Higher-order readings of WH-questions

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The traditional view

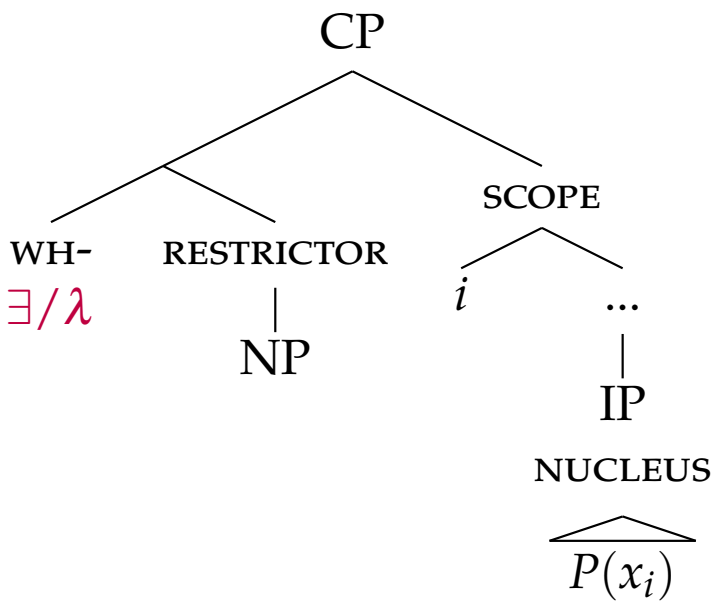
WH-questions expect answers naming an **entity** in the extension of the WH-complement or a **generalized quantifier** (GQ) over a set of such entities.

(1) Which student came?

a. Andy. $\rightsquigarrow$ *Andy is a student.*

b. Andy or Billy. $\rightsquigarrow$ *Andy and Billy are students.*

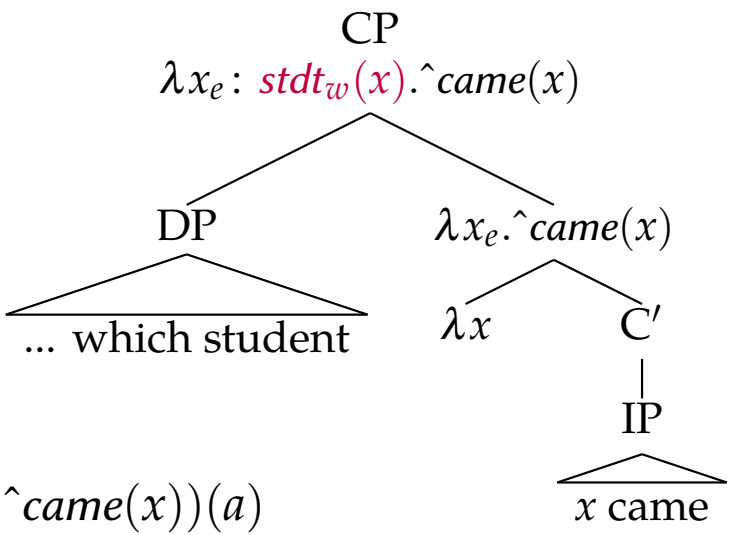
A general solution: The WH-phrase is a **binder of e-type variables**.



The traditional view: In categorial approaches ...

WH-phrases are **function domain restrictors**. A WH-question denotes a **Q-function** only defined for meanings in ⟦WH-complement⟧.

(2) Which student came?



a. **Entity**-naming answers

$$\begin{aligned}⟦\text{WH-Q}⟧(⟦\text{Andy}⟧) &= (\lambda x_e : stdt_w(x).\hat{}came(x))(a)\\ &= stdt_w(a).\hat{}came(a)\end{aligned}$$

b. **GQ**-naming answers

$$\begin{aligned}⟦\text{Andy or Billy}⟧(⟦\text{WH-Q}⟧) &= (a^{\Uparrow} \sqcup b^{\Uparrow})(\lambda x_e : stdt_w(x).\hat{}came(x))\\ &= stdt_w(a) \wedge stdt_w(b).\hat{}came(a) \cup \hat{}came(b)\end{aligned}$$

In short: **Q-domain ⊆ ⟦WH-complement⟧**

[Q-domain = Dom(Q-function). In other approaches, Q-domain refers to the set of values that a WH-bound variable can take.]

This talk

My claim

Some WH-questions admit **higher-order readings**, under which the Q-domain ranges over a set of higher-order meanings. Thus, *wh*-phrases can also bind higher-order variables.

Roadmap

A. Evidence for a higher-order Q-domain
B. Defining a higher-order Q-domain: The Positiveness Constraint
C. Distributing and deriving higher-order readings
D. Appendix: The 'disjunction-only' higher-order reading

Basics of Boolean coordinations and GQs

Conjunctions

(3) For two individuals x and y, $[\![x \text{ and } y]\!]$ is ambiguous between a and b:

a. $x \oplus y$ Sum of non-Montagovian individuals

b. $x^{\Uparrow} \sqcap y^{\Uparrow}$ Boolean conjunction/ Meet of Montagovian individuals

(4) $$A \sqcap B = \begin{cases} A \wedge B & \text{if } A, B \text{ are of type } t \\ \lambda x_\tau [A(x) \sqcap B(x)] & \text{if } A, B \text{ are of a conjoinable type } \langle \tau, \sigma \rangle \\ \text{undefined} & \text{otherwise} \end{cases}$$

(5) For any entity x: $x^{\Uparrow} =_{\text{df}} \lambda m_{\langle e,t \rangle}.m(\alpha)$

The live-on property

(6) For a GQ π and a set of individuals A:

a. π lives on A iff $\forall B[\pi(B) \leftrightarrow \pi(A \cap B)]$.

b. π ranges over A iff A is the smallest live-on set (SMLO) of π.

π	SMLO(π)
some/every/no student	*student*
some/most students	**student*

[Partee and Rooth 1983, Groenendijk and Stokhof 1989; Barwise and Cooper 1981; Szabolcsi 1997]

A. Evidence for a higher-order Q-domain

If Q-domain $\subseteq$ WH-complement

For any answer naming a GQ ...

1. this GQ must be interpreted with **wide scope** relative to the Q-nucleus.
2. this answer is not in the Hamblin-set — its derivation involves extra Boolean operations to the propositions in the Hamblin-set.

- **Non-reducibility**: diagnostic for disjunctions and $\exists$-GQs
- **Stubborn collectivity**: diagnostic for conjunctions and $\forall$-GQs
- Diagnostics for GQ-coordinations

1. Non-reducibility: Diagnostic for disjunctions

Spector (2007, 2008): Elided disjunctions can completely address □-questions.

(7) Which books does John **have to** read?
The French novels **or** the Russian novels.

a. 'F or R ... I don't know which exactly.' Partial: *or* ≫ □
b. 'F or R ... the choice is up to him.' Complete: □ ≫ *or*

(8) a. **First-order reading**:
'Which book(s) x is s.t. J has to read x?'
[[... which books] λx [have-to [J read x_e]]

b. **Higher-order reading**:
'What GQ π over books is s.t. J has to read π?'
[[... which books] $\lambda\pi$ [have-to [$\pi_{\langle et,t\rangle}$ λx [J read x_e]]]]

The higher-order reading involves **semantic reconstruction** (*a la* Cresti 1995).

$$\begin{aligned}[\![\text{WH-Q}]\!]([\![\text{F or R}]\!]) &= (\lambda\pi_{\langle et,t\rangle} : \textsc{smlo}(\pi) \subseteq {}^{*}book.\Box[\lambda w.\pi(\lambda x.read_w(j,x))])(f^{\Uparrow} \sqcup r^{\Uparrow}) \\ &= \textsc{smlo}(f^{\Uparrow} \sqcup r^{\Uparrow}) \subseteq {}^{*}book.\Box[\lambda w.(f^{\Uparrow} \sqcup r^{\Uparrow})(\lambda x.read_w(j,x))] \\ &= \{f, r\} \subseteq {}^{*}book.\Box[\lambda w.read_w(j,f) \vee read_w(j,r)]\end{aligned}$$

[NB: the Q-domain is subject to revision]

1. Non-reducibility: Diagnostic for disjunctions

The □-question helps to validate the existence of Boolean disjunctions in a Q-domain because its answer space is **not closed under disjunction**.

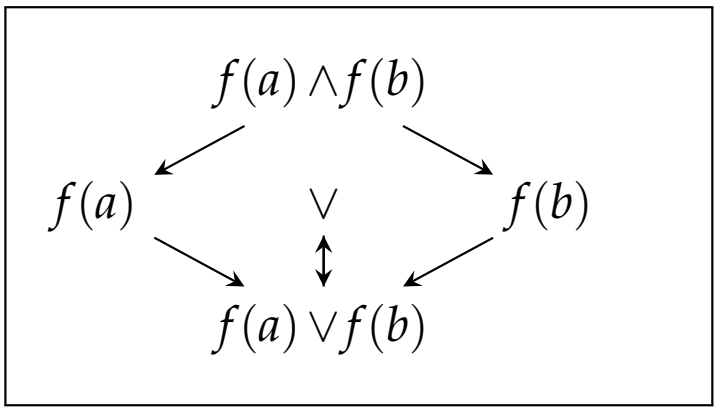


Figure 1: What did John read?

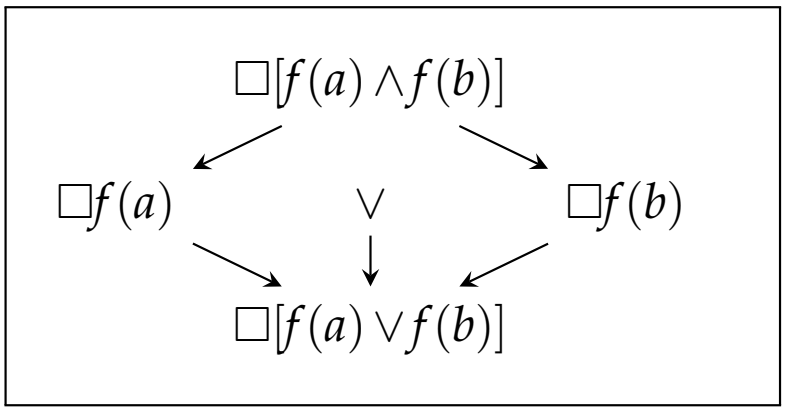


Figure 2: What does John have to read?

Or, the Q-function of the □-question is **not reducible** relative to disjunctions.

Reducibility relative to disjunctions

A function θ is reducible relative to disjunctions iff for any meanings a and b s.t. θ is defined for a and b or for $a^{\Uparrow}$ and $b^{\Uparrow}$: $\theta \bullet (a^{\Uparrow} \sqcup b^{\Uparrow}) \equiv (\theta \bullet a^{\Uparrow}) \sqcup (\theta \bullet b^{\Uparrow})$.

[•: the combinatory operation between θ and a GQ]

(9) John must read a or $b \not\equiv$ John must read a or John must read b.

1. Non-reducibility: Diagnostic for disjunctions

The diagnostic for disjunctions can be made based on any WH-questions where the Q-function is not reducible relative to disjunctions.

(10) Attitude verbs

a. Which books did John demand that we read?
b. Which books is John certain that Mary read?
c. Which books does John expect Mary to read?

(11) Modals

a. Which books is it sufficient to read?
b. Which books is John required to read?

(12) Quantifiers

a. Which books did most/all of the students read?
b. Which books does John always/ usually read?

[(10) and (11) are from Spector (2007).]

1. Non-reducibility: Diagnostic for ∃-quantifiers

The non-reducibility diagnostic also extends to many ∃-quantifiers.

Non-reducibility test

A function θ is reducible relative to a GQ π iff $\theta \bullet \pi \equiv \pi(\lambda x.\theta \bullet x^{\Uparrow})$

(13) John must read $\left\{\begin{array}{c}\text{at least}\\ \text{more than}\\ \text{exactly}\end{array}\right\}$ two books by Balzac.

$\not\equiv$ There are $\left\{\begin{array}{c}\text{at least}\\ \text{more than}\\ \text{exactly}\end{array}\right\}$ two books by Balzac that John must read.

(14) Which books does John have to read?

$\left\{\begin{array}{c}\text{At least}\\ \text{More than}\\ \text{Exactly}\end{array}\right\}$ two books by Balzac. ($^{OK}\exists \gg \Box$, $^{OK}\Box \gg \exists$)

2. Stubborn collectivity: Diagnostic for conjunctions

Quantized collective predicates (e.g. *formed a team*, *co-authored two papers*) are "**stubbornly collective**" (in contrast to e.g. *lifted the piano*).

Context: The kids formed two teams in total: $a+b$ formed one, $c+d$ formed one.

(15) a. The kids **formed teams**.
b. #The kids **formed a team**.

(16) a. #John knows [that **the kids** formed a team].
b. John knows [**which kids** formed a team].
$\rightsquigarrow$ *John knows that $a+b$ formed a team and $c+d$ formed a team.*

Puzzle: Where does the conjunctive closure in (16b) come from?

Clearly, it cannot come from the predicate or anywhere within the Q-nucleus.

Proposal (Xiang 2016: §1.6)

The conjunctive closure is supplied by the **WH-phrase**: it binds a higher-order trace and yields a Q-domain which includes also Boolean conjunctions.

(17) Which kids formed a team?
'For which GQ π over kids is such that π formed a team?'

a. **Logical Form**
[[... which kids] $\lambda\pi$ ... [$_{\text{IP}}$ $\pi_{\langle et,t\rangle}$ λx [$_{\text{VP}}$ x_e formed a team]]]

b. **Q-function** (domain to be revised)
$[\![\text{WH-Q}]\!] = \lambda\pi_{\langle et,t\rangle} : \text{SMLO}(\pi) \subseteq {}^{*}kid.\hat{}\pi(\lambda x.form\text{-}a\text{-}team(x))$

c. **Combining with a Boolean conjunction**
$[\![\text{WH-Q}]\!]((a \oplus b)^{\Uparrow} \sqcap (c \oplus d)^{\Uparrow})$
$= \{a \oplus b, c \oplus d\} \subseteq {}^{*}kid.\lambda w[form\text{-}a\text{-}team_w(a \oplus b) \wedge form\text{-}a\text{-}team_w(c \oplus d)]$

2. Stubborn collectivity: Diagnostic for conjunctions

Another (problematic) view: The conjunctive closure is from an operation outside the Q-root, such as Heim's (1994) answerhood-operator.

(18) $\textsc{Ans-H}(Q)(w) = \bigcap\{p \mid w \in p \in Q\}$

No. The contrast between (19a) and (19b) wrt uniqueness shows that the conjunctive closure comes from the WH-phrase.

(19) a. John knows [which **kids** formed a team].
b. #John knows [which **two kids** formed a team].
$\rightsquigarrow$ *Among the relevant kids, exactly two of them formed one single team.*

Dayal (1996): A question is defined only if it has a strongest true answer.

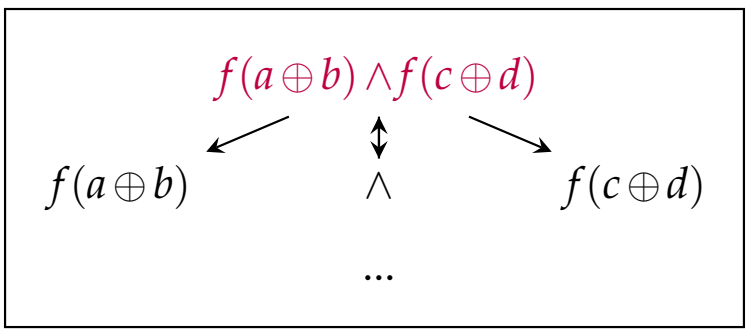


Figure 3: Which two kids formed a team?

The Q-domain of the basic plural-Q includes Boolean conjunctions, while that of the num-modified-Q doesn't.

Stubborn collectivity + Non-reducibility: Disjunctions over GQs

(w: As part of the course requirement, each pair of students have to co-present one paper this or next week. Moreover, the instructor requires the presentations in each week to be given by students from the same dept.)

junior linguists:	$\{a_1, b_1\}$	junior philosophers:	$\{a_2, b_2\}$
senior linguists:	$\{c_1, d_1\}$	senior philosophers:	$\{c_2, d_2\}$

(20) Guest: "Which students have to present a paper together this week?"
Instructor: "The two junior linguists and the two senior linguists, OR, the two junior philosophers and the two senior philosophers."
($\Box \gg \mathit{or} \gg \mathit{and}$)

(21) a. [[... which students] $\lambda\pi$ [$_{\text{IP}}$ have to [$\pi_{\langle et,t\rangle}$ λx [$_{\text{VP}}$ x_e p.a.p.t.]]]]

b. $((a_1 \oplus b_1)^{\Uparrow} \sqcap (c_1 \oplus d_1)^{\Uparrow}) \sqcup ((a_2 \oplus b_2)^{\Uparrow} \sqcap (c_2 \oplus d_2)^{\Uparrow})$

Non-reducibility: Conjunctions over GQs

(w: Jack is tolerated of taking up to one course a year in syntax or semantics, but he would be worried that if he has to take one or more courses for each subfield.)

(22) What courses is Jack worried that he must take [this year]?

a. Semantics I or II, and, Syntax I or II. ($worried \gg and \gg \Box \gg or$)

b. At least one course in semantics and at least one course in syntax.

(23) a. [whP $\lambda\pi$ [Jack$_i$ is worried that [must [$\pi_{\langle et,t\rangle}$ λx [he$_i$ takes x_e]]]]]

b. $(sem_1^{\Uparrow} \sqcup sem_2^{\Uparrow}) \sqcap (syn_1^{\Uparrow} \sqcup syn_2^{\Uparrow})$

4. Interim summary

- A WH-phrase can bind a variable with a complex type $\langle et, t \rangle$, yielding a higher-order reading.

  (24) [... *wh*P $\lambda\pi$ [IP ... $\pi_{\langle et,t \rangle}$ λx [... x_e ...]]]

- A higher-order Q-domain should include at least the following:
  - Boolean disjunctions and $\exists$-GQs (by non-reducibility)
  - Boolean conjunctions and $\forall$-GQs (by stubborn collectivity)
  - Boolean coordinations of those above

Next: Can we make the following generalization?

The higher-order Q-domain yielded by a WH-phrase consists of all GQs over subsets of the WH-complement and the Boolean compounds of these GQs.

No. Higher-order Q-domains are subject to **Positiveness**.

B. Defining a higher-order Q-domain: The Positiveness Constraint

Is there any GQ(-compound) that cannot be included in a Q-domain?

The Completeness Test (generalized from Spector 2008)

1. x knows Q $\rightsquigarrow$ x knows the complete true answer of Q.
2. For a proposition p naming a short answer x, if p is true but isn't entailed by the complete true answer of Q, then: $p \notin$ Hamblin set and $x \notin$ Q-domain.

(25) Assume that John's reading obligations include the following:

a. John must read at least two novel(s) by Andy,
b. John must read no book by Billy,

(26) Sue knows which books John must read.

$\rightsquigarrow$ Sue knows (a).	increasing GQ
$\not\rightsquigarrow$ Sue knows (b).	decreasing GQ
$\not\rightsquigarrow$ Sue knows (a) and (b).	non-monotonic GQ-compound

From increasing-ness to positive-ness

Spector: The GQ[-compound]s included in a Q-domain must be **increasing**.

(27) Assume that John's reading obligations include the following:

a. John must read {at least two, more than one} book(s) by Andy,
b. John must read no book by Billy,
c. John must read {at most one, less than two} book(s) by Cindy,
d. John must read {no more than two, up to two} books by Danny,
e. John must read no books except *Red Linguists* by Emmy,
f. John must read no books except *Blue Linguists* by Florian,
g. **John must read exactly two books by Gillion.**

(28) Sue knows which books John must read.

$\rightsquigarrow$ Sue knows (a) and (e). — increasing GQs
$\not\rightsquigarrow$ Sue knows (b)/(c)/(d)/(f) — decreasing GQs
$\not\rightsquigarrow$ Sue knows (a) and (b)/(c)/(d)/(f) ... — non-monotonic GQ-compounds
$\rightsquigarrow$ **Sue knows (g).** — **non-monotonic GQs**

Spector can't explain the inclusion of non-monotonic GQs and the exclusion of non-monotonic GQ-compounds.

The Positiveness Constraint

My view: Whether a GQ(-compound) should be included in a higher-order Q-domain is determined by its "**positiveness**", not its monotonicity.

The Positiveness Constraint

Only positive GQs and their coordination compounds can be in a Q-domain.

(29) A generalized quantifier π is **positive** iff $\pi \subseteq \mathit{some}(\textsc{smlo}(\pi))$.

π	$\textsc{smlo}(\pi)$	Increasing?	Positive?
$a^{\Uparrow}$	$\{a\}$	Yes	Yes
$a^{\Uparrow} \sqcap b^{\Uparrow}$, $a^{\Uparrow} \sqcup b^{\Uparrow}$	$\{a, b\}$	Yes	Yes
at least two books	*books*	Yes	Yes
at most two books	*books*	No	No
every book except a	$book - \{a\}$	Yes	Yes
no book except a	$book - \{a\}$	No	No
exactly two books	*books*	No	Yes
two to ten books	*books*	No	Yes

Defining a higher-order Q-domain

Let A (of type $\langle e,t\rangle$) be the set denoted by the extension of the WH-complement, then the **higher-order Q-domain** yielded by WH-A (if exists) is as follows:

(30) $$^{H}A = \textsc{min}\left\{ A' \;\middle|\; \begin{array}{r} \forall\pi_{\langle et,t\rangle}[\textsc{smlo}(\pi) \subseteq A \wedge \pi \subseteq \mathit{some}(\textsc{smlo}(\pi)) \rightarrow \pi \in A'] \\ \wedge\forall\alpha[\varnothing \subset \alpha \subseteq A' \rightarrow \bigsqcup\alpha \in A' \wedge \bigsqcap\alpha \in A'] \end{array} \right\}$$

(The minimal set which includes all the positive GQs living on a subset of A and the Boolean coordination compounds of these GQs.)

(31) Which books does John have to read?

a. **First-order reading**
$\lambda x_e : x \in {}^{*}\mathit{book}_w.\Box\lambda w.\mathit{read}_w(j,x)$

b. **Higher-order reading** (narrow scope π)
$\lambda\pi_{\langle et,t\rangle} : \pi \in {}^{H*}\mathit{book}_w.\Box\lambda w.\pi(\lambda x.\mathit{read}_w(j,x))$

[NB: $\textsc{smlo}(\pi)$ presupposes that π has a **live-on** property, and hence that π can be decomposed into a **conservative** type $\langle 1,1\rangle$ quantifier (i.e., a quantifier that can be lexicalized into a determiner) and a live-on set. It thus excludes many unwanted higher-order meanings.]

C. Distributing and deriving higher-order readings

Distributing constraints of higher-order readings

Higher-order readings are unavailable if the WH-phrase ...

1. ... is extracted out of a weak island (Spector 2008, skipped)
2. ... is SG-marked (Fox 2013; contra Elliott et al. 2017)
3. ... is NUM-modified (Xiang 2016)

- Uniqueness effects show that the following questions cannot have answers naming Boolean conjunctions.

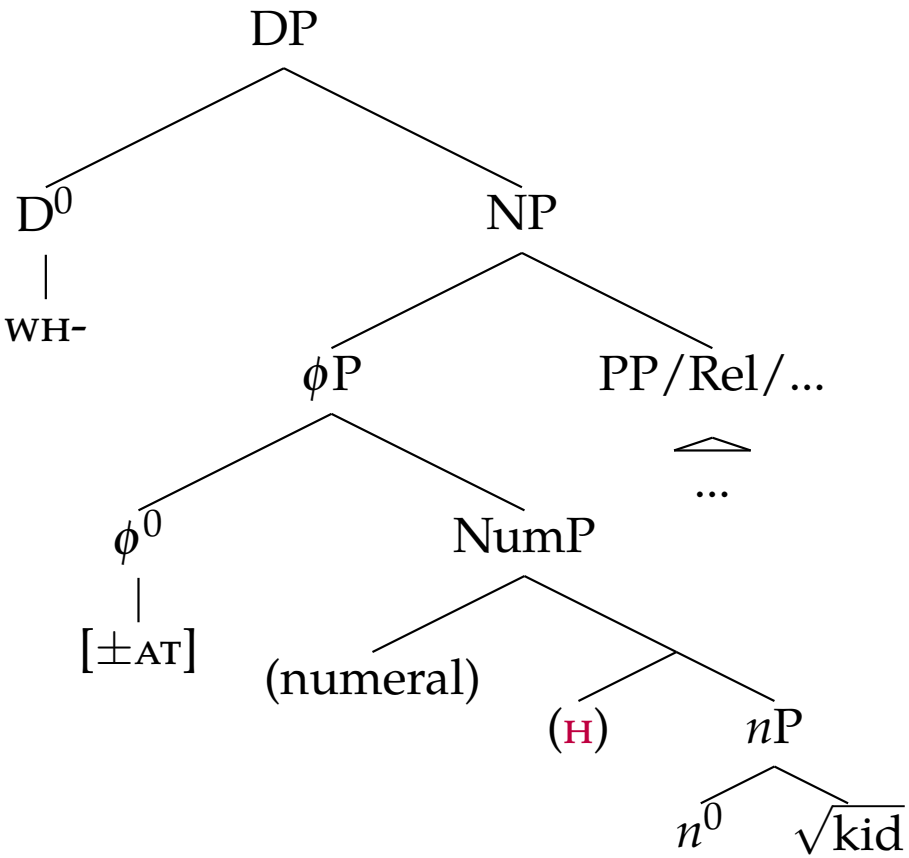
(32) I know which book John read,
... Book A.
#... Book A and Book B.

(33) I know which two kids formed a team,
... the two boys.
#... the two boys and the two girls.

- But, unlike numeral-modifiers, PP-modifiers do not trigger uniqueness.

(34) I know which kids in a group of two formed a team,
... the two boys.
... the two boys and the two girls. (no uniqueness)

Proposal

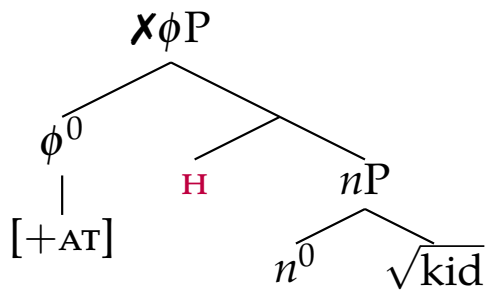


The H-shifter is applied to *n*P, where roots are assigned to the category of nouns and are structured into semi-lattices. [Assumptions on NP structure are from Sauerland (2003), Harbour (2014), Scontras (2014), Marti (2018). Note that a SG-marked phrase can be number-neutral in semantics (e.g., Spanish *quién* 'who.SG'; see Maldonado (2017), Alonso-Ovalle & Rouillard (2018), cf. Elliott et al. (2017))]

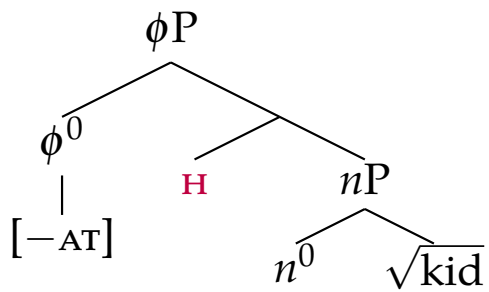
Predictions

1. The H-shifter cannot be used in N_{SG}: GQs are not atomic.

(35) a. *kid*

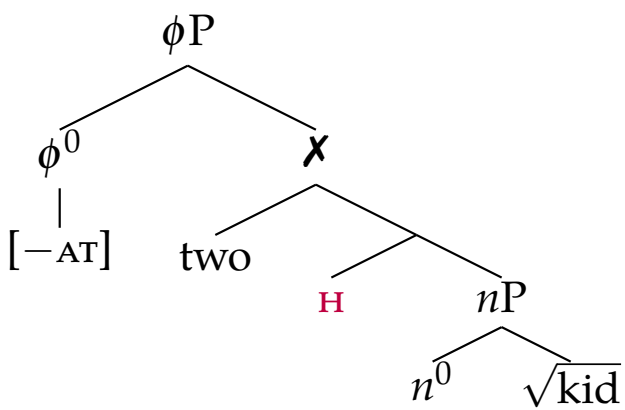


b. *kids*

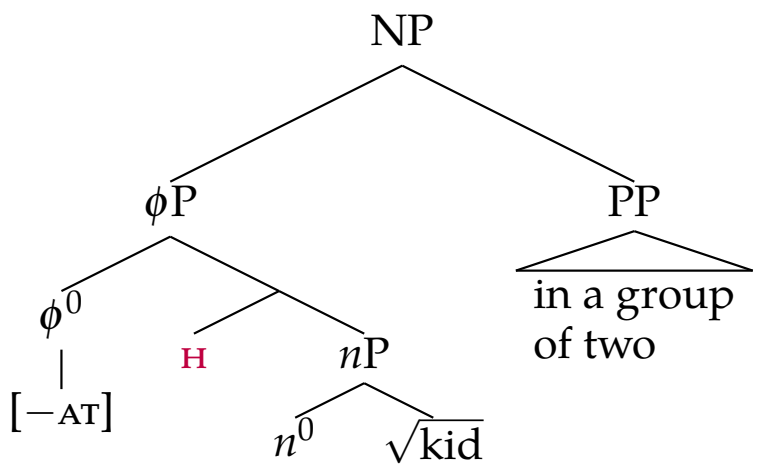


2. The H-shifter cannot be used in Num-N: numerals must check cardinality and cannot combine with a set of GQs.

(36) a. *two kids*

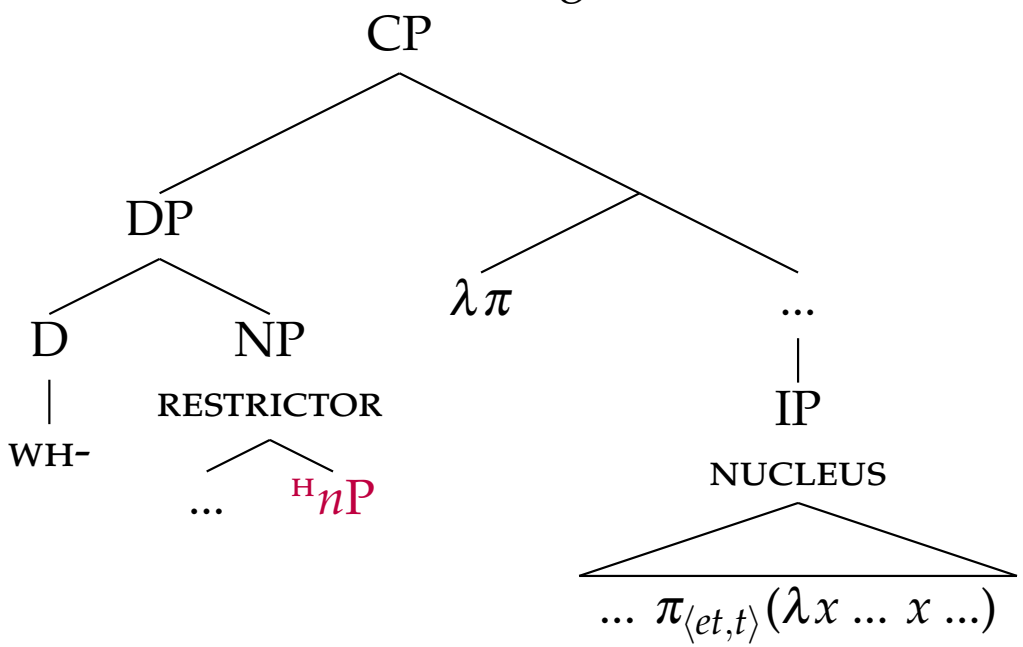


b. *kids in a group of two*



Conclusion

- **Evidence**
  Diagnostics based on non-reducibility and stubborn collectivity show that some WH-questions admit higher-order readings.
- **The Positiveness Constraint**
  A higher-order Q-domain consists of only positive GQs and their Boolean coordinations.
- **Derivation**
  - A H-shifter applies to the *n*P within the WH-complement and returns a higher-order restrictor.
  - WH-movement leaves a higher-order trace in the question nucleus.



Appendix. The ‘disjunction-only’ higher-order reading

A caveat about disjunctive answers: □-questions

In responding to □-questions where the WH-phrase is SG-marked or NUM-modified, narrow scope disjunctions are not as bad as conjunctions.

(37) I know which book John has to read,

#... Book A and Book B.

?... Book A or Book B. (*or* ≫ □, ?□ ≫ *or*)

(38) I know which two books John has to read ...

#... the two French books and the two Russian books.

?... the two French books or the two Russian books. (*or* ≫ □, ?□ ≫ *or*)

Narrow scope readings of disjunctions are more readily available in proper contexts:

(39) Which textbook should we use for this class?
Heim&Kratzer or *Meaning&Grammar*, (the choice is up to you.)

A caveat about disjunctive answers: ◊/MS-questions

Elided mention-all (MA-)answers of ◊-questions can have a conjunctive form or a disjunctive form. (See Xiang (2016: ch. 2) for derivations.)

(40) a. What can I use for this class?
b. *Heim&Kratzer* or/and *Meaning and Grammar*.
'You can use H&K and you can use M&G.'

A SG-marked ◊-question admits a multi-choice reading if the uniqueness inference evoked by the SG-WHP takes narrow scope. (Hirsch & Schwarz 2019)

(41) a. Which letter could be missing in *fo__m*?
b. The missing letter could be *a* and the missing letter could be *r*.

But, elided MA-answers of SG-marked ◊-questions must be disjunctions.

(42) a. Which textbook can I use for this class?
b. *Heim&Kratzer* or/#and *Meaning and Grammar*.

(43) a. Which letter could be missing in *fo__m*?
b. Letter *a* or/#and letter *r*

Deriving the 'disjunction-only' higher-order readings

Puzzles:

1. why these marked $\Box/\Diamond$-questions admit only disjunctions?
2. why this 'disjunction-only' reading is available even if the WHP is SG-marked or NUM-modified?

Proposal: The 'disjunction-only' reading involves **reconstructing** the WH-complement to the question nucleus.

(44) Which book does John have to read?

a. First-order + reconstruction
   (i) $[_{CP}$ which$_D$ λx ... $\Box$ [x is the book that J read]]
   (ii) $\lambda x_e : x \in D.\Box\lambda w[x = \iota y[book_w(y) \wedge read_w(y)]]$

b. Higher-order + reconstruction
   (i) $[_{CP}$ which$_{^HD}$ $\lambda\pi$ ... $\Box$ [$\pi_{\langle et,t\rangle}$ $\lambda x.$ x_e is the book that J read]]
   (ii) $\lambda\pi_{\langle et,t\rangle} : \pi \in {}^HD.\Box\lambda w[\pi(\lambda x_e.x = \iota y[book_w(y) \wedge read_w(j,y)])]$

The H-shifter can be applied since the discourse domain D is unmarked.

Predictions: □-questions

Conjunctive answers are unacceptable because they yield a contradiction.

(45) Which book does John have to read?
$[\![\text{CP}]\!] = \lambda\pi_{\langle et,t\rangle} : \pi \in {}^{H}D.\Box\lambda w[\pi(\lambda x_e.x = \iota y[book_w(y) \wedge read_w(j,y)])]$

a. Book A or Book B.
$[\![\text{CP}]\!](a^{\Uparrow} \sqcup b^{\Uparrow}) = \Box\lambda w.[a = \iota y[book_w(y) \wedge read_w(j,y)]] \vee [b = \iota y[book_w(y) \wedge read_w(j,y)]]$
(It has to be that the book that John read is Book A or is Book B.)

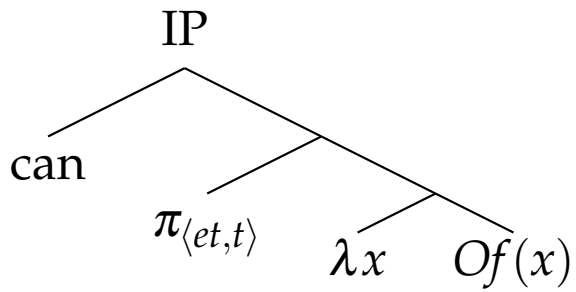
b. #Book A and Book B.
$[\![\text{CP}]\!](a^{\Uparrow} \sqcap b^{\Uparrow}) = \Box\lambda w.[a = \iota y[book_w(y) \wedge read_w(j,y)]] \wedge [b = \iota y[book_w(y) \wedge read_w(j,y)]]$
$= \bot$ (unless $a = b$)
(#It has to be that the book that John read is Book A and is Book B.)

Predictions: ◊-questions

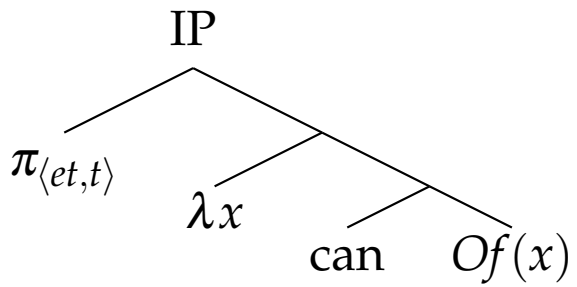
Conjunctive MA arises iff the higher-order trace scopes above the ◊-modal.

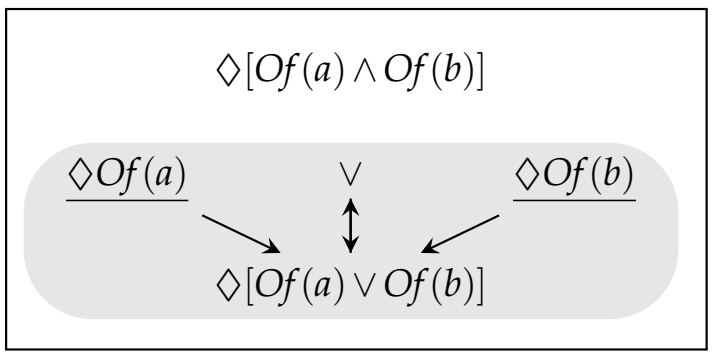
(46) Who can chair the committee? Prof A and Prof B.

a.

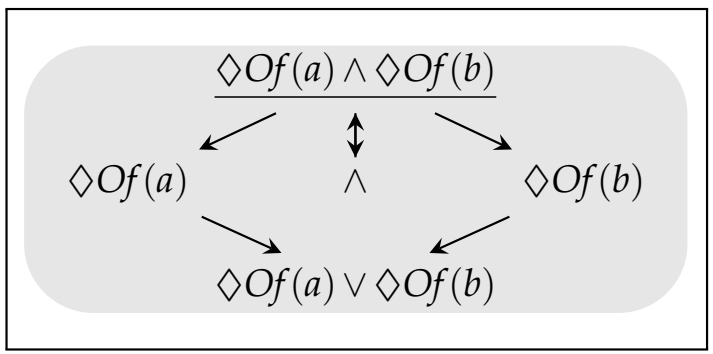


b.





$\Diamond \gg \pi$: MS



$\pi \gg \Diamond$: conjunctive MA

Wide scope uniqueness yield contradiction:

(47) Which professor can chair the committee? # Prof A and Prof B.

$$[\![\text{CP}]\!](a^{\Uparrow} \sqcap b^{\Uparrow}) = \lambda w.[a = \iota y[prof_w(y) \wedge \Diamond_w Ochair(j,y)]] \wedge [b = \iota y[prof_w(y) \wedge \Diamond_w Ochair(j,y)]]$$

Predictions: ◊-questions

Disjunctive MA arises when a covert Dou-operator is associated with the higher-order wh-trace. The higher-order wh-trace can take narrow scope.

Mandarin *dou* triggers **free choice** effect when associated with a pre-verbal disjunction, and forces **exhaustive** readings when associated with a *wh*P in a question.

(48) a. [Yuehan huozhe Mali] **dou** keyi jiao jichu hanyu
John or Mary DOU can teach intro Chinese
Intended: 'Both John and Mary can teach Intro Chinese.'

b. **Dou** [shei] keyi jiao jichu hanyu?
DOU who can teach Intro Chinese
'Who can teach Intro Chinese?' (MA only)

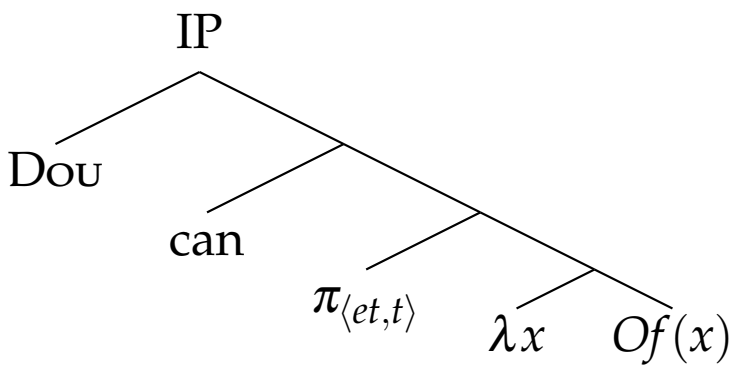
Xiang (To appear): *Dou* is a pre-exh exhaustifier over sub-alternatives. Sub-alternatives for dis/con-junctions are the dis/con-juncts.

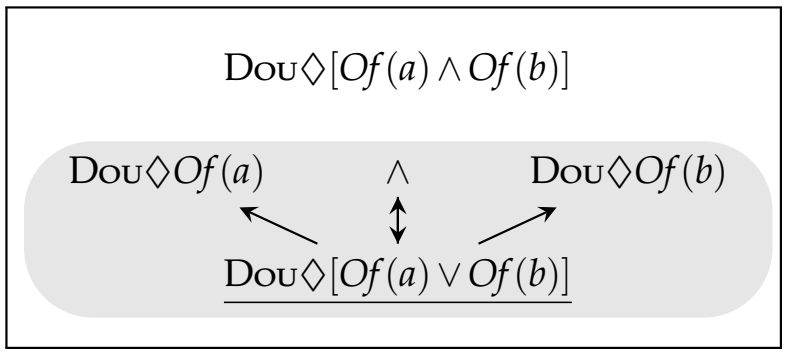
(49) $[\![dou_C]\!] = \lambda p \lambda w : \exists q \in \text{SUB}(p, C).p(w) = 1 \wedge \forall q \in \text{SUB}(p, C)[O_C(q)(w) = 0]$

Predictions: ◊-questions

In questions, Dou strengthens disjunctive answers into free choice statements, making the answer space closed under conjunction.

(50) Who can chair the committee? Prof A or Prof B.





With DOU ($\Diamond \gg \pi$): disjunctive MA

Narrow scope uniqueness doesn't yield contradiction:

(51) Which professor can chair the committee? Prof A or Prof B.

$$[\![\text{CP}]\!](a^{\Uparrow} \sqcup b^{\Uparrow}) = \text{Dou}\Diamond\lambda w.[[a = \iota y[prof_w(y) \wedge Ochair_w(j,y)]] \vee [b = \iota y[prof_w(y) \wedge Ochair_w(j,y)]]]$$
$$= \Diamond\lambda w[a = \iota y[prof_w(y) \wedge Ochair_w(j,y)] \wedge \Diamond\lambda w[b = \iota y[prof_w(y) \wedge Ochair_w(j,y)]$$

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