

Wh-movement and the semantics of questions

- ☞ A homework assignment has been posted, due **October 1**, before class.
- ☞ Office hours (starting next week): Hadas Friday 1:30-3pm, mitcho Wednesday 11-12:30am.

1 The meaning of a question

In general, we think we know what the meaning of a sentence is.

(1) **The meaning of a sentence**

To know the meaning of a sentence is to know the conditions under which it is true.

Declarative sentences can be judged as *true* or *false*: we can define the conditions that would make the sentence true, and then go out into the world and check if they are met.

(2) Jupiter has 24 moons.

True iff Jupiter has 24 moons, *false* otherwise.

Questions, on the other hand, cannot be treated in the same way:

(3) How many moons does Jupiter have?

The most widely adopted solution goes back to Hamblin (1958), who proposes to relate the meaning of a question to the meanings of the answer to the question. This is based on the (plausible) assumption that an answer to a question is a declarative sentence. Hence:

(4) **The meaning of a question**

To know the meaning of a question is to know what counts as an answer to the question.

A question denotes a set of propositions, which correspond to the *possible answers* to the question (Hamblin, 1973; Karttunen, 1977).

(5) Is John a student?

$\left\{ \begin{array}{l} \text{John is a student,} \\ \text{John is not a student} \end{array} \right\}$

(6) Is John a student or a professor?

$\left\{ \begin{array}{l} \text{John is a student,} \\ \text{John is a professor} \end{array} \right\}$

(7) *Which professor* is teaching ___ Syntax 3?

{
 Jessica is teaching Syntax 3,
 Lisa is teaching Syntax 3,
 Junko is teaching Syntax 3, ... }
}

(8) *What* did John eat ___?

{
 John ate *chocolate cake*,
 John ate *ice cream*,
 John ate *a cookie*,
 John ate *chocolate cake and ice cream*,
 John ate *ice cream and a cookie* ... }
}

2 The meaning of *wh*-words

Intuitively, we get the sets in (7)-(8) by plugging the different possible values of the *wh*-phrase into the gap position in the sentence.

We can define the meaning of a *wh*-phrase as the set of possible individuals it can refer to.

(9) **The meaning of *who* is a set of individuals:**¹

$\llbracket who \rrbracket = \{x \in D_e : x \text{ is human}\}$
 $\llbracket what \rrbracket = \{x \in D_e : x \text{ is not human}\}$

(10) **The meaning of a *which*-NP phrase is the same as NP itself:**²

$\llbracket which \text{ book} \rrbracket = \llbracket book \rrbracket = \{ \text{War \& Peace, Moby Dick, Oliver Twist, ...} \}$
 $\llbracket which \text{ books} \rrbracket = \llbracket books \rrbracket = \{ \text{War \& Peace, Moby Dick, Oliver Twist, War \& Peace and Moby Dick, War \& Peace and Oliver Twist, ...} \}$

Which phrases introduce an existence presupposition. Singular *which* phrases furthermore introduce a uniqueness presupposition, that exactly one boy came to the party. *Who* does not carry similar requirements.

(11) *Which boy* came to the party?

- a. ✓ John did.
- b. # John and Bill did.
- c. # No one did.

(12) *Who* came to the party?

- a. ✓ John did.
- b. ✓ John and Bill did.
- c. ✓ No one did.

¹With possible domain restriction, which we will ignore here.

²There is more to be said about the meaning of *which*-phrases and *which*-questions. See e.g. Pesetsky (1987); Dayal (1996); Rullmann and Beck (1998a,b).

3 Question embedding

An unembedded question like *Who came?* is a request for information. We can think of this as embedding under some kind of operator in a performative layer.

In addition, it is possible to embed questions under certain types of predicates. Question-embedders are normally classified into two classes, the *know* class and the *ask* class. 'Know'-type predicates but not 'ask' type predicates can take a declarative clause.

- (13) John *asked* who came.
 ≈ John asked: "who came?"
 * John asked that Mary came
- (14) John *knows* who came.
 ≈ John knows that Mary came.

When would we say that John knows who came?

- (15) John knows who came.
 In reality: Mary came and Sue didn't come.
 → John knows that Sue didn't come.³

(*Know* also has a mention-some reading, as in *John knows where you can buy a newspaper.*)
(See George (2011) for a theory of this reading.)

What about *surprise*? *Surprise* seems to pattern with *know* in its ability to embed declarative sentences.⁴

- (16) John was surprised (by) who came.
 In reality: Mary came and Sue didn't come.
 ↯ John expected Sue to come.

Know and *surprise* receive different interpretations, which can be defined as the *strongly exhaustive* and the *weakly exhaustive* interpretation.

- (17) **Strong exhaustivity:** {Mary came and nobody else came, Bill came and nobody else came, Sue came and nobody else came...}
- (18) **Weak exhaustivity:** {Mary came, Bill came, Sue came,...}.

Embedders like *ask* or *wonder* presumably need an even bigger set: the set of all *true and false* answers. The stronger notions in (17) and (18) can be derived from this set.

³See Cremers and Chemla (2014) for a recent study showing that *know* may be better described as having an 'intermediate' exhaustive reading: John knows for everyone who came that they came, and he doesn't have any false beliefs about anybody else.

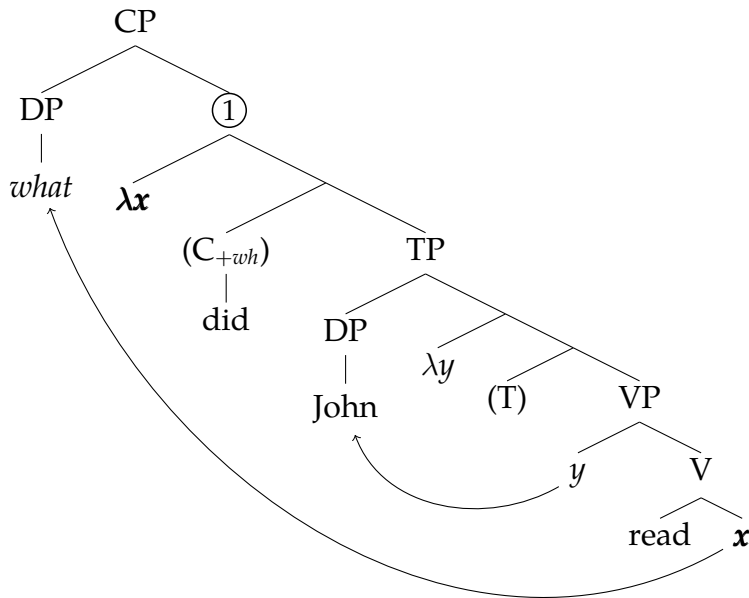
⁴The literature started from a discussion of *know* and is slowly expanding to consider other predicates. See Berman (1991), Heim (1994), Sharvit (2002) on *surprise* and *realize*, Klinedinst and Rothschild (2011) on *tell*, *predict*, Groenendijk and Stokhof (1984), Lahiri (2002), Beck and Rullmann (1999) on *agree*.

4 Wh-movement and question syntax

An English question always involves a fronted *wh*-phrase, which occurs at the beginning of the question. We will follow standard assumptions and label this position as Spec,CP.

(We can follow standard assumptions and take this movement to be *feature-driven*: C has a *wh*-probe which will search for a *wh*-phrase, agree with it, and move it to its specifier. (This also triggers head movement, perhaps only at PF.))

(19) The structure of a question:



We can compute the meaning of the sentence up to node ①.

$$\llbracket \textcircled{1} \rrbracket = \lambda x. \text{John read } x$$

Furthermore, recall that:

$$\llbracket \textit{what} \rrbracket = \{x \in D_e : x \text{ is not human}\}$$

Assuming contextual domain restriction (to make our lives easier), we might assume:

$$\llbracket \textit{what} \rrbracket = \{ \textit{War \& Peace}, \textit{Moby Dick}, \textit{Oliver Twist} \}.$$

These are both set descriptions, but we do not want to combine them using Predicate Modification, as this would not give us the meaning we would like to have for CP.

(20) Wh-composition:⁵

$$\left[\left[\begin{array}{c} \alpha \\ \textit{wh} \quad \beta \langle e, t \rangle \end{array} \right] \right] = \{ \llbracket \beta \rrbracket (x) \mid x \in \llbracket \textit{wh} \rrbracket \}$$

⁵A generalized version of this operation—pointwise functional application—will become very useful later in the course.

5 Questions with quantifiers

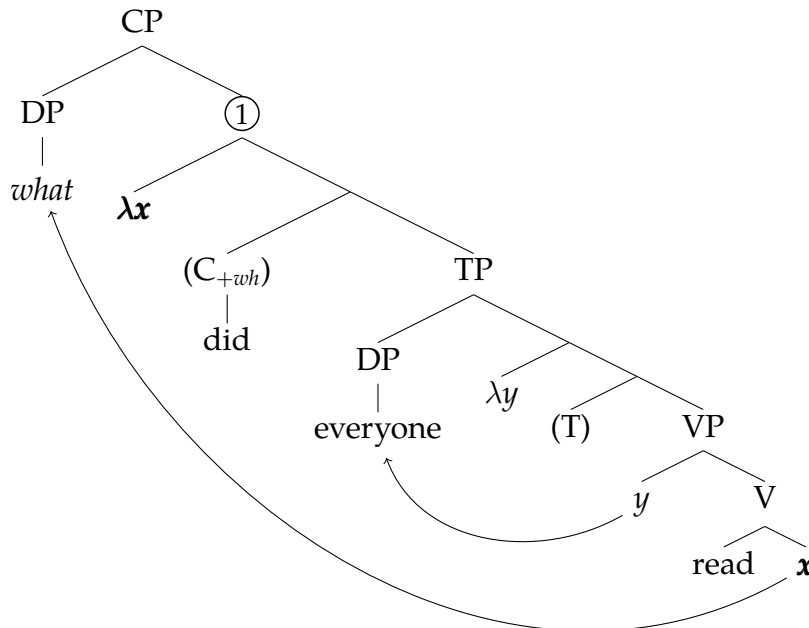
The properties of questions with quantifiers, have generated a great deal of discussion in the literature (see Szabolcsi 1997 for an overview).

Questions with quantifiers give rise to several distinct readings (note: not all quantifiers give rise to all readings):

- (21) *What* did everyone read?
- (Everyone read) War & Peace.
Single-pair reading: What is x , such that everybody read x ?
 - John read War & Peace, Mary read Moby Dick, and Bill read Oliver Twist.
Pair-list reading: For each person y , which x did y read? ⁶
- (22) *What ice cream flavor* does nobody like?
- (Nobody likes) Natto.
 - ?? (pairings of people in the empty set and ice cream flavors)

We can model this ambiguity as a scope ambiguity of the quantifier with regard to the *wh*-phrase.

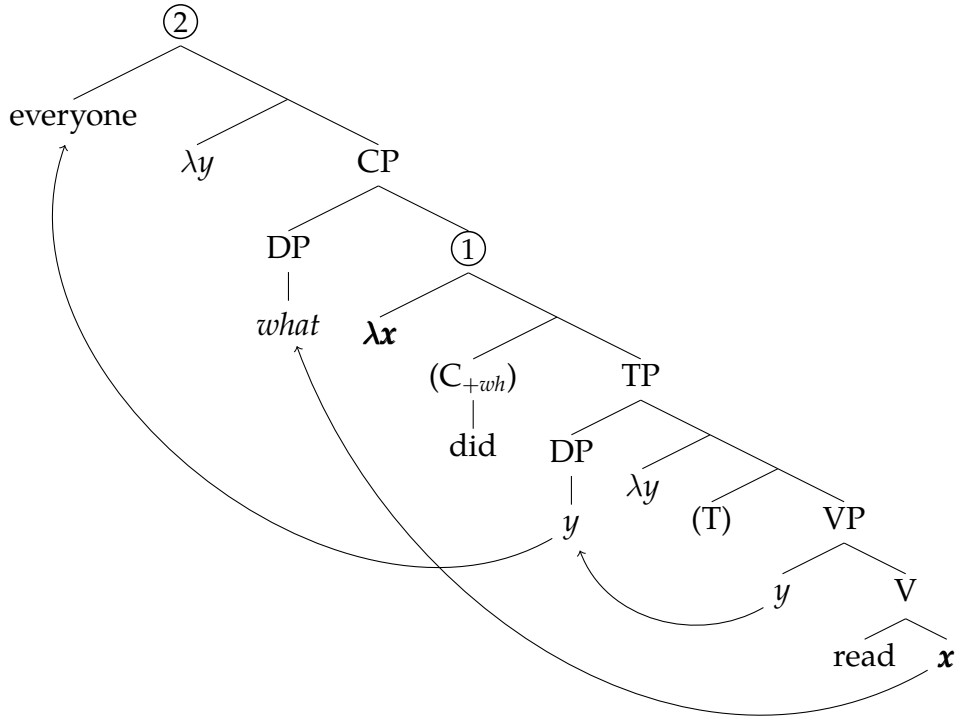
- (23) *What* > everyone:



→ Single-pair reading: What x is such that everybody read x ?

⁶A third possible reading is a *functional reading*: What is the function mapping people to things f , such that every person y read $f(y)$? A possible answer is: everyone read their favorite book.

(24) **Everyone > what:**



→ Pair-list reading: For every person y , which x did y read?

Several researchers have argued for structures roughly like (24), including e.g. Krifka (2001), and recently Nicolae (2013), although there are questions about how general this strategy can be.

Finally, it's worth noting that *multiple questions* in English give rise to similar ambiguities.

(25) Context: one student is supposed to present a paper in class next Monday.
Who will present what paper?

Single-pair answer: John will present Chomsky (1977).

(26) Context: every student in the class needs to choose a paper to present at some point in the semester.

Who will present what paper?

Pair-list answer: John will present Chomsky (1977), Mary will present Rooth (1985), and Bill will present Ross (1967).

We might want to model these pair-list readings the same way as the pair-list readings of questions with quantifiers. If we choose to use movement, this would force us to assume covert *wh*-movement. You might wonder if that is desirable, and what predictions this makes. We will not answer this question now, but it might come up again towards the end of the course.⁷

⁷See Kotek (2014) for extensive discussion.

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