Focus intervention effects and quantificational domains of focus-sensitive operators

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A pretheoretical look

(1) German (Mayr 2013: 5; see also Beck 1996)

a. * Wen hat nur der Hans$_F$ wann angerufen?
who has only the Hans$_F$ when called

b. Wen hat wann nur der Hans$_F$ angerufen?
who has when only the Hans$_F$ called
'Who did only Hans call when?'

(2) Mandarin (Yang 2008: 69)

a. ?? Zhiyou Zhangsan$_F$ mei chi na dao cai?
only Zhangsan$_F$ not eat which Cl dish

b. Na dao cai zhiyou Zhangsan$_F$ mei chi?
which Cl dish only Zhangsan$_F$ not eat
'Which dish did only Zhangsan not eat?'

Roadmap

- The intervention hypothesis
  - Minimality (Beck 2006)
  - Non-additivity (Mayr 2013)
- The quantificational-domain hypothesis (our view)
- Critical data in support of our view
  - F-WH association
  - Multiple-WH questions
  - Alternative questions
- Focus interverntion beyond questions
  - Contrastive topics

The intervention hypothesis

Some focus operator interferes with the interpretation of wh-questions (Pesetsky 2000; Beck 2006; Cable 2012; Mayr 2013; cf. Tomioka 2007; Haida 2008)

(3) $[\![[Q ... \textit{Focus} - \textit{sensitive operator} ... \textit{WH} ...]]\!]^g$
$=$ undefined
$\Rightarrow$ Wh-questions cannot recieve a proper interpretation

Minimality (Beck 2006)

(4) ?*[Q ... [$\sim$ [... WH ...]]]

- $[\![WH]\!]^f = \{a, b, c\}$ (Hamblin denotation)
- $[\![WH]\!]^g$ = undefined
- The role of Q is to elevate the focus semantic value of a wh-containing constituent to the ordinary semantic value
- $\sim$ *interferes with* the association between Q and the wh-containing constituent

Non-additivity (Mayr 2013)

(5) ?*[Q ... [non-additive operator [... WH ...]]]

- Additive operator *Op*:
  for any g, h, $Op\ (g \vee h) = Op\ (g) \vee Op\ (h)$
- an operator is a problematic intervener for wh-questions if it is non-additive

(6) Only John smokes or drinks. $\neq$

(7) Only John smokes or only John drinks.

- *only* is non-additive, hence a problematic intervener.

The quantificational-domain hypothesis

A warm-up: set membership relation

(8) $\alpha_1 \in \{\alpha_1, \alpha_2, \alpha_3\}$
a set of α

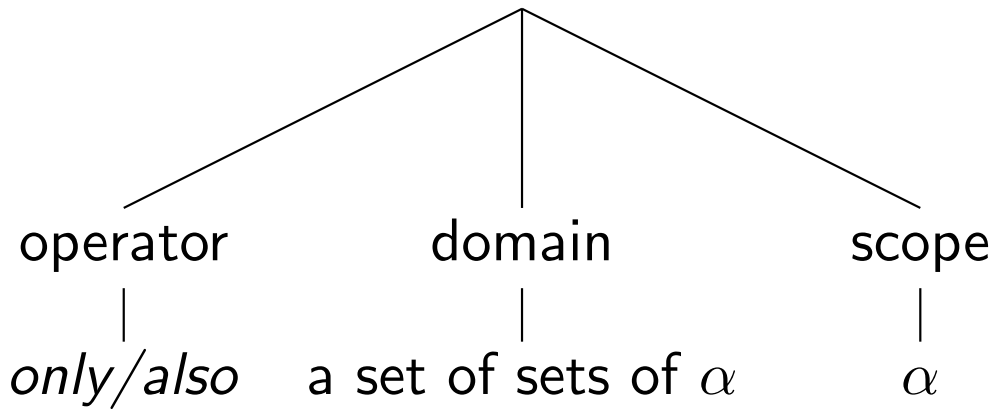
(9) $\alpha_1 \notin \{\ \{\alpha_1, \alpha_2, \alpha_3\}\ ,\ \{\alpha_4, \alpha_5, \alpha_6\}\ \}$
a set of sets of α

This very simple set membership relation is what lies in focus intervention effects.

Focus intervention is caused by the inappropriate quantificational domain of a focus-sensitive operator.

(10) ?*[Q ... focus-sensitive operator [$\underline{\text{XP}}_F$ ... WH ...]]

(11)



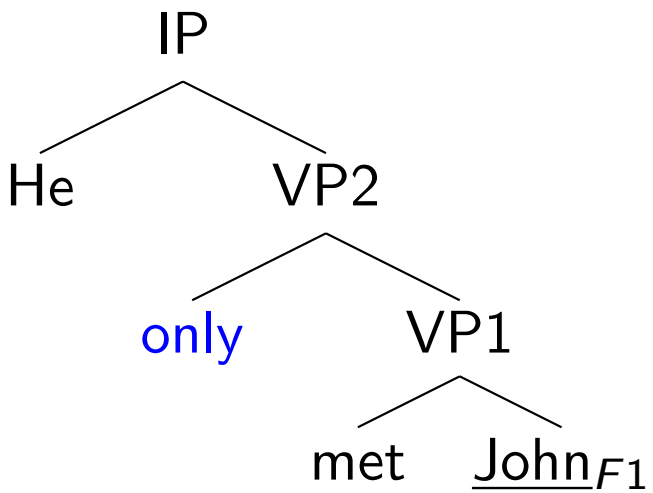
α does not belong to the quantificational domain

$\Rightarrow$ The quantificational structure induced by a focus-sensitive operator is illicit

Preliminary I: Focus semantics

Association with focus (Rooth 1985; Kratzer 1991)

(12)



a. $[\![John_{F1}]\!]^g$ = John; $[\![John_{F1}]\!]^{g,h} = h(1)$

b. $[\![VP1]\!]^g = \lambda$y. y met John

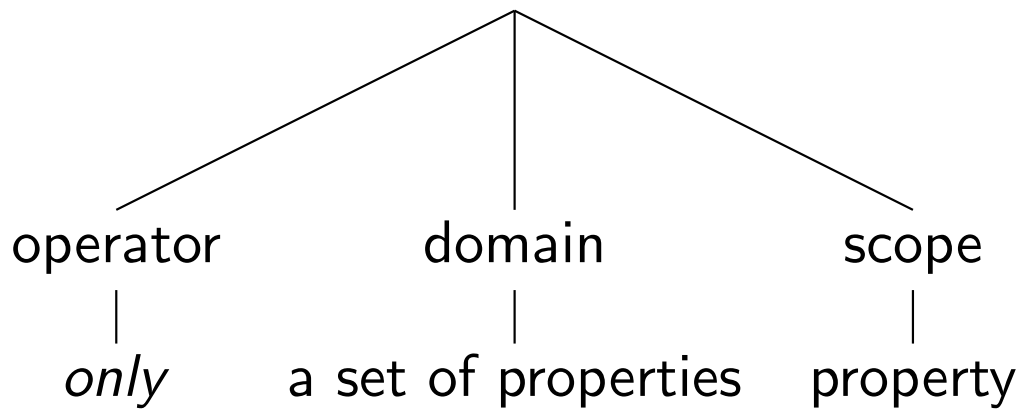
c. $[\![VP1]\!]^{g,h} = \lambda$y. y met $h(1)$

d. $[\![VP1]\!]^f = \{\lambda$y. y met $h(1) \mid h \in$ H$\}$
$= \{\lambda$y. y met John, λy. y met Peter, ...$\}$

Only takes as its quantificational domain the focus semantic value of VP1 $\Rightarrow$ Association with focus

(13) $[\![only\ VP1]\!]^g$
$= [\![only]\!]^g\ ([\![VP1]\!]^f)\ ([\![VP1]\!]^g)$
$= \lambda y.\forall P \in [\![VP1]\!]^f [P(y)=1 \rightarrow P(y)=[\![VP1]\!]^g(y)]$
Notice $P_{<e,t>} \in [\![VP1]\!]^f$ $_{<<e,t>,t>}$

(14)



Preliminary II: neo-Hamblin semantics

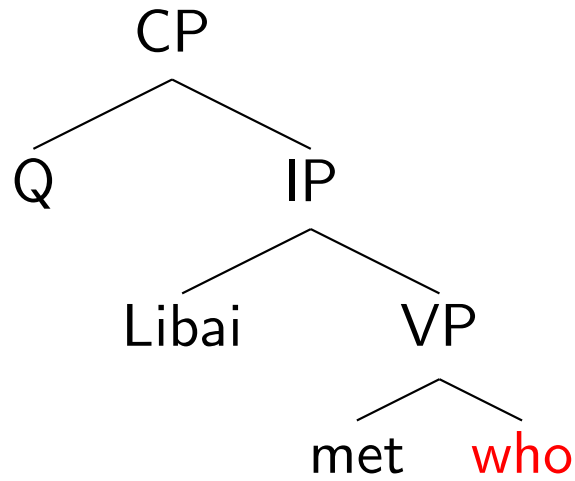
Semantics of wh-phrase

- Ordinary semantic value: a set of alternatives (Hamblin 1973)
- Focus semantic value: none (see also Eckardt 2007; contra Beck 2006)

Under Kratzer (1991)'s framework of focus interpretation

- $[\![WH]\!]^{g} = \{\text{a, b, c}\}$ (ordinary semantic value)
- $[\![WH]\!]^{g,h} = \{\text{a, b, c}\}$ (secondary semantic value)
- no focus semantic value

(15)



a. $[\![who]\!]^g = \{\text{John, Peter, ...}\}$

b. $[\![met]\!]^g = \lambda x.\lambda y.\ y \text{ met } x$

c. $[\![VP]\!]^g = \{[\![met]\!]^g\ (x) \mid x \in [\![who]\!]^g\}$
$= \{\lambda y.\ y \text{ met John}, \lambda y.\ y \text{ met Peter}, ...\}$
(pointwise functional application, Yatsushiro 2009, see also Hagstrom 1998)

(16) a. $[\![IP]\!]^g = [\![\textit{Libai met who}]\!]^g$
$= \{$Libai met John, Libai met Peter, ...$\}$

b. $[\![CP]\!]^g = [\![Q\ IP]\!]^g = [\![IP]\!]^g$
(Kratzer and Shimoyama 2002)

Derivation of focus intervention effects

Focus intervention effects in Mandarin

(17) ?* Ta zhi rang Libai$_F$ jian-le shei? (see 20)
he only allow Libai$_F$ meet-Asp who

Intended 'Who was the person x such that he only allowed Libai$_F$ to meet x?'

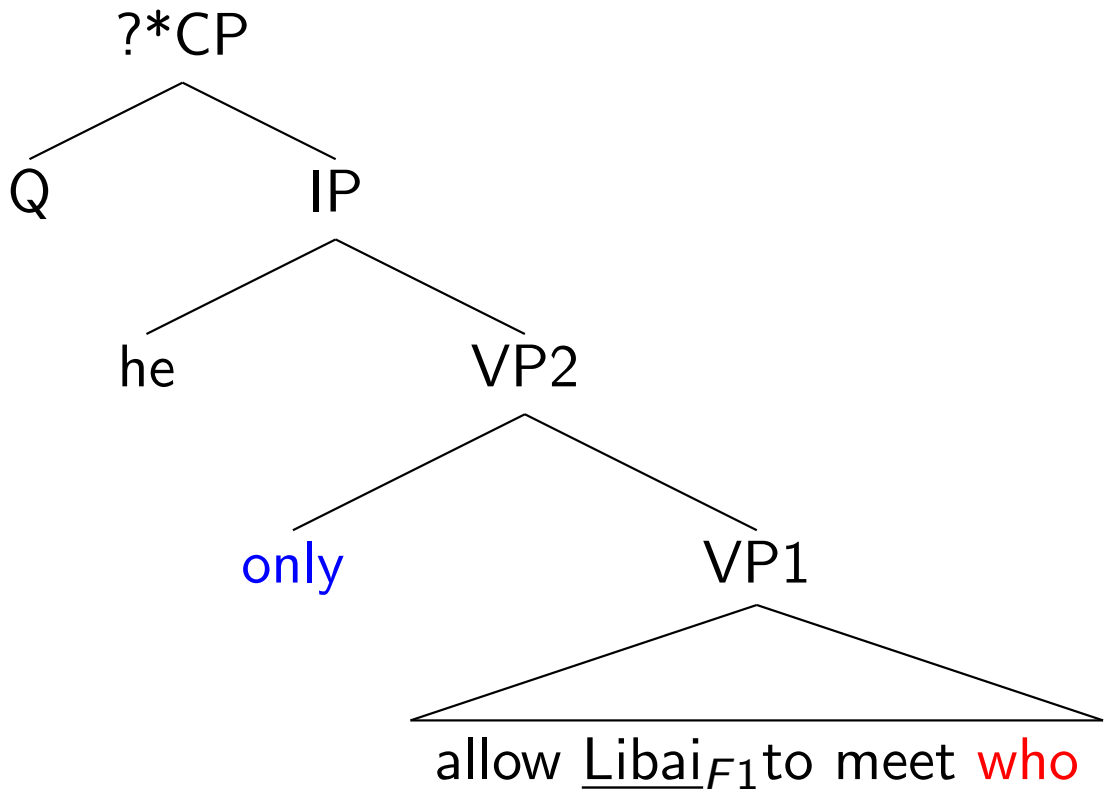
(18) ?* Zhiyou Libai$_F$ rang ta jian-le shei?
only Libai$_F$ allow him meet-Asp who

Intended 'Who was the person x such that only Libai$_F$ allowed him to meet x?'

(19) ?* Ta hai rang Dufu$_F$ jian-le shei?
he also allow Dufu$_F$ meet-Asp who

Intended 'Who was the person x such that he also allowed Dufu$_F$ to meet x?'

(20)



a. $[\![Libai_{F1}]\!]^g$ = Libai; $[\![Libai_{F1}]\!]^{g,h} = h(1)$

b. $[\![who]\!]^g = [\![who]\!]^{g,h} = \{$John, Peter, ...$\}$

(21) a. $[\![VP1]\!]^g = \{\lambda y.\ y \text{ allow Libai to meet } x \mid x \in [\![who]\!]^g\}$

$$= \left\{ \begin{array}{c} \lambda y.\ y \text{ allow Libai to meet John} \\ \lambda y.\ y \text{ allow Libai to meet Peter} \\ \ldots \end{array} \right\}$$

b. $[\![VP1]\!]^{g,h} = \{\lambda y.\ y \text{ allow } h(1) \text{ to meet } x \mid x \in [\![who]\!]^{g,h}\}$

$$= \left\{ \begin{array}{c} \lambda y.\ y \text{ allow } h(1) \text{ to meet John} \\ \lambda y.\ y \text{ aloow } h(1) \text{ to meet Peter} \\ \ldots \end{array} \right\}$$

c. $[\![VP1]\!]^f = \{[\![VP1]\!]^{g,h} \mid h \in H\}$

$$= \left\{ \left\{ \begin{array}{c} \lambda y.\ y \text{ allow } h(1) \text{ to meet John} \\ \lambda y.\ y \text{ allow } h(1) \text{ to meet Peter} \\ \ldots \end{array} \right\} \mid h \in H \right\}$$

$\Rightarrow$ a set of sets of alternatives

d. $[\![VP1]\!]^f$ = (a set of sets of alternatives)

$$\left\{ \begin{array}{c} \left\{ \begin{array}{c} \lambda y.\ y \text{ allow Libai to meet John} \\ \lambda y.\ y \text{ allow Libai to meet Peter} \\ \ldots \end{array} \right\} \\ \left\{ \begin{array}{c} \lambda y.\ y \text{ allow Dufu to meet John} \\ \lambda y.\ y \text{ allow Dufu to meet Peter} \\ \ldots \end{array} \right\} \\ \ldots \end{array} \right\}$$

Only takes as its quantificational domain the focus semantic value of VP1:

(22) a. $[\![\textit{only}]\!]^g = \lambda \mathrm{D}.\lambda \mathrm{F}.\lambda \mathrm{y}.\ \forall \mathrm{P} \in \mathrm{D}\ [\mathrm{P(y)}{=}1 \rightarrow \mathrm{P(y)}{=}\mathrm{F(y)}]$

b. $[\![\textit{only VP1}]\!]^g = [\![\textit{only}]\!]^g\ ([\![\textit{VP1}]\!]^f)\ ([\![\textit{VP1}]\!]^g)$
$= [\![\textit{only}]\!]^g\ ([\![\textit{VP1}]\!]^f)\ ([\![\textit{allow Libai to meet who}]\!]^g)$

$$= [\![\textit{only}]\!]^g\ ([\![\textit{VP1}]\!]^f) \left(\left\{ \begin{array}{c} \lambda \mathrm{y}.\ \mathrm{y\ allow\ Libai\ to\ meet\ John} \\ \lambda \mathrm{y}.\ \mathrm{y\ allow\ Libai\ to\ meet\ Peter} \\ \ldots \end{array} \right\} \right)$$

$$= \left\{ \begin{array}{c} [\![\textit{only}]\!]^g\ ([\![\textit{VP1}]\!]^f)\ (\lambda \mathrm{y}.\ \mathrm{y\ allow\ Libai\ to\ meet\ John}) \\ [\![\textit{only}]\!]^g\ ([\![\textit{VP1}]\!]^f)\ (\lambda \mathrm{y}.\ \mathrm{y\ allow\ Libai\ to\ meet\ Peter}) \\ \ldots \end{array} \right\}$$

$[\![only\ VP1]\!]^g = [\![only]\!]^g\ ([\![VP1]\!]^f)\ ([\![VP1]\!]^g) =$

$$\left\{ \begin{array}{c} \lambda y.\forall P \in [\![VP1]\!]^f\ [P(y)=1 \rightarrow P(y)=y \text{ allow Libai to meet John}] \\ \lambda y.\forall P \in [\![VP1]\!]^f\ [P(y)=1 \rightarrow P(y)=y \text{ allow Libai to meet Peter}] \\ \ldots \end{array} \right\}$$

However, $P_{<e,t>} \notin [\![VP1]\!]^f{}_{<<<e,t>t>t>}$

$\Rightarrow$ Illicit quantification

$\Rightarrow$ **Focus intervention effects**

Derivation of overt wh-fronting

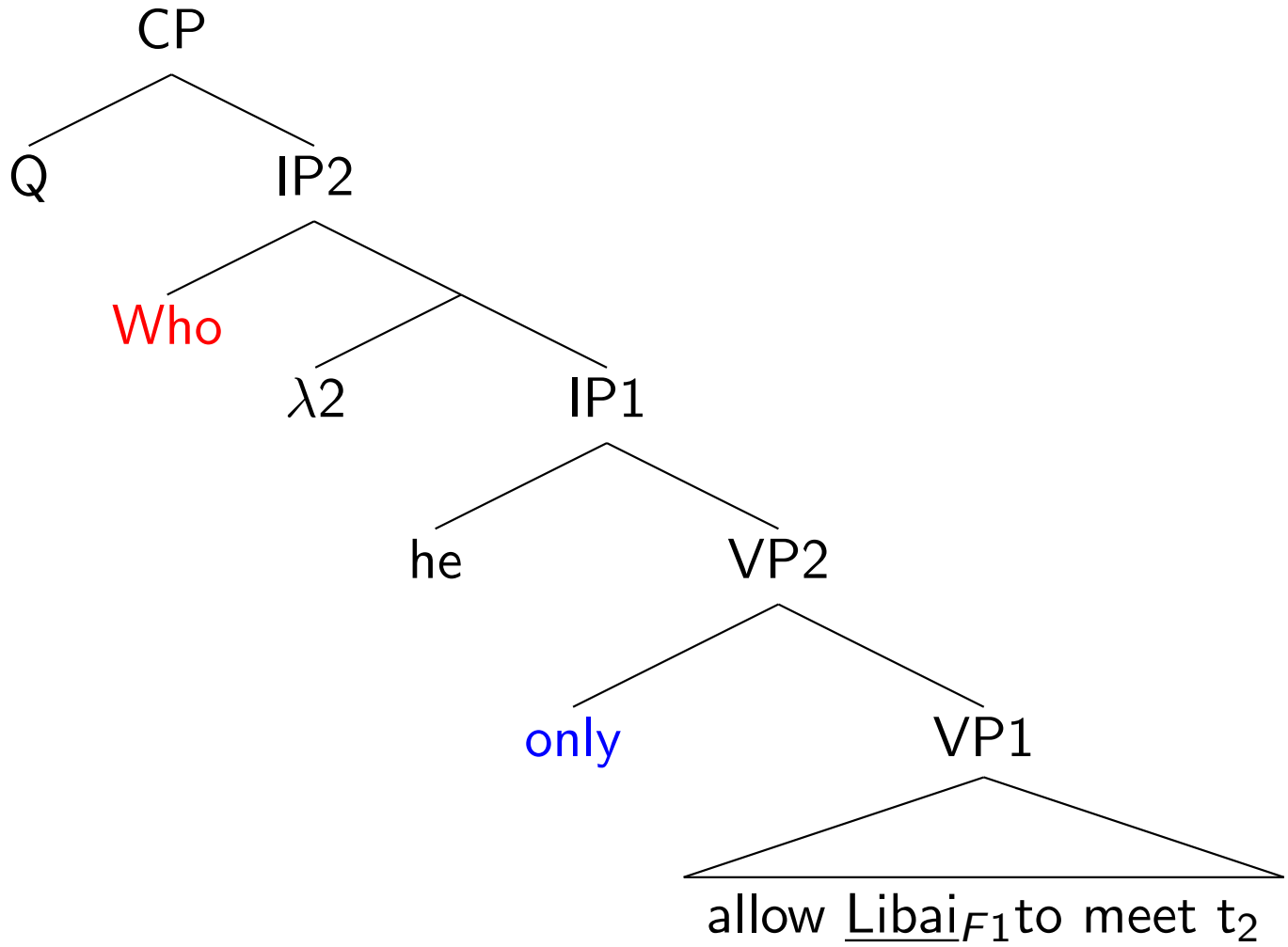
(23) Shei$_1$, ta zhi rang Libai$_F$ jian-le t_1? (see 25)
who he only allow Libai$_F$ meet-Asp

Intended 'Who was the person x such that he only allowed Libai$_F$ to meet x?'

(24) Na dao cai$_1$, zhiyou Zhangsan$_F$ mei chi t_1?
which-CL dish only Zhangsan$_F$ not eat

Intended 'Which dish did only Zhangsan not eat?'

(25)



a. $[\![Libai_{F1}]\!]^g$ = Libai; $[\![Libai_{F1}]\!]^{g,h} = h(1)$

b. $[\![t_2]\!]^g = [\![t_2]\!]^{g,h} = g(2)$

c. $[\![who]\!]^g = [\![who]\!]^{g,h} = \{$John, Peter, ...$\}$

(26) a. $[\![VP1]\!]^g = \lambda$y. y allow Libai to meet $g(2)$

b. $[\![VP1]\!]^{g,h} = \lambda$y. y allow $h(1)$ to meet $g(2)$

c. $[\![VP1]\!]^f = \{[\![VP1]\!]^{g,h} \mid h \in \mathrm{H}\}$

$$= \left\{ \begin{array}{c} \lambda\text{y. y allow Libai to meet } g(2) \\ \lambda\text{y. y allow Dufu to meet } g(2) \\ \ldots \end{array} \right\}$$

$\Rightarrow$ a set of alternatives

d. $[\![only\ VP1]\!]^g = [\![only]\!]^g\ ([\![VP1]\!]^f)\ ([\![VP1]\!]^g) =$
λy.$\forall$P$\in [\![VP1]\!]^f$[P(y)=1$\rightarrow$P(y)=y allow Libai to meet $g(2)$]
Here, $\mathrm{P}_{<e,t>} \in [\![VP1]\!]^f_{<<e,t>,t>}$
$\Rightarrow$ Licit quantification

(27) a. $[\![IP1]\!]^g$
$= \forall P \in [\![VP1]\!]^f [P(he) = 1 \rightarrow P(he) =$ he allow Libai to meet $g(2)] =$ he only allow Libai to meet $g(2)$

b. $\lambda 2.[\![IP1]\!]^{g[x/2]} = \lambda x.$ he only allow Libai to meet x

c. $[\![IP2]\!]^g = \{$he only allow Libai to meet x $\mid x \in [\![who]\!]^g\}$

$$= \left\{ \begin{array}{c} \text{he only allow Libai to meet John} \\ \text{he only allow Libai to meet Peter} \\ \ldots \end{array} \right\}$$

d. $[\![CP]\!]^g = [\![IP2]\!]^g$

Interim summary

Configuration of focus intervention effects in wh-questions

(28) ?*[... focus-sensitive operator [$\underline{\text{XP}}_F$ ... WH ...]]

- XP_F is as crucial as the focus-sensitive operator and the WH!

The quantificational-domain hypothesis of focus intervention

(29) Focus intervention effects arise iff what a focus-sensitive operator quantifies over is not a member of its quantificational domain.

Critical data

When focus-sensitive operators do not interfere with questions

- F-WH association
- F-Alt association

Focus intervention in non-questions

- Contrastive topics

Association between focus-sensitive operators and wh-phrases (F-WH association)

Mandarin

(30) Libai zhi jian-le shei?
Libai only meet-Asp who

'Who was the person x such that Libai met x *and nobody else*?'

(31) Zhiyou shei jian-le Libai?
only who meet-Asp Libai

'Who was the person x such that x *and nobody else* met Libai?'

(32) Libai hai jian-le shei?
Libai also meet-Asp who

'Who was the person x such that Libai met x *(and someone else)*?

Turkish

(33) John sadece kim-i gör-dü?
John only who-Acc see-Past

'Who was the person x such that John met x *and nobody else*?'

(34) Sadece kim John-i gör-dü?
only who John-Acc see-Past

'Who was the person x such that x *and nobody else* met John?'

A contrast between F-WH association and focus intervention

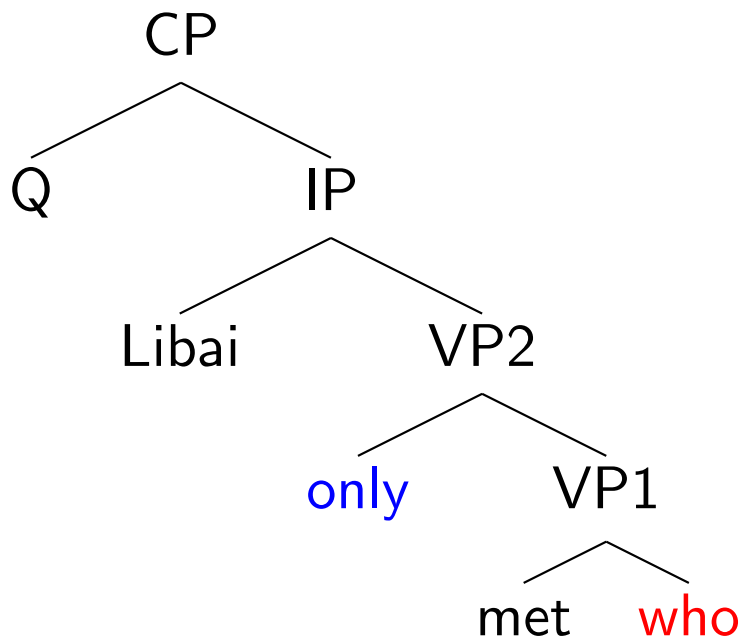
(35) [Q ... focus-sensitive operator [... WH ...]]

(36) *[Q ... focus-sensitive operator [$\underline{\text{XP}_F}$ ... WH ...]]

- In-situ wh-phrases can associate with focus-sensitive operators (Aoun and Li 1993; Li 2013).
- The presence of XP_F makes a difference!
- The intervention hypothesis makes no reference to XP_F, hence fails to predict the contrast.
- The quantificational-domain hypothesis predicts that XP_F interacts with the WH-containing constituent and results in an inappropriate quantificational domain for the focus-sensitive operator.

Derviation of F-WH association

(37)



a. $[\![who]\!]^{g} = [\![who]\!]^{g,h} = \{\text{John, Peter, ...}\}$

b. $[\![VP1]\!]^{g} = [\![VP1]\!]^{g,h} =$
$\{\lambda \text{y. y met John}, \lambda \text{y. y met Peter}, ...\}$
$\Rightarrow$ a set of alternatives

$$[\![VP2]\!]^g = [\![only\ VP1]\!]^g = [\![only\ met\ who]\!]^g$$

$$= \left\{ \begin{array}{c} \lambda y.\forall P \in [\![VP1]\!]^{g,h}[P(y)=1 \rightarrow P(y)=y \text{ met John}] \\ \lambda y.\forall P \in [\![VP1]\!]^{g,h}[P(y)=1 \rightarrow P(y)=y \text{ met Peter}] \\ \ldots \end{array} \right\}$$

Only takes as its quantificational domain the set of alternatives derived via the wh-phrase $\Rightarrow$ F-WH association

(38) $[\![CP]\!]^g$

$= [\![Q\ IP]\!]^g = [\![IP]\!]^g$ (Kratzer and Shimoyama 2002)

$= [\![\textit{Libai only met who}]\!]^g$

$$= \left\{ \begin{array}{c} \forall P \in [\![VP1]\!]^{g,h}[P(\text{Libai})=1 \rightarrow P(\text{Libai})=\text{Libai met John}] \\ \forall P \in [\![VP1]\!]^{g,h}[P(\text{Libai})=1 \rightarrow P(\text{Libai})=\text{Libai met Peter}] \\ \ldots \end{array} \right\}$$

$=$ {Libai only met John, Libai only met Peter, ...}

NB: Each proposition of this set encodes exhaustivity

$\Rightarrow$ An answer to this question must be exhaustive

Association with multiple WH

A focus-sensitive operator can be associated with multiple wh-phrases.

(39) Ta zhi [$_{VP}$ song-le shei shenme shu]?
he only send-Asp who what book

'Who was the person x and what was the book y such that he only sent x y?'

(40) Ta hai [$_{VP}$ song-le shei shenme shu]?
he also send-Asp who what book

'Who was the person x and what was the book y such that he also sent x y?'

(41) Ta zhi [$_{VP}$ song-le shei shenme shu]?
he only send-Asp who what book

a. $[\![VP]\!]^g = [\![VP]\!]^{g,h} =$
$\{\lambda$y. y sent x z $\mid$ x $\in [\![who]\!]^g$, z $\in [\![what\ book]\!]^g$ $\} =$
$\{\lambda$y. y sent Peter a novel,λy. y sent John a journal, ...$\}$
$\Rightarrow$ a set of alternatives (see also Hagstrom 1998)

b. $[\![only\ VP]\!]^g =$

$$\left\{ \begin{array}{c} \lambda y.\forall P \in [\![VP]\!]^{g,h}\ [P(y) \rightarrow P(y) = y \text{ sent Peter a novel}] \\ \lambda y.\forall P \in [\![VP]\!]^{g,h}\ [P(y) \rightarrow P(y) = y \text{ sent John a journal}] \\ \ldots \end{array} \right\}$$

$\Rightarrow$ Licit quantification

F-Alt association

Hamblin semantics of alternative questions in English

Assume that the compositional analysis of alternative questions follows Hamblin semantics (von Stechow 1991; Biezma and Rawlins 2012; see also Beck and Kim 2006).

(42) a. $[_{CP}$ Did John $[_{DisjP}$ dance or sing]]?

b. $[\![DisjP]\!]^g = \{\lambda$y. y danced, λy. y sang$\}$

c. $[\![CP]\!]^g = \{$John danced, John sang$\}$

In this framework, disjunctive phrases in alternative questions have the same ordinary semantic value as *wh*-phrases in Mandarin *wh*-in-situ questions. Consequently, our analysis predicts the following contrast:

(43) a. ?* [Q ... focus-sensitive operator [$\underline{\text{XP}}_F$ ... DisjP ...]]

b. [Q ... focus-sensitive operator [... DisjP ...]]
$\Rightarrow$ **Association with alternatives**
F-Alt association

(44) Focus intervention effects (Beck and Kim 2006: 172)

a. ?* Did only Mary$_F$ introduce Sue [$_{DisjP}$ to Bill or (to) Tom]?

b. ?* Did only Mary$_F$ introduce [$_{DisjP}$ Sue or Molly] to Bill?

c. ?* Did only John$_F$ drink [$_{DisjP}$ coffee or tea]?

(45) **F-Alt association**

a. Did Mary introduce Sue only [$_{DisjP}$ to Bill or (to) Tom]?

b. Did Mary only introduce [$_{DisjP}$ Sue or Molly] to Bill?

c. Did John only drink [$_{DisjP}$ coffee or tea]?

Beyond questions: Contrastive topic (CT) constructions

Constant (2010, 2012) argues that Mandarin has a CT operator *-ne*, which triggers topic movement of a focused phrase.

(46) Dufu ai he hongcha.
Dufu love drink black.tea
'Dufu likes to drink black tea.'

(er) Libai$_{F1}$ ne, t_1 ai he kafei$_F$.
while Libai$_F$ CT.operator like drink coffee$_F$

'Libai$_F$ likes to drink coffee$_F$.'

Constant (2012)'s analysis

(47) [$_{IP}$ Libai$_F$ ne, he-le kafei$_F$].
Libai$_F$ CT.operator drink-Asp coffee$_F$

a. $[\![Libai_F]\!]^g$ = Libai; $[\![Libai_F]\!]^f$ = {Libai, Dufu, ...}

b. $[\![kafei_F]\!]^g$ = coffee; $[\![kafei_F]\!]^f$ = {coffee, tea, ...}

c. $[\![IP]\!]^g$ = Libai drank coffee

d.

$$[\![IP]\!]^f = \left\{ \begin{array}{c} \{\text{Libai drank coffee, Libai drank tea}\} \\ \{\text{Dufu drank coffee, Dufu drank tea}\} \\ \ldots \end{array} \right\}$$

$\Rightarrow$ a set of sets of alternatives

It is predicted that focus intervention effects occur when a focus-sensitive operator scopes over a CT construction.

(48) [zhiyou [$_{IP}$ Libai$_F$ ne, he-le kafei$_F$]].
only Libai$_F$ CT.operator drink-Asp coffee$_F$

a. $[\![only\ IP]\!]^g =$
$\forall p \in [\![IP]\!]^f$ [p = 1 $\rightarrow$ p = Libai drank coffee]

b. However, p $\notin [\![IP]\!]^f$ (see (47d))
$\Rightarrow$ focus intervention effects

The prediction is borne out.

(49) * Zhiyou [$_{IP}$ Libai$_F$ ne, he-le kafei$_F$].
only Libai$_F$ CT.operator drink-Asp coffee$_F$
Intended 'Only Libai$_F$ drank coffee$_F$.'

(50) * Shi [$_{IP}$ Dabufen de ren$_{F1}$ ne,
Cleft.operator most DE person$_F$ CT.operator
dou he-le kafei$_F$].
DOU drink-Asp coffee$_F$
Intended 'It is most persons$_F$ who drank coffee$_F$.'

Conclusion

- The quantificational-domain hypothesis:
  Focus intervention is due to an inappropriate quantificational domain of a focus-sensitive operator.
- Attested predictions
  - Focus-sensitive operators can take WH and DisjP in AltQs as their associates without triggering focus intervention effects.
  - Focus intervention effects are not limited to questions.

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