TOP song-even release-PAST

a. Context: That athlete has been selling a lot of products since they won their gold medal. They released a photo album and released an autobiography... 'That gold medalist even released [a song]$_F$.' object focus

b. Context: That athlete has been doing a lot of newsworthy things since they won their gold medal. They have been on TV and have been dating a famous actor... 'That gold medalist even [released a song]$_F$.' VP focus

Notice that the focused constituent in (57b) is the VP, which contains the focus particle *sae* 'even.' Chris Tancredi (p.c.) calls such patterns *association from within*.

Association from within is also observed with Miyara Yaeyaman (Ryukyuan) *du*, a particle on interrogative *wh*-phrases and corresponding answer focus. (Only answers shown here.)

(58) **Miyara Yaeyaman (Davis, 2013):**

a. Subject focus:
Who made soba?
[jurie]$_F$=n=**du** tsukur-ee-ru.
Yurie=NOM=DU make-RES-PRES
'[Yurie]$_F$ made (soba).'

b. Object focus:
What did that guy eat?
[saata-tempura]$_F$=ba=**du** fa-i.
sugar-fried.dough=BA=DU eat-MED
'(He) ate [fried dough]$_F$.'

c. Broad focus:
What happened?
[hajasi-san=**du** ziroo=ba bar-i]$_F$.
Hayashi-san=DU Jiro=BA hit-MED
'[Hayashi-san hit Jiro]$_F$.'

d. VP focus:
What did that woman do?
kunu midun-pïto=o [izï=ba=**du** fa]$_F$-i.
this woman=TOP fish=BA=DU eat-MED
'This woman [ate fish]$_F$.'

Dawson (2017) documents a similar but limited pattern in Tiwa (Tibeto-Burman).

- Kotani (2008); Davis (2013); Dawson (2017) all analyze these patterns as the result of some postsyntactic morphological (or morphophonological) process which affects the placement of the particle. For Kotani, this is *Lowering* (in the DM sense; Embick and Noyer 2001); for Davis and Dawson, this is a type of second position clitic looking for an appropriate host.

5 Sentential focus particles

5.1 Analysis

What we want to capture is the following intuition:

(59) I only introduced [Sue]$_F$ to Bill.
≈ 1 iff $\forall y \in D_e$ [I introduced y to Bill $\rightarrow y$ = Sue]

(60) I only introduced Sue to [Bill]$_F$.
≈ 1 iff $\forall y \in D_e$ [I introduced Sue to $y \rightarrow y$ = Bill]

Note that the focused constituent does not have to be of type e.

(61) John only [swims]$_F$.
≈ 1 iff $\forall Q \in D_{\langle e,t \rangle}$ [Q(John) = 1 $\rightarrow Q = [\![\text{swim}]\!]$]

In the case of (61), the relevant set of properties must be other VP denotations. The sentence asserts that John has no relevant properties distinct from 'swim.'

We will use the influential *Alternative Semantics* approach of Rooth (1985, 1992). The goal is to build up the 'relevant set of alternatives' compositionally.

(62) **Definitions**:

a. Each node α has, in addition to its ordinary semantic value, a focus semantic value.

b. We will use $[\![\cdot]\!]^o$ (or: $[\![\cdot]\!]$) to compute the ordinary semantic value of a node and $[\![\cdot]\!]^f$ to compute the focus semantic value of a node.

c. $[\![\alpha]\!]^o$, the ordinary semantic value, is the value of α that we know and love.

d. $[\![\alpha]\!]^f$, the focus semantic value, is the set of all ordinary semantic values obtained by substituting alternatives for any F-marked subparts of α.

Note: (if they are both defined) $[\![\alpha]\!]^o \in [\![\alpha]\!]^f$

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

(63) a. $[\![$[Mary]$_F$ ate a sandwich$]\!]^o$ =

b. $[\![$[Mary]$_F$ ate a sandwich$]\!]^f$ =

e. $[\![$Mary [ate a sandwich]$_F]\!]^o$ =

f. $[\![$Mary [ate a sandwich]$_F]\!]^f$ =

We can compute $[\![\cdot]\!]^f$ compositionally:

(64) **A recursive definition for the computation of focus-semantic values:**

If α of type τ is F-marked: $[\![\alpha]\!]^f$ = a contextually-determined subset of D_τ.

If α is not F-marked:

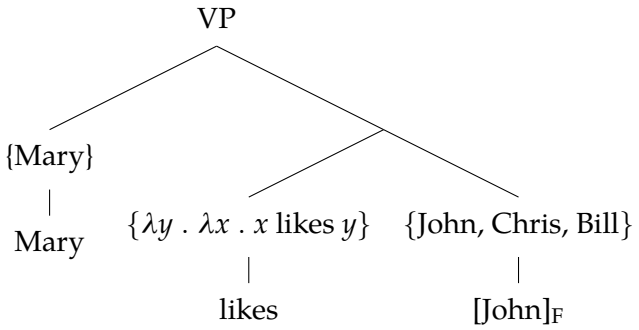
$$[\![\alpha]\!]^f = \begin{cases} \{[\![\alpha]\!]^o\} & \text{if terminal node} \\ [\![\beta]\!]^f & \text{if non-branching with daughter } \beta \\ \left\{b \circ g : b \in [\![\beta]\!]^f, g \in [\![\gamma]\!]^f\right\} & \text{if branching with daughters } \beta, \gamma \end{cases}$$

where $\circ$ is the appropriate composition rule, e.g. Functional Application.

A similar procedure was also proposed by Hamblin (1973) for the interpretation of *wh*-questions, so we call this procedure in (64) *Rooth-Hamblin alternative computation*.

Exercise: Compute the focus-semantic value of the following:

(65)



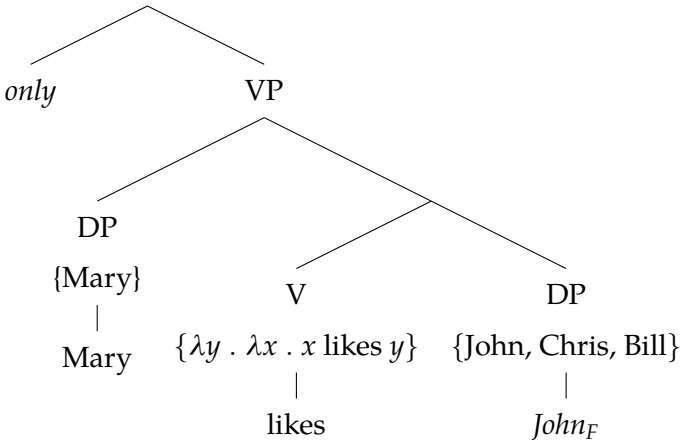
We now have a way of creating the 'relevant set of alternatives' that *only* operates on.

(66) **A *syncategorematic* one-place *only*:**

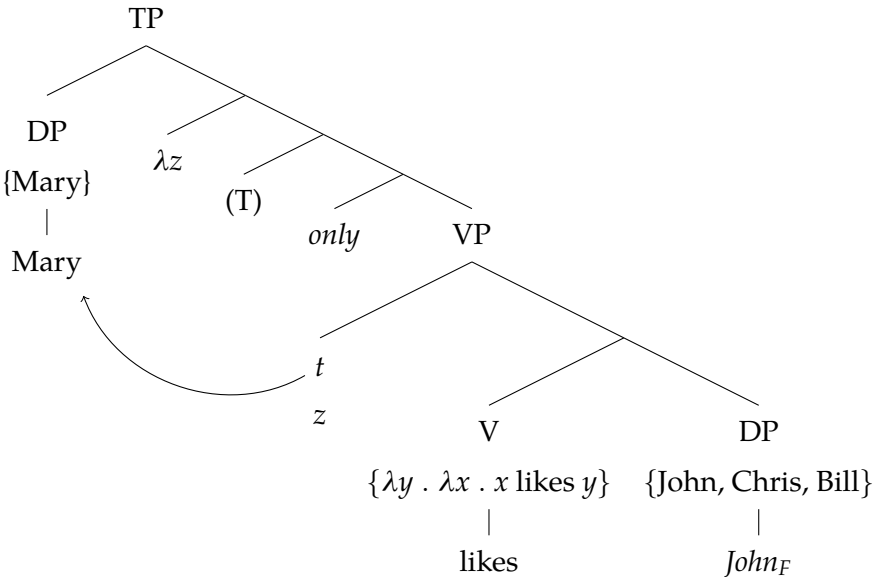
$$[\![\overbrace{\textit{only} \quad \alpha}]\!] = 1 \text{ iff } \forall q \in [\![\alpha]\!]^f \left(q \neq [\![\alpha]\!]^o \rightarrow q = 0\right)$$

Presupposition: $[\![\alpha]\!]^o = 1$

(67) **A toy LF for in-situ focus association:**



(68) **A more realistic LF for in-situ association:**



We can also use this approach to compute other focus particles, like *also* and *even*:

(69) $\left[\!\left[\overbrace{\textit{also} \quad \alpha} \right]\!\right] = 1$ iff $[\![\alpha]\!]^o = 1$

Presupposition: $\exists q \in [\![\alpha]\!]^f \left[q \neq [\![\alpha]\!]^o \text{ and } q = 1\right]$

(70) $\left[\!\left[\overbrace{\textit{even} \quad \alpha} \right]\!\right] = 1$ iff $[\![\alpha]\!]^o = 1$

Presupposition: $\forall q \in [\![\alpha]\!]^f \left[q \neq [\![\alpha]\!]^o \rightarrow [\![\alpha]\!]^o <_{\textit{likely}} q\right]$

5.1.1 What *only* negates

To say that all non-prejacent alternatives are false in (66) will run into problems:

(71) John only [swims]$_F$. (=61)

a. $\Rightarrow$ John does not run.

b. $\not\Rightarrow$ John does not breathe.

c. $\not\Rightarrow$ John does not live.

Maybe we can claim that "breathe" or "live" are reasonably not properties that are relevant alternatives here. But this approach can't be taken in some other cases:

(72) *How many kids does John have?* (Does he have two? or three? or four? or five?)
John only has [two]$_F$ kids.

a. $\Rightarrow$ John does not have three kids.

b. $\not\Rightarrow$ John does not have one kid.

► *Only* negates all alternatives that are not entailed by the prejacent. (*Only* negates everything that it can, without contradicting the prejacent.)

In (72), the prejacent "John has two kids" entails "John has one kid" so it is not negated. The prejacent does not entail "John has three kids," so it is negated.

5.1.2 Alternatives through domain restriction/squiggle (Rooth, 1985, 1992)

Observation: The alternatives that focus particles quantify over are contextually determined.
Idea (Rooth, 1985, 1992): This seems like quantificational domain restriction. (On domain restriction in general, see von Fintel (1994).)

(73) Everyone$_D$ voted for Trump.

(74) I interviewed five Republicans. Everyone$_{D'}$ voted for Trump.

Rooth (1992): The set of focus alternatives is a discourse variable C, and an operator $\sim$ ("squiggle") restricts C.
This offers a somewhat nice unification of a range of focus-sensitive phenomena (see Rooth, 1992), and allows for a non-syncategorematic treatment for the semantics of *only*:[3]

(75) $[\![\text{only}_C]\!] = \lambda p_t : p = 1 \,.\, \forall q \in C\,(q \neq p \rightarrow q = 0)$

5.1.3 Alternatives from a Question Under Discussion (Beaver and Clark, 2008)

Observation (repeated): The alternatives that focus particles quantify over are contextually determined.
Another idea (Beaver and Clark, 2008): The set of alternatives is always a Question Under Discussion (Roberts, 1996/2012) that exists in the discourse.
This naturally explains the fact that explicit questions in preceding discourse can help determine the relevant set of alternatives. Compare:

(76) *Which animal did Alex take to school?*
Alex only took [the turtle]$_F$ to school.

(77) *Which of his prized possessions did Alex take to school?*
Alex only took [the turtle]$_F$ to school.

[3] Or with the modification motivated in section 5.1.1:

(i) $[\![\text{only}]\!]_C = \lambda p_t : p = 1 \,.\, \forall q \in C\,(p \not\Rightarrow q \rightarrow q = 0)$ cf (66)

Note that there is an abuse of notation here (and everywhere else in these notes), mixing intensions and extensions ($\langle s, t\rangle$ propositions and truth values). Ask me about it.

5.2 Scope: English sentential *only*

As noted by Taglicht (1984), Rooth (1985), and others, in contrast to constituent *only* (§6.3), sentential *only* always takes surface scope:[4]

(78) a. I knew (that) he had *only* learnt [Spanish]$_F$. knew > *only*

b. I *only* knew (that) he had learnt [Spanish]$_F$. *only* > knew

(79) a. We are required to *only* study [syntax]$_F$. required > *only*

b. We are *only* required to study [syntax]$_F$. *only* > required

- There is a significant debate regarding the scope of sentential *even*. One stance is that English sentential *even* is always interpreted in its surface position. (We discuss this debate later in section 7.1.)
- On the scope of English *also* and *too*/*either*, see Rullmann (2003).

5.3 Position: Vietnamese (Erlewine, 2017b)

Vietnamese has a sentential *only* and a constituent *only* which are pronounced differently. (Similar facts hold for other focus particles in the language, too; see Hole (2013).)

(80) **Two *only*s in Vietnamese (Hole, 2013):**

a. *chỉ* is a sentential *only*; (glossed here as ONLY$_{\text{sent}}$)

b. *mỗi* is a constituent *only*. (glossed here as ONLY$_{\text{cons}}$)

(81) **Stacking the two *only*s on the subject:**

a. ✓ **Mỗi** [Nam]$_F$ mua cuốn sách.
ONLY$_{\text{cons}}$ Nam bought CL book
'Only [Nam]$_F$ bought the book.'

b. ✓ **Chỉ** [Nam]$_F$...
ONLY$_{\text{sent}}$ Nam

c. ✓ **Chỉ mỗi** [Nam]$_F$...
ONLY$_{\text{sent}}$ ONLY$_{\text{cons}}$ Nam

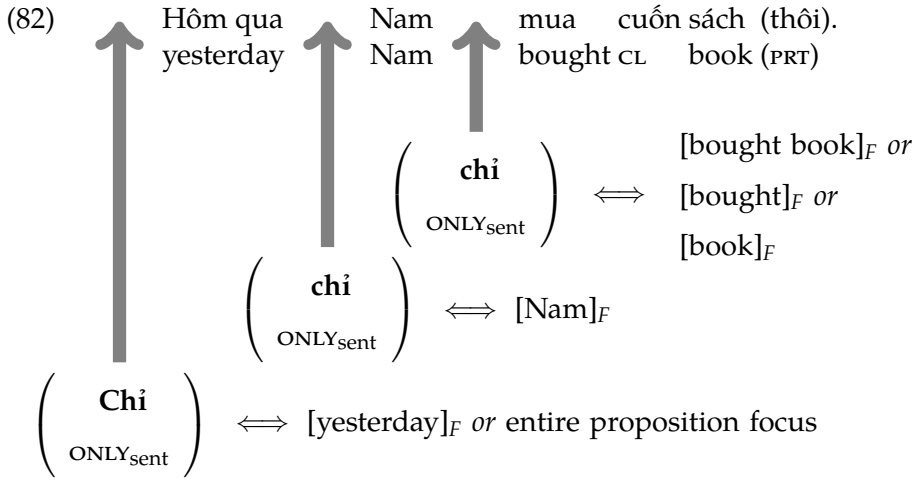
d. * **Mỗi chỉ** [Nam]$_F$...
ONLY$_{\text{cons}}$ ONLY$_{\text{sent}}$ Nam

This is what is predicted by Hole's (2013) analysis of *chỉ* as a sentential modifier and *mỗi* as a constituent modifier: the sentential *only* is necessarily linearly outside of the constituent *only*.

[4] Except in environments where negation systematically takes non-surface scope with respect to certain modals. Sentential *only* patterns with negation in these cases. For example, "John can *only* speak [Spanish]$_F$" = "John cannot speak other languages" (not > can).

Question: Given a particular position for *chỉ*, where can its focus associate be? Or given a particular position of focus, where can *chỉ* be to associate with it?

(82)



Chỉ can associate long-distance, into a lower clause, but when it does, it must be in immediately preverbal position:

(83) (***Chỉ**) Tôi ✓**chỉ** nói [$_{CP}$ là Nam thích [Ngân]$_F$ (thôi).
ONLY$_{sent}$ I ONLY$_{sent}$ say that Nam like Ngan (PRT)
'I *only* said Nam likes [Ngan]$_F$.'

(84) Tôi nói [$_{CP}$ là (***chỉ**) Nam ✓**chỉ** thích [Ngân]$_F$ (thôi).
I say that ONLY$_{sent}$ Nam ONLY$_{sent}$ like Ngan (PRT)
'I said Nam *only* likes [Ngan]$_F$.'

► Vietnamese clearly distinguishes between sentential and constituent *only*s, and we see that ONLY$_{sent}$ follows the following generalization:

(85) **Generalization (Erlewine, 2017b):**
Sentential focus particles must be as low as possible while c-commanding their focus associate, within a given phase.

Interestingly, a similar "as low as possible" requirement on the placement of sentential focus particles has been described for German (Jacobs, 1983, 1986; Büring and Hartmann, 2001) — although see Reis 2005; Meyer and Sauerland 2009; Smeets and Wagner 2016 for alternative accounts — and Mandarin Chinese (Erlewine, in progress).

6 Constituent focus particles

Three questions to ask about *constituent* focus particles (refined from (46)):

1. Where can material modified by constituent focus particles be in the clause?
2. What size material can constituent focus particles adjoin to?
3. (Again) What scope do they take?

6.1 Position: Hungarian etc.

Hungarian has an immediately preverbal focus position. We can tell whether the focus position is filled or not by the position of verbal "prefixes" (verb marker = VM):

(86) **If there's a focus or negation, "prefix" becomes post-verbal:** (É Kiss, 2002, p. 56–57)

a. János fel-olvasta a verseit
John VM-read his poems
'John read out his poems.'

b. János [tegnap]$_F$ olvasta fel a verseit
John yesterday read VM his poems
'It was yesterday that John read out his poems.'

c. János nem olvasta őket fel
John not read them VM
'John didn't read them out.'

► Hungarian *csak* is a constituent *only*; *csak*-phrases and *wh*-phrases are attracted to the focus position.[5] (É Kiss, 2002, p. 90)

(87) a. * János be-mutatott [csak [Pétert]$_F$] Marinak.
John VM-introduced only Peter-ACC Mary-DAT
'John introduced only Peter to Mary.'

b. János [csak [Pétert]$_F$] mutatott be Marinak.

(88) a. * János be-mutatott *kit* Marinak?
John VM-introduced whom Mary-DAT
'Whom did John introduce to Mary?'

b. János *kit* mutatott be Marinak?

...but if there's more than one:

(89) **Only one *only*-phrase moves, and it's scope-rigid:** (É Kiss, 2002, p. 91)

a. [Csak [Mari]$_F$] kapott [csak [két]$_F$ tárgyból] jelest
only Mary received only two subject-from A+
only M > only two: 'It was only Mary who got an A+ only in two subjects.'

[5] also negative existential quantifiers ('few...'), negative adverbs of degree ('hardly,' 'seldom,'...), and negative adverbs of manner ('badly').

b. [Csak [két]$_F$ tárgyból] kapott [csak [Mari]$_F$] jelest
only two subject-from received only Mary A+
only two > only M: 'It was only in two subjects in which only Mary got an A+.'

...and if there's a *wh* and an *only*:

(90) **Move the *wh*-phrase** (É Kiss, 2002, p. 91)

a. *Ki* látta [csak [Pétert]$_F$]?
who saw only Peter-ACC
'Who saw only Peter?'

b. * [Csak Pétert] látta *ki*?

► There is exactly one focus position per clause. *Wh* wins over focus.

Még...is 'even' also associates with focus, but the *még...is*-phrase *cannot* be moved to the focus position:

(91) a. Mari el-késett [még [az esküvőjéről]$_F$ is].
Mary-NOM VM-late.PAST MEG the wedding-her-from IS
'Mary was even late for [her wedding]$_F$.'

b. * Mari [még [az esküvőjéről]$_F$ is] késett el ___.
Mary-NOM MEG the wedding-her-from IS late.PAST VM

Note that the constituent moved to the focus position is not necessarily the F-marked constituent itself (and its particle):

(92) **The focus can be a subpart of the focus position:** (Horvath, 2007, p. 21)

a. [[Mary]$_F$ Pesten lakó fiát] hívták fel ___.
Mary-NOM Pest-on living son-hers-ACC called.3PL up
'They called up [[Mary]$_F$'s son living in Pest].'

b. [Mari [Pesten lakó]$_F$ fiát] hívták fel ___.
Mary-NOM Pest-on living son-hers-ACC called.3PL up
'They called up [Mary's son [living in Pest]$_F$].'

c. [Mari Pesten lakó [fiát]$_F$] hívták fel ___.
Mary-NOM Pest-on living son-hers-ACC called.3PL up
'They called up [Mary's [son]$_F$ living in Pest].'

In a (perhaps deep) parallel with the behavior of *wh*-movement, we call this *pied-piping*. (Unfortunately I have not found an example of *csak* 'only' with pied-piping.)

Because of this pied-piping behavior, Horvath (2000, 2007) argues that it is not exactly the F-marked constituent that is fronted, but rather a constituent *containing the focus*.

The idea:

1. *Csak* 'only' or a covert particle with cleft semantics (which Horvath calls *EI*) adjoins to a constituent containing a focus.
2. The focus position attracts *csak*/EI-phrases. It is *not* attracting [F].

This is exactly parallel to Cable's (2010) the analysis of *wh*-pied-piping, involving "Q-particles" adjoined to *wh*-containing phrases.

Note that this description also applies perfectly to movement in English *it*-cleft formation:

(93) **English *it*-cleft pivots exhibit pied-piping:** (also noted in Velleman et al., 2012)

a. It's (only) [[Mary]$_F$'s son living in Pest] that they called up ___.

b. It's (only) [Mary's [son]$_F$ living in Pest] that they called up ___.

c. It's (only) [Mary's son [living in Pest]$_F$] that they called up ___.

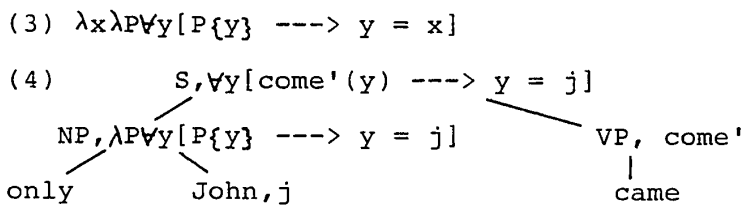
Bigger question:

- Earlier (page 7), we wondered whether any language realizes [F] with a morpheme (other than requiring prosodic prominence). I suspect that the answer is *no*.
- ► Similarly, we could ask whether any language syntactically targets (for agreement or movement) F-marked constituents. I again suspect that the answer is *no*.
- In all cases that I'm aware of, what may appear to be syntactic targeting of focused constituents is in reality targeting a focus-containing phrase of some limited size.

6.2 Analysis

Rooth (1985) sketches the following proposal for constituent *only*:

(94) Rooth (1985, p. 28):



With types:

(95) **A two-place *only*:**

$[\![\text{only}]\!]_{\langle e,\langle\langle e,t\rangle,t\rangle\rangle} = \lambda x_e \,.\, \lambda P_{\langle e,t\rangle} \,.\, \forall y \in D_e\, [P(y) \rightarrow y = x]$

A couple notes:

1. The prejacent presupposition is not illustrated here. It would be $P(x) = 1$.

2. The semantic type of an *only*-phrase (*only* and its sister) is type $\langle\langle e,t\rangle,t\rangle$, the type of quantificational DPs. We predict that *only* might be able to participate in scope ambiguities in the way that quantifiers can, via *Quantifier Raising* (QR).

   Non-subject *only*-phrases will require QR for type reasons (not discussed in the semantics crash course, but see Heim and Kratzer 1998 ch. 7).

This is a good first approximation of constituent *only*, but it's ultimately untenable. We need to revise the analysis in two ways: to make it focus-sensitive within *only*'s sister and type-flexible.

6.2.1 Make it focus-sensitive within the sister

- (95) works when *only*'s sister is the F-marked constituent. But it's not sensitive to the placement of F-marking *within* the sister of *only*.

(96) **The choice of focus within the sister of *only* matters too:**

a. [Only [$_{DP}$ [Mary]$_F$'s son]] likes John.

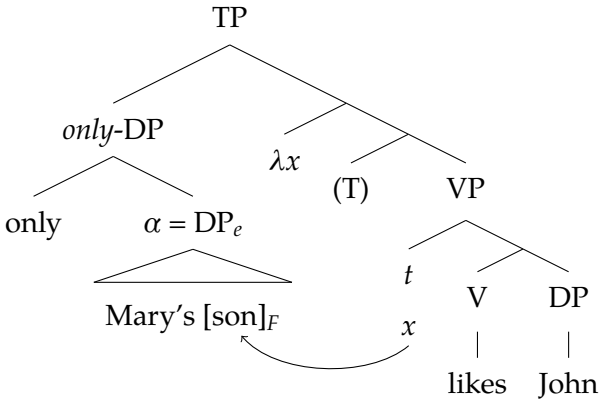
b. [Only [$_{DP}$ Mary's [son]$_F$]] likes John.

We also saw this same effect in Hungarian focus fronting (clefting) (92) and in English cleft pied-piping (93).

(97) **A focus-sensitive two-place *only*:**

$$\left[\!\!\left[\overset{\frown}{only \quad \alpha_e} \right]\!\!\right] = \lambda P_{\langle e,t\rangle} : P\left([\![\alpha]\!]^o\right) = 1 \,.\, \forall x \in [\![\alpha]\!]^f \left(x \neq [\![\alpha]\!]^o \rightarrow P(x) \text{ is false}\right)$$

(98) **Computing *only* with overt pied-piping (96b):**



(99) $[\![\alpha]\!]^f = \left\{ \begin{array}{l} \text{Mary's son,} \\ \text{Mary's daughter,...} \end{array} \right\}$

(100) $[\![[\text{only } \alpha]]\!]^o = \lambda P_{\langle e,t\rangle} : P(\text{M's son}) = 1 \;.\; \forall x \in \left\{ \begin{array}{l} \text{M's son,} \\ \text{M's daughter,...} \end{array} \right\}$
$[x \neq \text{M's son} \rightarrow P(x) \text{ is false}]$

To be clear, under this view, the interpretation of a constituent focus particle involves both movement (for scope-taking of *only*) and Rooth-Hamblin alternative computation (for further sensitivity into the sister of *only*).

(101) $[_{\text{pied-piping}}$ *only* Mary's [son]$_F$] λx [T [x likes John]].
Rooth-Hamblin alternatives *movement*

6.2.2 Make it type-flexible

- A further problem is that the analyses above require the sister of *only* to be type e.
  - Something would have to change if we wanted to take a DP of type $\langle\langle e,t\rangle,t\rangle$.
  - Something would have to change if we wanted to take a PP of type ???.

Exercise: Fix this. Or look up an (imperfect?) answer in Wagner (2006a) or Erlewine and Kotek (2018).

6.3 Scope: English constituent *only* (Taglicht, 1984)

Taglicht (1984) shows that English constituent *only* in non-subject position introduces scope ambiguities:

(102) I knew (that) he had learnt [*only* [Spanish]$_F$] (Taglicht, 1984, p. 150)

a. knew > *only*:
I knew he *hadn't* learnt any other language.

b. *only* > knew:
I *didn't* know he had learnt any other language.

(103) We are required to study [*only* [syntax]$_F$]. (Rooth, 1985, p. 90)

a. required > *only*:
We are required to *not* study {semantics, phonology,...}.
$\Longleftrightarrow$ we are not allowed to study {semantics, phonology,...}.

b. *only* > required:
We are *not* required to not study {semantics, phonology,...}.

Quantifiers can QR to different heights (always adjoining to a propositional node—type t) and that this could be the source of scope ambiguities. We can model the ambiguities above in this way.

Two things to note:

1. For regular quantifiers, it is generally believed that QR cannot escape finite clauses.

   (104) * A different student$_i$ thought/knew [$_{CP}$ that she$_i$ had studied every language].
   Intended: 'For every language$_j$, a different student$_i$ thought/knew that she$_i$ had studied it$_j$.'

   (105) ✓ A different student is required [$_{\text{nonfinite}}$ to study every language].
   'For every language$_j$, a different student is required to study it$_j$.'

   If the wide-scope reading of *only* in (102) is due to QR of the *only*-phrase, this QR seems to be exceptional.

2. The ambiguities above (and other examples given by Taglicht and Rooth) all have an *only*-phrase in non-subject position. Bayer (1996, pp 59–61) notes that *only* on subjects of finite clauses do not lead to these types of ambiguities, and instead only have surface scope.

   (106) ***Only* on subjects of finite clause embeddings do not take wide scope:**
   They believe [(that) only [John]$_F$ is stupid].
   a. ✓ believe > *only*:
   They believe that {Mary, Sue,...} are *not* stupid.
   b. * *only* > believe:
   They do not believe that {Mary, Sue,...} are stupid.

   Note that this is not a general requirement for pre-subject *only* to take surface scope. *Only* on subjects of nonfinite clauses (ECM embeddings and small clauses) can take wider scope:

   (107) ***Only* on nonfinite subjects can take wide scope (Bayer, 1996, p. 60):**
   a. They find [$_{SC}$ only [John]$_F$ stupid].
   b. They believe [$_{TP}$ only [John]$_F$ to be stupid].

   Bayer (1996) attributes this difference between finite subjects (106) and nonfinite subjects (107) to the Empty Category Principle, a syntactic rule governing the movement of some subjects.

6.4 Scope: Japanese and Korean *only*

In Japanese and Korean, focus particles can be inside or outside postpositions/case markers, with consequences for their scope possibilities:

(108) **Japanese *dake* 'only' (Futagi, 1998, p. 95):**

a. [Taro]$_F$-ni-**dake** denwa-dekiru.
Taro-DAT-only telephone-can.do
   i. * '*pro* can call Taro alone.' (*can > only)
   ii. ✓ 'The only person *pro* can call is Taro.' (only > can)

b. [Taro]$_F$-**dake**-ni denwa-dekiru.
Taro-only-DAT telephone-can.do
   i. ✓ '*pro* can call Taro alone.' (can > only)
   ii. ✓ 'The only person *pro* can call is Taro.' (only > can)

(109) **Korean *man* 'only' (Lee, 2005, p. 172):**

a. *man* goes outside of *-ekey* 'to'; inside of ACC

motun-salam-i [Mary]$_F$-{ekey-**man**/**man**-ul} senmwul-ul cwuessta.
every-person-NOM Mary-to-only/only-ACC gift-ACC gave

'Everyone gave a gift {only} to {only} Mary.'

   i. ✓ Everyone gave a gift to Mary and no one else. (every > only)
   ii. * Mary is the only person that everyone gave a gift to. (*only > every)

b. Scrambled *man*-ACC must reconstruct:

[Mary]$_F$-**man**-ul motun-salam-i ___ senmwul-ul cwuessta.
Mary-only-ACC every-person-NOM gift-ACC gave

'Only Mary, everyone gave a gift.'

   i. ✓ Everyone gave a gift to Mary and no one else. (every > only)
   ii. * Mary is the only person that everyone gave a gift to. (*only > every)

c. Scrambled *-ekey-man* can take wide scope:

[Mary]$_F$-ekey-**man** motun-salam-i ___ senmwul-ul cwuessta.
Mary-to-only every-person-NOM gift-ACC gave

'Only to Mary, everyone gave a gift.'

   i. ✓ Everyone gave a gift to Mary and no one else. (every > only)
   ii. ✓ Mary is the only person that everyone gave a gift to. (only > every)

► See Lee (2004, 2005) for an interesting analysis of the Korean facts, where *man* is a reflex of agreement with a higher, abstract ONLY. Futagi (1998, 2004) takes a different approach with the Japanese facts, proposing that postposition-internal *dake* and postposition-external *dake* are fundamentally different items.

7 More on focus particle meanings

7.1 Scale reversal with *even*

Recall that *even* introduces a presupposition ($\rightsquigarrow$) that its prejacent is less likely than its alternatives.[6]

(110) $\left[\!\!\left[\overset{\frown}{even \quad \alpha} \right]\!\!\right] = 1$ iff $[\![\alpha]\!]^o = 1$ (=70)

Presupposition: $\forall q \in [\![\alpha]\!]^f \left[q \neq [\![\alpha]\!]^o \rightarrow [\![\alpha]\!]^o <_{likely} q \right]$

(111) Bill even read [*Syntactic Structures*]$_F$.

$\rightsquigarrow$ For all alternatives x to *Syntactic Structures*:

(Bill read *Syntactic Structures*) $<_{likely}$ (Bill read x)

- Karttunen and Peters (1979) observed that this scalar inference of *even* is reversed in downward-entailing environments.

(112) ***Scale reversal* of *even*:**

Bill didn't even read [*Syntactic Structures*]$_F$.

$\rightsquigarrow$ For all alternatives x to *Syntactic Structures*:

(Bill read *Syntactic Structures*) $>_{likely}$ (Bill read x) (cf 111)

There are broadly two approaches to this scale reversal behavior:

1. *Ambiguity theory:*

   There is an NPI *even*, whose scalar meaning is reversed (Rooth, 1985; Rullmann, 1997; Erlewine, 2014b, to appear, a.o.):

   (113) $\left[\!\!\left[\overset{\frown}{even_{\text{NPI}} \quad \alpha} \right]\!\!\right] = 1$ iff $[\![\alpha]\!]^o = 1$

   Presupposition: $\forall q \in [\![\alpha]\!]^f \left[q \neq [\![\alpha]\!]^o \rightarrow [\![\alpha]\!]^o \underline{\geq_{likely}} q \right]$

   The *even* in (110) is then either a PPI or in some sort of blocking relationship with $even_{\text{NPI}}$.

[6] Or less expected / more noteworthy etc...; see discussion in Bennett (1982); Kay (1990); Lycan (1991).

Note that there are languages where these two forms of *even* are pronounced differently (König, 1991; von Stechow, 1991; Rullmann, 1997; Giannakidou, 2007; Lahiri, 2008, a.o.):

	even (positive)	$even_{\text{NPI}}$
Dutch	*zelfs*	*zelfs maar* 'even only,' *ook maar* 'also only'
Finnish	*jopa*	*edes*
German	*sogar*	*auch nur*
Greek	*akomi*	*oute*
Spanish	*incluso*, *hasta*	*siquiera*
Swedish	*tom*	*ens*

2. *Scope theory:*

   Even in examples such as (112) takes higher scope than its pronounced position (Karttunen and Peters, 1979; Wilkinson, 1996; Guerzoni, 2004; Nakanishi, 2012, a.o.).

   (114) **Interpreting (112) using the scope theory:**

   a. LF: *even* [$_{\alpha}$ Bill didn't read [*Syntactic Structures*]$_{\text{F}}$]

   b. *even* $\rightsquigarrow$ For all alternatives x to *SS*:
   (Bill didn't read *SS*) $<_{likely}$ (Bill didn't read x)
   $\iff$ For all alternatives x to *SS*:
   (Bill read *SS*) $>_{likely}$ (Bill read x)

► The scope theory is very clever and attractive. I also think it's wrong, at least for English sentential *even*.

In the scope theory, the mismatch between the pronounced and interpreted positions of *even* is often described as covert movement, but this "movement" would not leave a semantically contentful trace (see e.g. LFs given in Wilkinson 1996, Guerzoni 2004. It also doesn't obey regular constraints on movement, such as islands (Rullmann, 1997).

(115) **Scale-reversed *even* inside a relative clause (Rullmann, 1997, p. 48):**
They hired no linguist who had even read [*Syntactic Structures*]$_{\text{F}}$.

(116) **Predicted meaning from the scope theory:**
LF: *even* [they hired no linguist who had read [*Syntactic Structures*]$_{\text{F}}$]
even $\rightsquigarrow$ For all alternatives x to *SS*:
(they hired no linguist who had read *SS*) $<_{likely}$ (they hired no linguist who had read x)
$\iff$ For all alternatives x to *SS*:
(they hired a linguist who had read *SS*) $>_{likely}$ (they hired a linguist who had read x)

(116) predicts a presupposition for *even* in (115) which does seem to accord with our intuitions. But notice that *even* had to move out of a relative clause island at LF.

In contrast, under the ambiguity theory (with appropriate tweaks from Erlewine 2014b, to appear), $even_{\text{NPI}}$ interpreted in (115) would yield the following meaning:

(117) **Predicted meaning from the ambiguity theory:**

LF: They hired no linguist who had $even_{\text{NPI}}$ read $[\textit{Syntactic Structures}]_{\text{F}}$.

$$even_{\text{NPI}} \rightsquigarrow \textsc{gen}(y \text{ linguist}) \left(\begin{array}{l} \text{for all alternatives } x \text{ to } SS\text{:} \\ (y \text{ had read } SS) >_{likely} (y \text{ had read } x) \end{array} \right)$$

Practically, it seems very difficult to distinguish the inferences predicted in (116) and (117).

Finally, Nakanishi (2012) offers a clever recent argument for the scope theory, but ultimately I do not think the argument goes through (Erlewine, to appear).

7.2 Anaphoric *also*

Previously we proposed that *also* introduces an *additive* presupposition, that another alternative is true. We would imagine this meaning would apply to *too*, too.

(118) $\left[\!\!\left[\overset{\frown}{\textit{also} \quad \alpha} \right]\!\!\right] = 1$ iff $[\![\alpha]\!]^o = 1$ (=69)

Presupposition: $\exists q \in [\![\alpha]\!]^f \left[q \neq [\![\alpha]\!]^o \text{ and } q = 1 \right]$

But consider the following examples with *too* or *also*.

(119) Tonight, $[\text{John}]_{\text{F}}$ is having dinner in New York, too.

(120) Tonight, $[\text{John}]_{\text{F}}$ is also having dinner in New York.

- Kripke (1990/2009) notes that the use of *too* (or *also*) in such examples should almost always be natural, because the speaker and hearer should almost always be able to assume or accommodate that someone else besides John is having dinner in New York tonight.

We instead need *also/too* to be *anaphoric* to a previously mentioned alternative proposition in the discourse.

(121) $\left[\!\!\left[\overset{\frown}{\textit{also} \quad \alpha} \right]\!\!\right] = 1$ iff $[\![\alpha]\!]^o = 1$ (=69)

Presupposition: $\exists q \in [\![\alpha]\!]^f \left[q \neq [\![\alpha]\!]^o \text{ and } \underline{q \text{ is in the discourse}} \text{ and } q = 1 \right]$

- Wagner (2013) identifies another constraint on the meaning of additives: The prejacent cannot entail or be entailed by the anaphoric alternative.

(122) # Someone solved the problem. Everyone also solved the problem.

7.3 The additive part of *even*

That *even* introduces a scalar presupposition is uncontroversial. There is, however, controversy around whether *even* also has an additive meaning or not.

(123) **Two meanings introduced by *even*:**
Even [John]$_F$ came to the party.
a. $\rightsquigarrow$ John was less likely than others to come to the party *scalar*
b. $\rightsquigarrow$ Someone other than John came to the party. *additive*

Horn (1969), Karttunen and Peters (1979), and some others clearly claim that *even* has the additive meaning in (b), in addition to its scalar meaning. This has been disputed by von Stechow (1991), Krifka (1992), Rullmann (1997), and others.

- Some evidence for the additive meaning (taken from Wagner, 2013):

  (124) I heard the results of this year's marathon were surprising. Is it true that this time it wasn't a Kenyan who won the gold medal?
  Oh yes. # Even a [Canadian]$_F$ won it.

  (125) John was a favorite in the marathon. Did he win a medal?
  Oh yes. # John won even the [gold]$_F$ medal.

  These improve with possibility modals, which makes sense — multiple people *could* win the gold medal, even though only one does.

  (126) Even a [Canadian]$_F$ could win the gold medal.

  (127) John could win even the [gold]$_F$ medal.

  Recall that additives require a non-entailing/entailed anaphoric alternative (see (122)). Wagner (2013) attributes the strangeness of (128) to the additive meaning of *even*.

  (128) I was hoping that at least some of the students would be able to pass the test.
  # But in the end, even [everyone]$_F$ was able to do it.

- Some evidence for the lack of an additive meaning:

  Rullmann (1997, p. 61) discusses scales with mutually exclusive alternatives, e.g. {being an Assistant Professor, being an Associate Professor,...}:

  (129) A: Is Claire an Assistant Professor?
  B: No, she's even an [Associate]$_F$ Professor.

(130) **Wagner's (2013) observation:**

The presence or absence of the additive meaning of *even* depends on its sytnax. Constituent *even* encodes the additive meaning, but sentential *even* need not.

(131) **Constituent *even* is additive but sentential *even* is not (Wagner, 2013):**

Did John read some of the books?

a. Yeah, John even read [all]$_F$ of the books.

b. # Yeah, John read even [all]$_F$ of the books.

What about Rullmann's example (129) which shows no additive presupposition? Wagner proposes that this has a parse with a sentential *even*, although this is obscured by the pronounced position of the copula.

(132) **A clearer "Associate Professor" example (Wagner, 2013):**

a. Claire married an Assistant Prof., and Sally even married an [Associate]$_F$ Prof.

b. # Claire married an Assistant Prof., and Sally married even an [Associate]$_F$ Prof.

(133) **The gold medal revisited (Wagner, 2013):**

The results in the Marathon were quite surprising. A Russian won the gold medal.

a. # Even a [Canadian]$_F$ won the silver medal. (unless two people won it)

b. # The silver medal was won even by a [Canadian]$_F$. (unless two people won it)

c. The silver medal was even won by a [Canadian]$_F$. (one winner)

See Wagner (2013) for discussion of two approaches to this contrast.

7.4 Example: Burmese *mha* (New and Erlewine, 2018)

Colloquial Burmese has a particle *mha* which in some contexts expresses exhaustivity and in some contexts expresses a scalar ('even'-like) meaning. Okell (1969) describes these two uses simply as "hma$_A$" 'even' and "hma$_B$" 'only' (pp. 284–286).

(134) **Exhaustive *mha* (cleft):**

What did Aung drink? / Did Aung drink beer or water?

Aung-ga yay-ko-**mha** tout-kae-dal.
Aung-NOM water-ACC-MHA drink-PAST-REAL
'It's WATER that Aung drank.'

... Aung-ga biya-ko-lal tout-kae-dal.
Aung-NOM beer-ACC-also drink-PAST-REAL
'...Aung also drank beer.'

This exhaustive *mha* is not an *only*, as diagnosed by embedding under a higher clause negation:

(135) ***mha* embedded under non-local negation: embedded cleft**

[Aung-ga yay-ko-mha tout-kae-dal/dar-lo] Su-ga ma-pyaw-kae-bu.
Aung-NOM water-ACC-MHA drink-PAST-REAL/DAR-C Su-NOM NEG-say-PAST-NEG

a. 'Su didn't say [that it is [water]$_F$ that Aung drank].'

b. * 'Su didn't say [that Aung drank only [water]$_F$].'

c. * 'Su didn't even say [that Aung even drank [water]$_F$].'

(135) is compatible with Su (and the speaker) believing that Aung didn't drink water, in contrast to a negated *only* as in (135b).

(136) **Scalar *mha*:**

Context: There were many drinks offered at the party and out of all the drinks, it is expected that Aung will drink water; it is less likely or more noteworthy for Aung to drink beer.

a. Aung-ga yay-ko-**mha** **ma**-tout-kae-**dar**.
Aung-NOM water-ACC-MHA NEG-drink-PAST-DAR
'Aung didn't drink water.' + ???

b. # Aung-ga biya-ko-mha ma-tout-kae-dar.
Aung-NOM beer-ACC-MHA NEG-drink-PAST-DAR
'Aung didn't drink beer.' + ???

Because of the sensitivity to the prejacent's relative ordering on the scale of likelihood, (136a) often gets translated as 'Aung didn't even drink WATER.'

Q: When is *mha* interpreted as exhaustive vs scalar?

A: "Scalar" uses of *mha* require both local sentential negation *ma-* and the final *-dar* mood morpheme.

(137) ***mha* with negation but no *-dar*: cleft > NEG**

Aung-ga yay-ko-**mha** **ma**-tout-kae-**bu**.
Aung-NOM water-ACC-MHA NEG-drink-PAST-NEG
'It is WATER that Aung didn't drink.'

Proposal:

- *mha* cliticizes to the focus-containing constituent but takes propositional scope at LF.[7]
- The presence or absence of *-dar* (indirectly) tracks the relative scope of *mha* and negation.
- Let C be the (relevant) focus alternatives of the sister of *mha* at LF. C is closed under conjunction and is ordered by $<_{likely}$.

[7] This can be thought of as *mha* moving from its pronounced position, in a clause-bound fashion, or as *mha* agreeing with a covert MHA on the clausal spine, with this dependency being clause-bound.

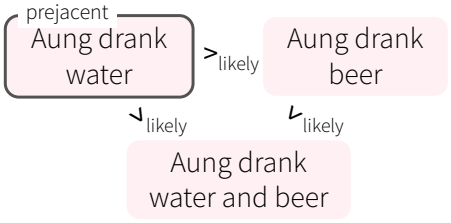
- *mha* passes up its sister's truth conditions, but introduces the presupposition that "no less likely alternative is true":[8]

(138) $mha(p) \rightsquigarrow \forall q \in C\,[(q <_{likely} p) \rightarrow q = 0]$

Wide-scope *mha* yields an exhaustive (cleft) meaning:

Let the relevant atomic alternatives be "Aung drank beer" and "Aung drank water." Suppose drinking water is more likely than drinking beer (not crucial here).

(139) LF: MHA [$_p$ Aung drank [water]$_F$]

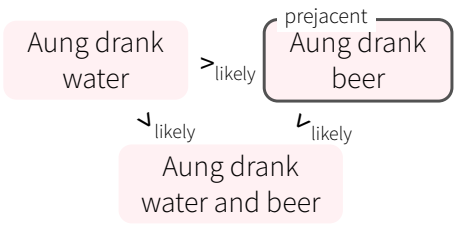


presupposes: ¬beer ∧ ¬(water ∧ beer)

asserts: p = water

result: 'It's water that Aung drank.'

(140) LF: MHA [$_p$ Aung drank [beer]$_F$]



presupposes: ¬(water ∧ beer)

asserts: p = beer

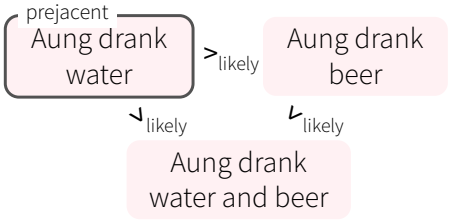
result: 'It's beer that Aung drank.'

This logic will apply as long as *mha* takes widest scope. Without *-dar*, *mha* takes scope over negation, explaining the cleft > NEG reading in (137).

mha scoping under negation yields scale-sensitivity:

Let the relevant atomic alternatives be "Aung drank beer" and "Aung drank water." Suppose drinking water is more likely than drinking beer (now crucial).

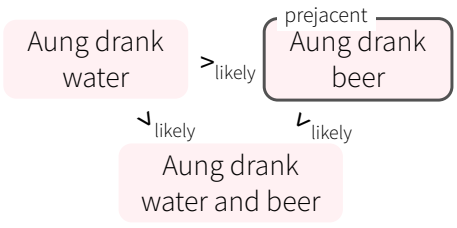
(141) LF: NEG [MHA [$_p$ Aung drank [water]$_F$]]



presupposes: ¬beer ∧ ¬(water ∧ beer)

asserts (with NEG): ¬p = ¬water

(142) LF: NEG [MHA [$_p$ Aung drank [beer]$_F$]]



presupposes: ¬(water ∧ beer)

asserts: ¬p = ¬beer

► The addition of *mha* doesn't add anything to the meaning in (142), so its addition is ungrammatical by Non-Vacuity (Crnič, 2011) or a similar condition.

[8] This meaning proposed for *mha* is very close to what is proposed for clefts by Velleman et al. (2012). See also other "scalar exhaustives" proposed in e.g. Klinedinst (2005); Beaver and Clark (2008); Coppock and Beaver (2014); Roberts (2011).

(143) **The Principle of *Non-Vacuity* (Crnič, 2011, p. 110):**
The meaning of a lexical item used in the discourse must affect the meaning of its host sentence (either its truth-conditions or its presuppositions).

Because *mha* in (141/142) can only be used when some less likely alternatives can be negated in the presupposition, *mha* under negation seems scale-sensitive, lending itself to translations with (scale-reversed) English *even*.

8 *Wh*-quantification

In many languages, modified *wh*-phrases form quantifiers.

- *Wh*-quantification often involves focus particles — or disjunction, which is also an alternative-sensitive operator. Why is this?

8.1 *Wh*-questions

One approach to the semantics of questions, starting with Hamblin (1973), views the meaning of a question to be the set of possible answer propositions:

(144) $[\![\text{Who does Alex like?}]\!] = \left\{ \begin{array}{l} \text{Alex likes Bobby,} \\ \text{Alex likes Chris,} \\ \text{Alex likes Dana,...} \end{array} \right\}$

Hamblin (1973) describes a procedure for computing such sets compositionally, with a procedure which is identical to what Rooth (1985) proposed for the computation of focus alternatives.[9] See (64) above.

Here is a particular, modern implementation of this idea in the Roothian two-dimensional semantics. *Wh*-phrases have sets of possible values (≈ short answers) as their focus-semantic value, with no defined ordinary semantic value (Ramchand, 1997; Beck, 2006):

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

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

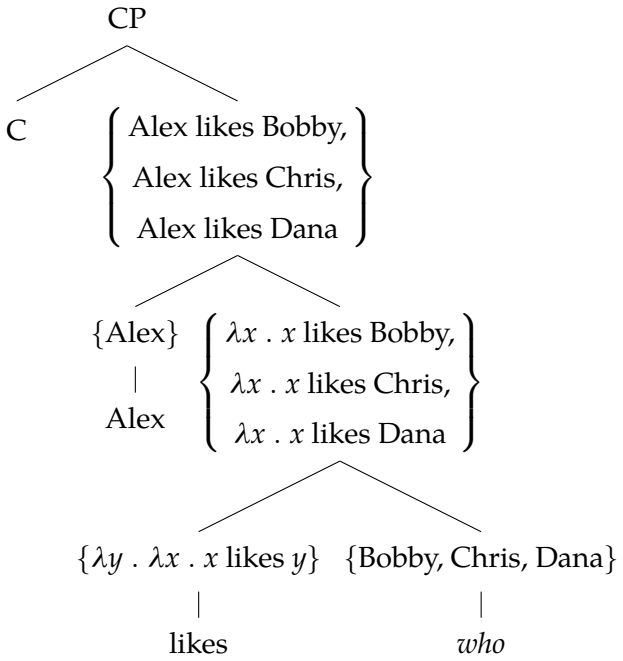
c. **The semantics of *which* NP:**
Ordinary semantic value: $[\![which\ \text{NP}]\!]^o$ is undefined
Focus-semantic value: $[\![which\ \text{NP}]\!]^f = [\![\text{NP}]\!]^o$

We can compute the set of possible answer propositions compositionally, even with the *wh*-phrase in-situ:

> "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)

[9] Historical note: Rooth (1985) was not aware of Hamblin (1973) when developing his proposal, see fn 7 in Rooth (1992).

(146) **A toy LF of question interpretation via Rooth-Hamblin alternative computation:**



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

(148) **The semantics of interrogative C (Beck and Kim, 2006):**[10]

a. $[\![[C_{int}\ TP]]\!]^o = [\![TP]\!]^f$

b. $[\![[C_{int}\ TP]]\!]^f = \{[\![[C\ TP]]\!]^o\} = \left\{[\![TP]\!]^f\right\}$

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.

(149) a. $[\![C_{int}\ [\text{Alex likes who}]]\!]^o \left\{ \begin{array}{l} \text{Alex likes Bobby,} \\ \text{Alex likes Chris,} \\ \text{Alex likes Dana} \end{array} \right\}$

b. $[\![C_{int}\ [\text{Alex likes who}]]\!]^f = \left\{ \left\{ \begin{array}{l} \text{Alex likes Bobby,} \\ \text{Alex likes Chris,} \\ \text{Alex likes Dana} \end{array} \right\} \right\}$

8.2 Disjunction and alternative questions

A similar approach can be taken for disjunction in alternative questions:

(150) Do you want coffee or tea? (alternative question)

Let this English *or* be the pronunciation of J, a head that collects the ordinary values of its disjuncts into a set of alternatives:

[10] In pair-list multiple questions, this operation will have to apply twice; Kotek (2016, to appear) therefore proposes that this is not the function of interrogative C, but rather a separate operator called this AltShift.

(151) **J with disjuncts x_1 … x_n:**

a. $[\![\text{J } \{x_i\}]\!]^o$ undefined

b. $[\![\text{J } \{x_i\}]\!]^f = \bigcup [\![x_i]\!]^{\text{o}}$

(152) a. $[\![\text{J } \{\text{tea, coffee}\}]\!]^o$ undefined

b. $[\![\text{J } \{\text{tea, coffee}\}]\!]^f = \{\text{tea, coffee}\}$

(153) a. $[\![\text{you want tea or}_{\text{J}} \text{ coffee}]\!]^o$ undefined

b. $[\![\text{you want tea or}_{\text{J}} \text{ coffee}]\!]^f = \left\{ \begin{array}{l} \text{you want tea} \\ \text{you want coffee} \end{array} \right\}$

(154) a. $[\![\text{C}_{\text{int}} \text{ [you want tea or}_{\text{J}} \text{ coffee]}]\!]^o \left\{ \begin{array}{l} \text{you want tea} \\ \text{you want coffee} \end{array} \right\}$

b. $[\![\text{C}_{\text{int}} \text{ [you want tea or}_{\text{J}} \text{ coffee]}]\!]^f = \left\{ \left\{ \begin{array}{l} \text{you want tea} \\ \text{you want coffee} \end{array} \right\} \right\}$

The result is a constituent question, just like the *wh*-question in (149). This works because the output of J (152) is like a *wh*-phrase.

Of course, an alternative question isn't the only possible result of *or* disjunction. Boolean disjunction can be thought of as the application of an operator $\exists$ which creates an existential quantifier out of the focus-semantic value of its sister.

(155) **$\exists_{\text{reset}}$ with argument α:**

a. $[\![\exists_{\text{reset}} \ \alpha]\!]^o = \bigvee [\![\alpha]\!]^f$

b. $[\![\exists_{\text{reset}} \ \alpha]\!]^f = \left\{ \bigvee [\![\alpha]\!]^f \right\}$

(156) a. $[\![\exists_{\text{reset}} \text{ [you want coffee or}_{\text{J}} \text{ tea]}]\!]^o = 1$ iff you want coffee $\vee$ you want tea

b. $[\![\exists_{\text{reset}} \text{ [you want coffee or}_{\text{J}} \text{ tea]}]\!]^f = \{$ you want coffee $\vee$ you want tea $\}$

I call this operator "$\exists_{\text{reset}}$" because it "resets" the focus-semantic value to be the singleton set of the ordinary semantic value; in inquisitive-semantic terms, the result is non-inquisitive.

(157) **Pronouncing English disjunction:**

a. J $\Rightarrow$ *or*

b. $\exists_{\text{reset}}$ + J $\Rightarrow$ *or*

There are languages which use distinct disjunctors in alternative questions.

(158) **Pronouncing Mandarin disjunction (Erlewine, 2017a):**

a. J $\Rightarrow$ *háishi*

b. $\exists_{\text{reset}}$ + J $\Rightarrow$ *huò*

A similar decomposition of disjunction into of alternative-collection (J) and existential quantification ($\exists_{\text{reset}}$) is proposed in Alonso-Ovalle (2006, 2008) using a one-dimensional (Hamblin) semantics. See also Winter (1995, 1998); Den Dikken (2006); Szabolcsi (2015).

8.3 *Wh*-disjunctor indefinites

- If J creates a meaning similar to *wh*-phrases, and ∃ can apply to the output of J, could ∃ apply to the output of *wh*-phrases?

As Haspelmath (1997), Bhat (2000), and others note, many languages use *wh*-phrases as indefinites, especially together with disjunctive markers.

(159) **Some *wh*-disjunctor indefinites:**

	'who'	'someone'	
Hungarian	*ki*	*vala-ki*	(Szabolcsi, 2015)
Japanese	*dare*	*dare-ka*	
Kannada	*yaaru*	*yaar-oo*	(Amritavalli, 2003)
Malayalam	*aarə*	*aar-oo*	(Jayaseelan, 2001)
Tiwa	*shar*	*shar-khi*	(Dawson, to appear)

- In these languages, the pronunciation of the disjunction could reflect only the use of (some version of) ∃, even in the absence of J.

(160) a. $[\![\exists_{\text{reset}}\ \text{[Alex likes who]}]\!]^o = 1$ iff Alex likes Bobby ∨ Alex likes Chris ∨ Alex likes Dana
= 1 iff Alex likes someone

b. $[\![\exists_{\text{reset}}\ \text{[Alex likes who]}]\!]^f = \{$ Alex likes someone $\}$

$\exists_{\text{reset}}$ in (160) is applied at the propositional level, but it more likely applies directly to the *wh*-phrase. Logical disjunction ∨ can be easily defined for other types as well, resulting in existential quantifiers. See e.g. Appendix C of Alonso-Ovalle (2006).

8.3.1 *Wh*-indefinites in Tiwa (Dawson, 2018, to appear)

Tiwa (Tibeto-Burman) offers a nice example of the disjunctor as the realization of a version of ∃, which takes a particular scope.

(161) **Two types of *wh*-indefinites (Dawson, 2017):**

a. Maria *shar*-**pha**-go lak mán-ga.
Maria who-PHA-ACC meet-PFV
'Maria met someone.'

b. Maria *shar*-**khí**-gô lak mán-ga.
Maria who-KHI-ACC meet-PFV
'Maria met someone.'

(162) ***Wh-pha* takes narrow scope in conditionals:**

Chidî [*shar*-**pha** sister]-go lak mán-a phi-gaido, Saldi khúp khâdu-gam.
if who-PHA sister-ACC meet-INF come-COND Saldi very happy-CF
'If Saldi meets some nun, she would be very happy.'

a. ✓ Meeting any nun will make Saldi happy. if > ∃

b. # There is a particular nun that Saldi wants to meet. ∃ > if

(163) ***Wh-khi* takes wide scope out of conditionals:**

Chidî [*shar*-**khí** sister]-go lak mán-a phi-gaido, Saldi khúp khâdu-gam.
if who-PHA sister-ACC meet-INF come-COND Saldi very happy-CF
'If Saldi meets some nun, she would be very happy.'

a. # Meeting any nun will make Saldi happy. if > ∃

b. ✓ There is a particular nun that Saldi wants to meet. ∃ > if

► This correlates with the scope-taking behavior of two different disjunctions: *ba* and *khi*.

(Virginia Dawson p.c.: The disjunctor *ba* is possibly related diachronically to *-pha*.)

(164) ***Ba* disjunction takes narrow scope in conditionals:**

Mukton **ba** Monbor phi-gaido, Saldi khâdu-gam.
Mukton BA Monbor come-COND Saldi happy-CF
'If Mukton or Monbor comes, Saldi would be happy.'

a. ✓ Saldi is in love with both Mukton and Monbor. She will be happy if either of them comes. if > ∨

b. # Saldi is in love with either Mukton or Monbor, but we don't know who. Whoever it is, if he comes to visit, Saldi will be very happy. ∨ > if

(165) ***Khi* disjunction takes wide scope out of conditionals:**

Mukton **khi** Monbor phi-gaido, Saldi khâdu-gam.
Mukton KHI Monbor come-COND Saldi happy-CF
'If Mukton or Monbor comes, Saldi would be happy.'

a. # Saldi is in love with both Mukton and Monbor. She will be happy if either of them comes. if > ∨

b. ✓ Saldi is in love with either Mukton or Monbor, but we don't know who. Whoever it is, if he comes to visit, Saldi will be very happy. ∨ > if

See Dawson (2018, to appear) for additional scope facts.

► The uniform wide scope of *khi* disjunction and *wh-khi* can be explained if *khi* is uniformly the realization of a particular form of ∃ which requires widest scope.

8.4 *Wh-even* NPIs

NPIs have often been analyzed as involving an overt or covert *even*.

- ► An NPI is an *even* associating with an indefinite. (see e.g. Heim, 1984; Krifka, 1994; **?**; Lahiri, 1998)

(166) John didn't (even) lift a [finger]$_F$ to help.

(167) **Some Hindi indefinites and NPIs (Lahiri, 1998):**

ek 'one'	*ek bhii* 'any, even one'
koii 'someone'	*koii bhii* 'anyone, any (count)'
kuch 'something, a little'	*kuch bhii* 'anything, any (mass)'

The scalar meaning of *even* associated with an indefinite will be strange, unless it's in a downward-entailing environment.

(168) * EVEN(I saw SOMEONE)

$$[\![\text{I saw SOMEONE}]\!]^f = \left\{ \begin{array}{l} \text{that I saw someone,} \\ \text{that I saw many,} \\ \text{that I saw everyone} \end{array} \right\}$$

EVEN $\rightsquigarrow$ (that I saw someone) $<_{likely}$(that I saw many) and

(that I saw someone) $<_{likely}$(that I saw everyone)

This presupposition is unsatisfiable, in any context.

(169) ✓ EVEN(NEG(I see SOMEONE)) = "I didn't see *anyone*."

$$[\![\text{NEG(I saw SOMEONE)}]\!]^f = \left\{ \begin{array}{l} \text{NEG(that I saw someone),} \\ \text{NEG(that I saw many),} \\ \text{NEG(that I saw everyone)} \end{array} \right\}$$

EVEN $\rightsquigarrow$ NEG(that I saw someone) $<_{likely}$NEG(that I saw many) and

NEG(that I saw someone) $<_{likely}$NEG(that I saw everyone)

$\iff$ (that I saw someone) $>_{\text{likely}}$ (that I saw many) and

(that I saw someone) $>_{\text{likely}}$ (that I saw everyone)

This presupposition is always satisfiable.

8.4.1 Tibetan-type (based on Erlewine and Kotek, 2016)

- ► In languages like Tibetan and Japanese, NPIs are formed by *wh*-(one)-EVEN, but *wh*-(one) itself is not an indefinite.

(170) **Some Tibetan *wh*, indefinites, and NPIs:**

su 'who'	*mi-chik* "person-one" 'someone'	*su-(chi)-ye* 'anyone'
khare 'what'	*(chala)-chik* "(thing)-one" 'something'	*khare-(chi)-ye* 'anything'

(171) *Su*-(chi)-**ye** lep-**ma**-song.
who-(one)-EVEN arrive-NEG-PRFV
'No one arrived.'

(172) **Some Japanese *wh*, indefinites, and NPIs:**

dare 'who'	*dare-ka* "who-or" 'someone'	*dare-(hitori)-mo* 'anyone'
nani 'what'	*nani-ka* "what-or" 'something'	*nani-(hitotsu)-mo* 'anything'

Idea: These languages have a free, covert ∃ which only contributes an ordinary semantic value, and *does not* reset the focus-semantic value (173). They do not have covert $\exists_{\text{reset}}$.

(173) **∃ with argument α:**

a. $[\![\exists\ \alpha]\!]^o = \bigvee [\![\alpha]\!]^f$

b. $[\![\exists\ \alpha]\!]^f = [\![\alpha]\!]^f$

(174) a. $[\![\exists$ [who arrived]$]\!]^o$ = someone arrived

b. $[\![\exists$ [who arrived]$]\!]^f = \left\{ \begin{array}{l} \text{1 iff A arrived,} \\ \text{1 iff B arrived,} \\ \text{1 iff C arrived,...} \end{array} \right\}$

► Notice that this meaning in (174) produced by ∃ (173) is weird.

(175) ***Principle of Interpretability*, revised from (147):**

a. An LF α must have a defined ordinary semantic value $[\![\alpha]\!]^o$.

b. $[\![\alpha]\!]^o \in [\![\alpha]\!]^f$

(Rooth's (1992) *Focus Interpretation Principle* — the presupposition of ∼ — was explicitly designed to enforce satisfaction of (175).)

(174) by itself will violate this Principle of Interpretability (175), so it is ungrammatical. But assuming that focus particles reset the focus alternatives (see e.g. Beck, 2006), applying EVEN to this will result in an interpretable meaning.

(176) a. $[\![$EVEN $[\exists$ [who arrived]$]]\!]^o$ = 1 iff someone arrived

$\rightsquigarrow \forall x$ [(someone arrived) $<_{likely}(x$ arrived)]

b. $[\![$EVEN $[\exists$ [who arrived]$]]\!]^f = \{$ 1 iff someone arrived $\}$

✓ Principle of Interpretability; × unsatisfiable presupposition

(177) a. $[\![$EVEN $[$NEG$[\exists$ [who arrived]$]]]\!]^o$ = 1 iff no one arrived

$\rightsquigarrow \forall x$ [$\neg$(someone arrived) $<_{likely} \neg(x$ arrived)]

b. $[\![$EVEN $[$NEG$[\exists$ [who arrived]$]]]\!]^f = \{$ 1 iff no one arrived $\}$

✓ Principle of Interpretability; ✓ satisfiable presupposition

8.4.2 Burmese *wh-mha* (New and Erlewine, 2018)

A classic *even* need not be the only route to forming *wh*-NPI. Here's an additional fact about Burmese *mha*:

(178) ***Wh-mha* forms NPIs:**

a. * nga-ga *bal*-panthee-ko-**mha** yu-kae-dal.
1-NOM which-apple-ACC-MHA take-PAST-REAL

b. nga-ga *bal*-panthee-ko-**mha** **ma**-yu-kae-bu.
1-NOM which-apple-ACC-MHA NEG-take-PAST-NEG
'I didn't take any apple(s).'

Wh-mha requires a local negation. It is not simply licensed under other downward-entailing environments.

Recall our proposal for the meaning contributed by *mha*:

(179) $mha(p) \rightsquigarrow \forall q \in C\,[(q <_{likely} p) \rightarrow q = 0]$ (=138)

Let 1, 2, and 3 be apples in the context.

(180) a. $[\![\text{Aung ate which apple}]\!]^o$ undefined

b. $[\![\text{Aung ate which apple}]\!]^f$ = {Aung ate 1, Aung ate 2, Aung ate 3}

× Violates the Principle of Interpretability (175)

Suppose Burmese has the covert ∃ in (173).

(181) a. $[\![\exists\,[\text{Aung ate which apple}]]\!]^o = 1$ iff Aung ate 1 ∨ Aung ate 2 ∨ Aung ate 3

b. $[\![\exists\,[\text{Aung ate which apple}]]\!]^f$ = {Aung ate 1, Aung ate 2, Aung ate 3}

× Violates the Principle of Interpretability (175)

Now consider *mha* applying to this, with and without negation:

(182) * LF: MHA [∃ [Aung ate which apple]]
assertion: Aung ate some apple
presupposition: ¬1 ∧ ¬2 ∧ ¬3
× The assertion will contradict the presupposition and be unsatisfiable, leading to ungrammaticality (see e.g. Gajewski, 2002, 2009)

(183) LF: NEG [MHA [∃ [Aung ate which apple]]]
assertion: ¬ [Aung ate some apple] = Aung didn't eat any apple
presupposition: ¬1 ∧ ¬2 ∧ ¬3
✓ This assertion is compatible with its presupposition.

In fact, the presupposition of *mha* here seems vacuous and therefore a violation of Non-Vacuity (143), but *mha* must apply here in order to satisfy the Principle of Interpretability.

- ► Focus particles (and the resetting disjunction $\exists_{\text{reset}}$) are common in *wh*-quantification because they fix violations of the Principle of Interpretability.

8.5 Summary

A number of basic ingredients are used in combination to form questions and quantifiers:

- *wh*-phrases and J form meanings with no ordinary semantic value, but with a set of alternatives as the focus-semantic value:

(184) $[\![wh]\!]$:
o(rdinary semantic value): undefined
f(ocus-semantic value): {a, b, c}

(185) $[\![\text{J } \{a, b, c\}]\!]$:
o: undefined
f: {a, b, c}

- Interrogative C (= Kotek's AltShift) lifts a meaning produced by *wh* or J into a Hamblin question meaning:

(186) **The effect of C_{int}:**

	$[\![TP]\!]$	$[\![C_{int}\ TP]\!]$
o:	undefined	{a, b, c}
f:	{a, b, c}	{{a, b, c}} ↓ reset

- Existential operators (the ∃ family) supply an ordinary semantic value of the disjunction of the input's alternatives, with or without resetting the focus-semantic value to satisfy the Principle of Interpretability (175).

(187) **The effect of ∃:**

	$[\![TP]\!]$	$[\![\exists\ TP]\!]$
o:	undefined	a ∨ b ∨ c
f:	{a, b, c}	{a, b, c} (unchanged)

(188) **The effect of $\exists_{\text{reset}}$:**

	$[\![TP]\!]$	$[\![\exists_{\text{reset}}\ TP]\!]$
o:	undefined	a ∨ b ∨ c
f:	{a, b, c}	{a ∨ b ∨ c} ↓ reset

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