Focus intervention effects

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Data

Focus intervention configuration

Cross-linguistically, *wh*-expressions cannot be preceded by focus expressions (Hoji 1985; Beck 1996; Beck & Kim 1997; Tomioka 2004; Yang 2012; a.o.).

(1) a. *Zhǐyǒu LǏBÁI dú-le nǎ-běn shū ne?
  only LB buy-PERF which-CL book Q

 b. Nǎ-běn shū zhǐyǒu LǏBÁI dú-le ne?
  Which-CL book only LB read-PERF Q
  'What did only LB buy?' (Mandarin)

(2) a. *Minsu-man nuku-lŭl po-ass-ni?
  Minsu-only who-ACC see-PAST-Q

 b. Nuku-lŭl Minsu-man po-ass-ni?
  Who Minsu-only see-PAST-Q
  'Who did only Minsu see?' (Korean)

(3) a. *Wen hat nur Karl wo angetroffen?
  whom has only Karl where meet?

 b. Wen hat wo nur Karl angetroffen?
  who has where only Karl meet
  'Who did only Karl met where?' (German)

Pied-piping

In English, FIEs occur within pied-piping constituents (Pesetsky 2000; Kotek & Erlewine 2016; Kotek 2019; a.o.).

(4)   a.   Which student did only JOHN introduce to which professor?

       b.   Which student only APPRAISES pictures of which president?

(5)   a.   [A picture of which president] does Jim own?

       b.   *[Only PICTURE of which president] does Jim own?

(6)   a.   Which collector sold a picture of which president?

       b.   *Which collector sold only PICTURE of which president?

Wh-over-focus preference

In Hungarian, only *wh*-expressions can move to the preverbal position–the focus region, when they co-occur with focus expressions (É Kiss 1998).

(7)   a.   *Csak MARIT   látogatta meg ki?
           only Mary.ACC visited   PREV who

      b.   Ki   látogatta meg csak MARIT?
           who visited   prev only M.acc
           'Who visited only Mary?'

FIE configuration

FIE configuration:

$$*[\dots \text{focus-sensitive operator FOCUS} \dots \text{wh} \dots]$$

Research question: What triggers FIEs?

- Beck's (2006) focus semantics of questions
- A modular approach

Focus semantics of questions

Roothian focus semantics

Focus evokes another dimensional meaning in addition to the ordinary meaning.

$$[\![\text{JANE}]\!] = j \qquad\qquad [\![\text{JANE}]\!]^f = \{x \mid x \in D_e\}$$
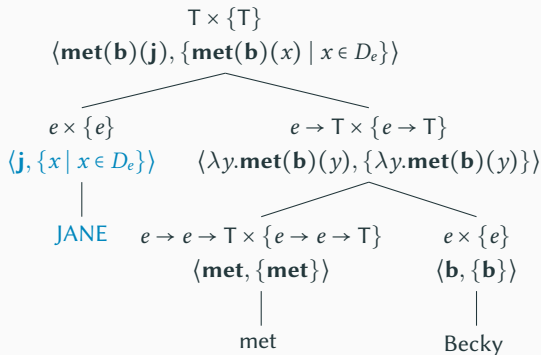
Compositionally, a sentence has a two-dimensional meaning.

- Every lexical entry has a two-dimensional meaning.
- The focus meaning is computed via the pointwise functional application.

Rooth (1985, 1992)

Focus composition

$$\mathsf{T} \times \{\mathsf{T}\}$$
$$\langle \mathbf{met}(\mathbf{b})(\mathbf{j}), \{\mathbf{met}(\mathbf{b})(x) \mid x \in D_e\}\rangle$$

$$e \times \{e\}$$
$$\langle \mathbf{j}, \{x \mid x \in D_e\}\rangle$$

$$e \to \mathsf{T} \times \{e \to \mathsf{T}\}$$
$$\langle \lambda y.\mathbf{met}(\mathbf{b})(y), \{\lambda y.\mathbf{met}(\mathbf{b})(y)\}\rangle$$

JANE

$$e \to e \to \mathsf{T} \times \{e \to e \to \mathsf{T}\}$$
$$\langle \mathbf{met}, \{\mathbf{met}\}\rangle$$

$$e \times \{e\}$$
$$\langle \mathbf{b}, \{\mathbf{b}\}\rangle$$

met

Becky

Association with focus

(8) John only introduced MARY to Sue.
     ⤳ John didn't introduce anyone else to Sue.

(9) John only introduced Mary to SUE.
     ⤳ John didn't introduced Mary to anyone else.

The focus meaning serves as the quantificational domain of *only*.

$$[\![only]\!]\langle \kappa, K \rangle = \lambda \vec{x} \lambda w \forall f \in K : f(\vec{x})(w) \rightarrow \kappa(\vec{x}) \subseteq f(\vec{x})$$

- $[\![only]\!]([\![\text{introduced MARY to Sue}]\!])([\![John]\!])$ (8)

  $= \lambda w \forall p \in \{\mathbf{intro}(\mathbf{s})(x)(\mathbf{j}) \mid x \in D_e\} : p(w) \rightarrow \mathbf{intro}(\mathbf{s})(\mathbf{m})(\mathbf{j}) \subseteq p$

- $[\![only]\!]([\![\text{introduced Mary to SUE}]\!])([\![John]\!])$ (9)

  $= \lambda w \forall p \in \{\mathbf{intro}(x)(\mathbf{m})(\mathbf{j}) \mid x \in D_e\} : p(w) \rightarrow \mathbf{intro}(\mathbf{s})(\mathbf{m})(\mathbf{j}) \subseteq p$

Reducing questions to focus

A *wh*-expression is undefined in the ordinary dimension but triggers alternatives in the focus dimension.

$$\llbracket \text{who} \rrbracket = \# \text{ (undefined)} \qquad\qquad \llbracket \text{who} \rrbracket^f = \{x \mid x \in \textbf{hmn}\}$$
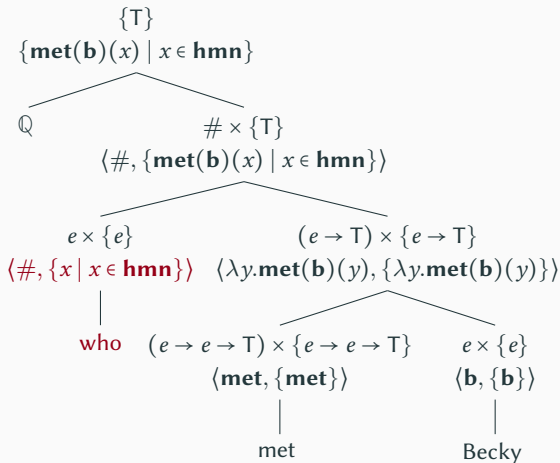
In other words, *wh*-expressions only have contributions in the focus dimension.

A question operator $\mathbb{Q}$ is needed to shift the focus meaning of a *wh*-constituent to the ordinary meaning of the whole question.
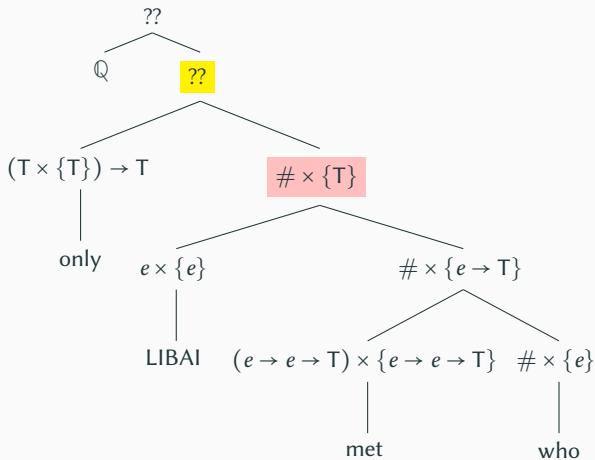
$$\llbracket \mathbb{Q} \rrbracket \langle \#, Q \rangle = Q$$

Beck (2006); Cable (2010); Dong (2018); Uegaki (2018); Kotek (2019); a.o.

Question composition

$$\{\mathsf{T}\}$$
$$\{\mathbf{met}(\mathbf{b})(x) \mid x \in \mathbf{hmn}\}$$

$$\mathbb{Q}$$

$$\# \times \{\mathsf{T}\}$$
$$\langle \#, \{\mathbf{met}(\mathbf{b})(x) \mid x \in \mathbf{hmn}\} \rangle$$

$$e \times \{e\}$$
$$\langle \#, \{x \mid x \in \mathbf{hmn}\} \rangle$$

who

$$(e \to \mathsf{T}) \times \{e \to \mathsf{T}\}$$
$$\langle \lambda y.\mathbf{met}(\mathbf{b})(y), \{\lambda y.\mathbf{met}(\mathbf{b})(y)\} \rangle$$

$$(e \to e \to \mathsf{T}) \times \{e \to e \to \mathsf{T}\}$$
$$\langle \mathbf{met}, \{\mathbf{met}\} \rangle$$

met

$$e \times \{e\}$$
$$\langle \mathbf{b}, \{\mathbf{b}\} \rangle$$

Becky

Explaining FIEs

Association with WH

Beck's analysis predicts that a focus-sensitive operator should not be associated with an *wh*-expression.

$$*[\ldots \text{ only } \ldots \text{ wh } \ldots \text{ }]$$

However, in Mandarin, a focus-sensitive operator can take a *wh*-expression as its associate (Li & Law 2016; see also Aoun & Li 1993).

(10) Zhǐyǒu shéi méi lái?
      only   who not come
      'Who is the person x s.t. only x didn't come?'

(11) Lǐbái shì gēn shéi xué-de   gāngqín?
      LB   be with who learn-CFM piano
      'Who is the person x s.t. it is x who taught LB piano?'

Turkish

The same pattern is also observed in Turkish (Demirok 2020).

(12) a. *Sadece SELIN kim-le   konuştu?
          only   Selin who-with talk
          'Who did only Selin talk to?'

      b. Pelin sadece hangi soruyu   cevapla-dı?
          Pelin only   which question.ACC answer-PST
          'What is the question x s.t. Pelin only answers x?'

A modular approach

Key parts in question and focus composition

- *Wh* and focus expressions trigger a systematic enrichment of the standard meaning.
- Generalize to the worst case

$F(X) = \{f(x) \mid f \in F, x \in X\}$

$F(X) = \langle F_0(X_0), \{f(x) \mid f \in F_1, x \in X_1\} \rangle$

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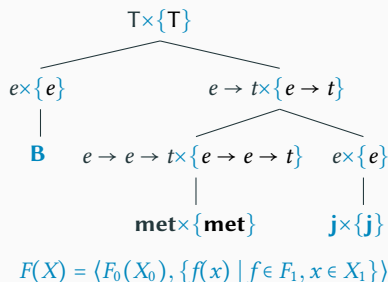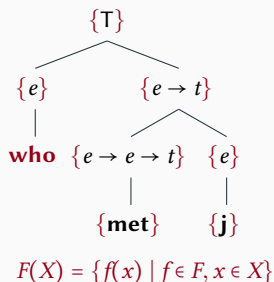
Abstraction

Abstract contributions of question and focus

Question

$\eta(x) = \{x\}$ $\qquad\qquad\qquad \eta : a \to \{a\}$

$F \circledast X = \{f(x) \mid f \in F, x \in X\}$ $\quad \circledast : \{a \to b\} \to \{a\} \to \{b\}$

Focus

$\eta(x) = \langle x, \{x\} \rangle$ $\qquad\qquad\quad \eta : a \to (a \times \{a\})$

$F \circledast X = \langle F_0(X_0), F_1 \circledast X_1 \rangle$ $\quad \circledast : (a \to b) \times \{a \to b\} \to a \times \{a\} \to b \times \{b\}$

General functions:

$$\eta : a \to F(a) \qquad\qquad\qquad \circledast : F(a \to b) \to F(a) \to F(b)$$

Charlow (2017)

Modularization

Enrich the standard meaning when you need

$$\eta : a \to F(a) \qquad\qquad \circledast : F(a \to b) \to F(a) \to F(b)$$

$F(G(a))$

η — $G(a)$

η — a

$F(G(a)) \to F(G(b))$

$\circledast$ — $F(G(a) \to G(b))$

$F(G(a \to b)) \to F(G(a) \to G(b))$ — $F(G(a \to b))$

$\circledast$ — $F(G(a \to b) \to G(a) \to G(b))$
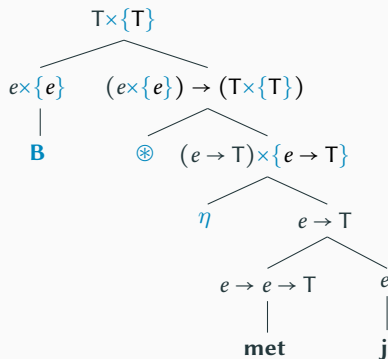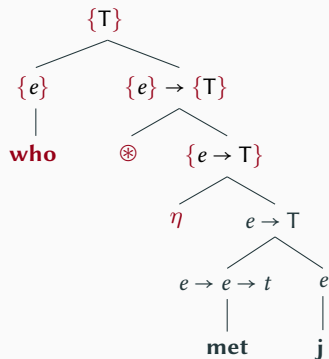
η — $G(a \to b) \to G(a) \to G(b)$

$\circledast$
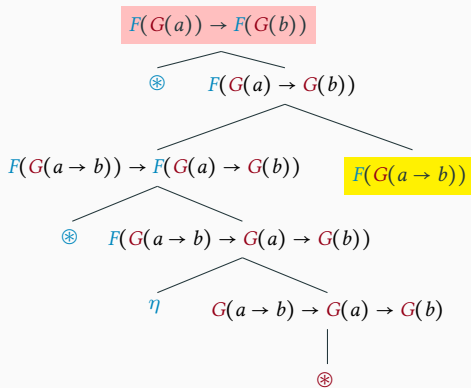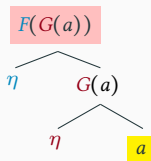
FIEs and AwW

FIEs and AwW (Association with WH) are consequences of interactions of Focus Module and Question Module

- F(Q) ⇒ [... focus-sensitive operator FOCUS ... wh ...] ✗
- Q(F) ⇒ [... focus-sensitive operator ... wh ...] ✓

Focus over Question
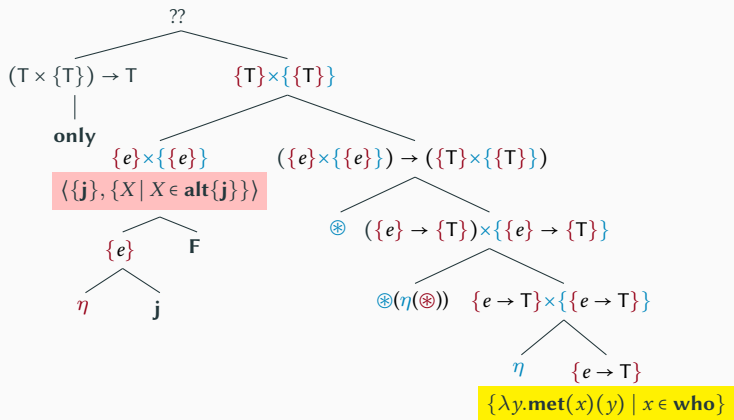
$$\llbracket \text{only} \rrbracket \langle \kappa, K \rangle = \lambda \vec{x} \lambda w \forall f \in K : f(\vec{x})(w) \rightarrow \kappa(\vec{x}) \subseteq f(\vec{x})$$
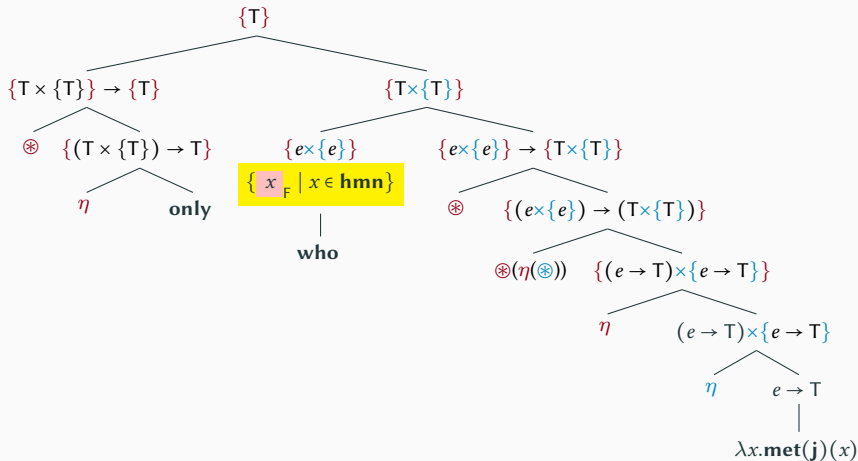
Focus over Question

$$\circledast(\eta(\circledast)) = \circledast\langle\lambda F\lambda Y.F \circledast Y,\ \{\lambda F\lambda Y.F \circledast Y\}\rangle$$
$$= \lambda\Gamma.\langle\lambda Y.\Gamma_0 \circledast Y,\ \{\lambda F\lambda X.F \circledast Y\} \circledast \Gamma_1\rangle$$

$$[\circledast(\eta(\circledast))](\eta[\![\text{met who}]\!]) = [\circledast(\eta(\circledast))]\langle[\![\text{met who}]\!],\ \{[\![\text{met who}]\!]\}\rangle$$
$$= \langle\lambda Y.[\![\text{met who}]\!] \circledast Y,\ \{\lambda F\lambda Y.F \circledast Y\} \circledast \{[\![\text{met who}]\!]\}\rangle$$
$$= \langle\lambda Y.[\![\text{met who}]\!] \circledast Y,\ \{\lambda Y.[\![\text{met who}]\!] \circledast Y\}\rangle$$

$$\circledast([\circledast(\eta(\circledast))](\eta[\![\text{met who}]\!]))$$
$$= \lambda\Gamma.\langle[\![\text{met who}]\!] \circledast \Gamma_0,\ \{\lambda Y.[\![\text{met who}]\!] \circledast Y\} \circledast \Gamma_1\rangle$$
$$= \lambda\Gamma.\langle[\![\text{met who}]\!] \circledast \Gamma_0,\ \{[\![\text{met who}]\!] \circledast Y \mid Y \in \Gamma_1\}\rangle$$

$$[\circledast([\circledast(\eta(\circledast))](\eta[\![\text{met who}]\!]))]\langle\{\mathbf{j}\},\ \{Y \mid Y \in \mathbf{alt}\{\mathbf{j}\}\}\rangle$$
$$= \langle[\![\text{met who}]\!] \circledast \{\mathbf{j}\},\ \{[\![\text{met who}]\!] \circledast Y \mid Y \in \{Y \mid Y \in \mathbf{alt}\{\mathbf{j}\}\}\}\rangle$$
$$= \langle\{\mathbf{met}(x)(\mathbf{j}) \mid x \in \mathbf{who}\},\ \{\{\mathbf{met}(x)(y) \mid x \in \mathbf{who}, y \in Y\} \mid Y \in \mathbf{alt}\{\mathbf{j}\}\}\rangle$$

Question over Focus
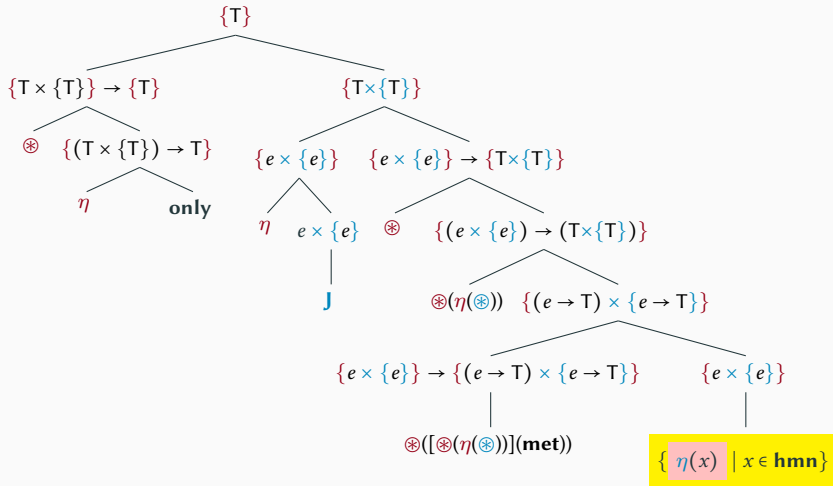

$$\{[\![\text{only}]\!]\langle\mathbf{met}(\mathbf{j})(x), \{\langle\mathbf{met}(\mathbf{j})(x) \mid x \in \mathbf{alt}(x)\}\rangle \mid x \in \mathbf{hmn}\}$$
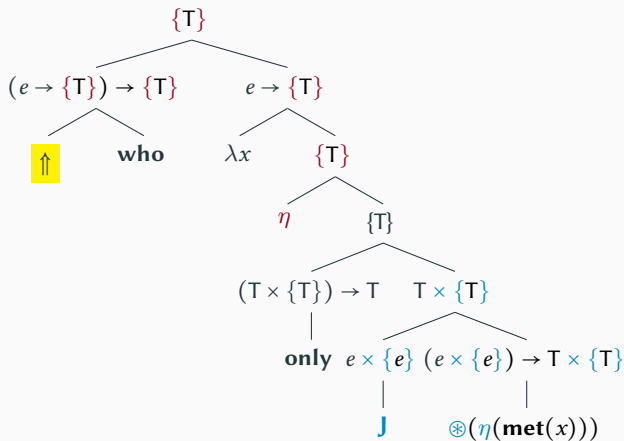
What prevents the option Question over Focus in FIE sentences?

What prevents the scope taking of *wh*-expressions in FIE sentences?
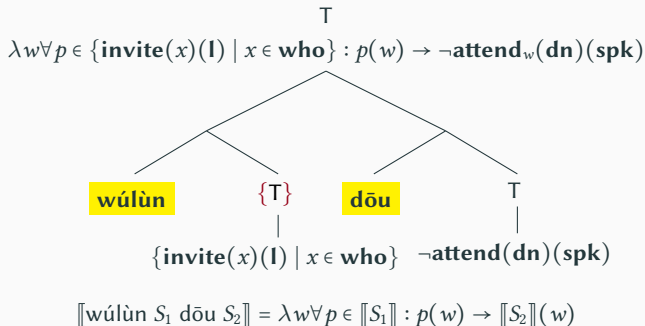
FIE beyond questions

Generalized FIEs

In natural languages, not only interrogative *wh*-expressions evoke alternatives in the ordinary meaning dimension.

- Non-interrogative *wh*-expressions
- Disjunctive expressions

Unconditionals

(13) Wúlùn   Lǐbái yǎoqǐng shéi, wō dōu bú huì chūxí wǎnyàn.
no.matter LB   invite   who I ALL not will attend dinner
'No matter who LB invites, I won't attend the dinner.'

$$\lambda w \forall p \in \{\mathbf{invite}(x)(\mathbf{l}) \mid x \in \mathbf{who}\} : p(w) \to \neg\mathbf{attend}_w(\mathbf{dn})(\mathbf{spk})$$

wúlùn $\{\mathsf{T}\}$ **dōu** T

$$\{\mathbf{invite}(x)(\mathbf{l}) \mid x \in \mathbf{who}\} \quad \neg\mathbf{attend}(\mathbf{dn})(\mathbf{spk})$$

$$[\![\text{wúlùn } S_1 \text{ dōu } S_2]\!] = \lambda w \forall p \in [\![S_1]\!] : p(w) \to [\![S_2]\!](w)$$

Lin (1996); **see also** Rawlins (2013)

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FIEs in unconditionals

(14) *Wúlùn   zhǐyǒu Lǐbái yāoqǐng shéi, wǒ dōu bú huì cānjā wǎnyàn.
      no.matter only   LB   invite   who I   ALL not will attend dinner
      'No matter who only LB invites, I won't attend the dinner.'

(15) Wúlùn   shì shéi yāoqǐng-le Lǐbái, wǒ dōu huì gǎnxiè tā.
      no.matter be who invite-PERF LB   I   ALL will thank her
      'No matter who is the person x s.t. it's x that invited LB, I will thank her.'

Wh-indefinites

The scope of a *wh*-indefinite is determined by its licensor (Lin 2004).

(16) Kěnéng Lǐbái chī-le shěnme dōngxi.
maybe LB eat-PERF what thing
'Perhaps LB ate something.'

(17) Kěnéng Lǐbái méi zuòduì shěnme tí ba.
maybe LB not answer.correctly what problem SFP
a. It's possible that LB didn't answer any question correctly.
b. It's possible that there were some questions that LB didn't answer correctly.

Existential Closure

Existential Closure maps a set of alternatives of type a to an object of type a.

$$\llbracket \mathbb{EX} \rrbracket = \lambda A \lambda \vec{x} \lambda w . \exists f \in A : f(\vec{x})(w)$$

Kratzer & Shimoyama (2002)

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(18) $\llbracket$ maybe $\mathbb{EX}$ LB not correctly answer what question $\rrbracket$

= $\mathbf{maybe}(\lambda w . \exists p \in \{ \neg \mathbf{corr\text{-}ans}(x)(\mathbf{l}) \mid x \in \mathbf{que} \} : p(w))$

(19) $\llbracket$ maybe LB not $\mathbb{EX}$ correctly answer what question $\rrbracket$

= $\mathbf{maybe}(\lambda w . \neg \exists P \in \{ \mathbf{corr\text{-}ans}(x) \mid x \in \mathbf{que} \} : P(\mathbf{l})(w) \})$

Focus intervenes *wh*-indefinites

(20) Kěnéng zhíyǒu Lǐbái méi zuòduì   shěnme tí   ba.
      maybe only   LB   not answer.correctly what question

    a. maybe only LB not $\mathbb{EX}$ correctly answer what question
        ⇝ It's possible that only LB didn't answer any question correctly.'

    b. ??maybe $\mathbb{EX}$ only LB not correctly answer what question
        ⇝ It's possible that there were some problems that only LB didn't answer correctly.'

(21) ... #Gūjì bú shì dàishù tí   jiù shì jǐhé   tí.
      ... guess not be algebra question just be geometry question
      '... I guess it is either algebra or geometry.'

Disjunctive expressions

Disjunctive sentences can be modeled after alternative semantics (Simons 2005; Alonso-Ovelle 2006; Aloni 2007 a.o.).

(22)   Peter introduced John to Mary or Sue.

(23) $[\![\mathbb{E}\mathbb{X}$ Peter introduced John to Mary or Sue$]\!]$
        $= \lambda w \exists p \in \{\mathbf{intro}(x)(\mathbf{j})(\mathbf{p}) \mid x \in \{\mathbf{m}, \mathbf{s}\}\} : p(w)$

Scope of disjunctive expressions

Disjunctive expressions enter into scopal interactions.

(24)   Peter *may* introduce John to Mary or Sue.

      a.   ↝ Peter may introduce John to Mary and may introduce him to Sue.
(free choice: *may* > *or*)

      b.   … I don't know which one.   (*or* > *may*)

Free choice (Simons 2005)

$$\llbracket \text{may } S_1 \text{ or } S_2 \rrbracket = \lambda w. \exists W \subseteq \mathbf{ACC}_w : W \text{ is divided up into } \llbracket S_1 \rrbracket \text{ and } \llbracket S_2 \rrbracket$$

Equivalently, (modulo some details unrelated to our discussion)

$$\llbracket \text{may } S_1 \text{ or } S_2 \rrbracket = \lambda w. \forall p \in \{ \llbracket S_1 \rrbracket, \llbracket S_2 \rrbracket \} : \exists w \in \mathbf{ACC}_w : p(w)$$

FIEs in disjunctive sentences

(25) Only Peter may introduce John to Mary or Sue. #I'm not sure which.

≈ $\mathbb{E}\mathbb{X}$ Only Peter may introduce John to Mary or Sue

(26) Peter may only introduce John to MARY or SUE. I'm not sure which.