

Where to Interpret What*

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Hotze is known now for his work on tense, and on the vagaries of pronouns, but I got to know him when he was working on questions. His work on the semantics of *wh*-questions — a lot of it with Sigrid Beck — heavily influenced my thinking about the syntax of movement. I blame him for my resulting, years-long, obsession with multidominance. His work was the first step in a long line of interesting work on the syntax and semantics of *wh*-questions that continues today. The immediate predecessor to this work was Hotze's equally important dissertation: one of the first attempts to explain an island condition entirely from its semantics. It remains an important role model for the contemporary work on the semantics of islands, and opened my eyes to the wider possibilities of finding the source of islands. Thank you Hotze for starting me on a journey that has dominated my research life. But the reason I'm contributing to your volume is even more personal: it's because the other thing I learned when I got to know you is how much I like you.

In this note, I'll sketch a few facts about *wh*-movement that expand on the view in Beck and Rullman (1998) and Rullmann and Beck (1998) that *wh*-phrases are interpreted in their underlying position, no matter where they show up in the surface representation. In addition to the semantic reasons for this conclusion, there are straightforward facts about anaphora that animate this view. A famous kind of example of this is (1).

(1) Which articles about herself should no woman respond to?

This sentence has an interpretation in which *herself* is understood as a variable bound by *no woman*. Under normal circumstances, a reflexive pronoun in English, like *herself*, can only be bound by arguments that c-command them, are local, and sit in Argument positions. There is no successful definition of local and Argument position that I am aware of, but c-command is serviceably defined by (2).

* My thanks to Satoshi Tomioka for help on this paper.

(2) α c-commands β iff β (reflexively) dominates α 's sister.

These three requirements on binding a reflexive are illustrated by (3)-(5).

- (3) a. No woman₁ should respond to these articles about herself₁.
b. *No woman₁'s son should respond to these articles about herself₁.
- (4) a. No woman₁ should should ask herself₁ about the articles that respond to me.
b. *No woman₁ should ask me about the articles that respond to herself₁.
- (5) a. Each day₁ begins with its₁ best meal.
b. *Each day₁ I eat its₁ best meal at dawn.

(3b) violates the c-command requirement, as the sister to *no woman* is *son*, and *herself* is not included in *son*. (4) violates the locality condition—which requires very roughly that the reflexive be in all the CPs dominating its binder. In (4b) the relative clause is a CP that contains *herself* but not *no woman*. And finally, (5b) violates the requirement that the binder sit in an Argument position. Unlike (5a), *each day* does not sit in an Argument position in (5b), and for this reason differs from (5a) in being able to bind *its*.

What (1) shows, then, is that the position from which a wh-phrase moves can be used to calculate whether a reflexive it contains meets its requirements for being bound. Engdahl (1980) showed that functional readings for questions have a similar dependency on terms that c-command the position from which the wh-phrase moves. To see this, consider the pair of sentences in (6).

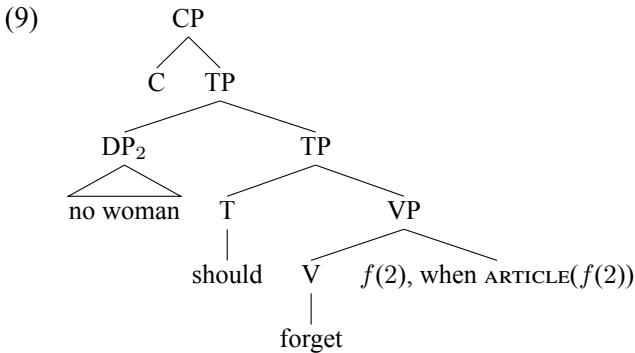
- (6) a. Which article should no woman forget?
b. Which article should the advisor no woman worked with forget?

The syntax and semantics for (6a) should allow (7) to be a short version of the answer in (8).

(7) her first article

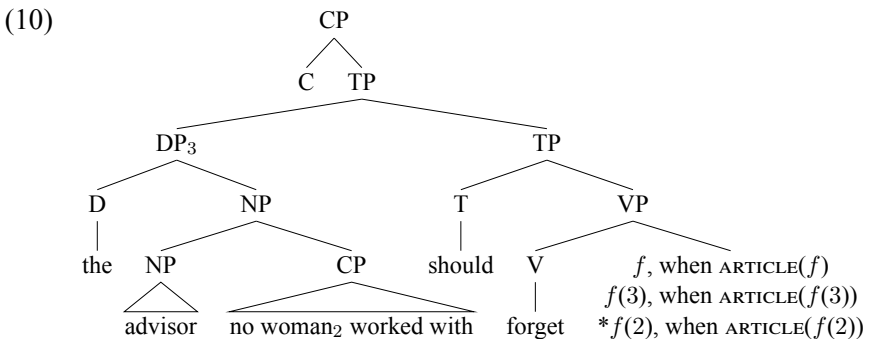
(8) No woman₂ should forget her₂ first article.

But the syntax and semantics for (6b) should disallow the answer (7) to express a parallel relation between *her* and *no woman*. Engdahl suggested that questions involve quantification over a Skolemized choice function. The variable within that choice function must be in the scope of its binder to deliver an interpretation where the function varies with the binder. Schematically, we need something like (9), for (6a). (*f* is semantic type $\langle e, e \rangle$.)



Let questions be sets of propositions that differ just in the value that *f* takes. In (9), *f*'s value depends on the value 2 has, and (7) is the answer (8) because it provides the value “ $\lambda x x$'s first article” for *f*.

By contrast, (6b) cannot involve an *f(x)* whose variable is bound by *no woman*. If it has a variable, that variable must be bound by the *advisor* DP. (Engdahl argues that the functions can have any number of variables. It can also be the constant, non-Skolemized, choice function *f*.)



For this reason, (7) can only be the shortened version of one of the answers in (11).

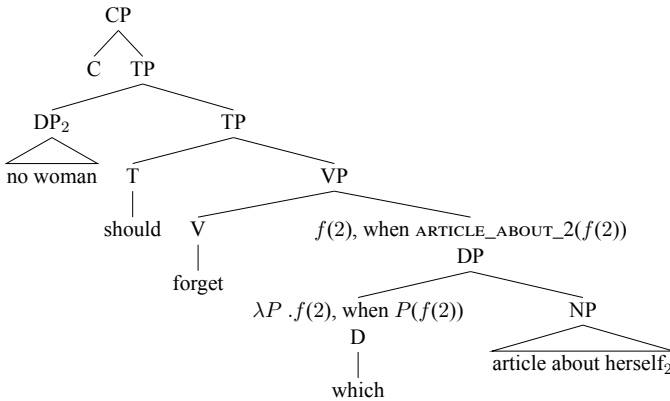
(7) her first article.

- (11) a. The advisor₃ should forget her₃ first article.
 b. The advisor should forget her first article. (*her* contextually given)

We can capture these two phenomena if the denotation for the material in the pre-moved position contains the syntactic material in the moved position. Let's start, then, with the assumption that the syntactic representation which is semantically interpreted is (12).

- (12) a. $[[\text{which}]] = \lambda P.f^*, \text{ when } P(f^*) (f^* \in \{f, f(x), f(x, y), \dots\})$

b.



This question seeks information about a function, f , which depends on the value given to 2 and selects an entity which is an article about 2. An appropriate answer to such a question is *the nicest* which will pick out, for each woman, the nicest article about that woman.

On this view, *wh*-determiners can have a hidden pronoun in them which is capable of being bound. Interestingly, this hidden pronoun is also subject to the requirement that the binder be in an Argument position. This is demonstrated by the contrast in (13).

- (13) a. Which meal should each day begin with?
 b. Which meal did you tell me each day to eat?

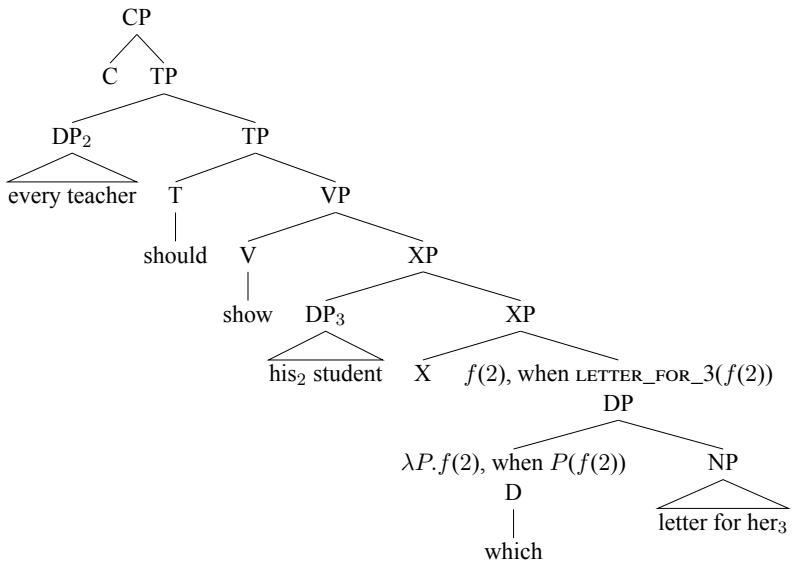
The answer *its best* is inappropriate for (13b) unless the context provides a value for *it*. Only as an answer to (13a) can it name a function whose variable, i.e. *it*, is bound by *each day*. Only in (13a) is *each day* in an

Argument position. The difference in (13) corresponds to the fact that only in (14) can *it* be bound by *each day*.

- (14) a. Each day₂ should begin with its₂ best meal.
- b. *You told me each day₂ to eat its₂ best meal.

This analysis allows the variable that comes with the choice function associated with *which* to be different than any variable that is within the NP, like *herself* in (12). This correctly predicts that questions like (15) can receive an interpretation in which these variables have different binders.¹

- (15) Which letter for her should every teacher show his student?



This question seeks the identity of the *f* which, for each teacher-student pair, picks the thing for the teacher that is a letter for the student. This allows *his best* to be a short form of the answer in (16).

- (16) Every teacher₂ should show his₂ student₃ his₂ best letter for her₃.

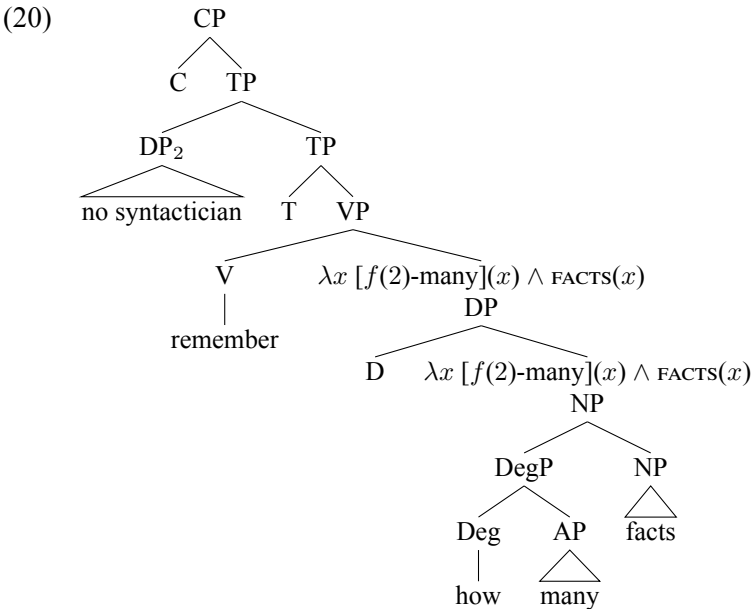
This account extends to questions involving degrees. Degree questions can also seek the identity of a Skolemized function. The expression in (18a) can express the answer to (17) that is found in (18b).

¹ My thanks to Satoshi Tomioka for help with this example.

- (17) How many facts should each syntactician remember?
- (18) a. no fewer than are needed to solve the problem at hand
 b. Each syntactician should remember no fewer facts than are needed to solve the problem at hand.

The dialogue in (17)-(18) allows there to be different solutions to the problem at hand. Those solutions can depend on the facts each linguist has in their memory. Christopher Hammerly, for instance, might need only to remember two facts he knows about Ojibwe to solve the problem at hand, whereas I, ignorant of those facts, can do no better than to remember four facts about Norwegian in forming my solution. The answer in (18) picks out numbers of facts that depend on the syntactician — two for Dr. Hammerly, four for me, etc. This can be derived if (17) has a representation something like (20).

(19) $\llbracket \text{how} \rrbracket = \lambda P \lambda Q \lambda x [f(y)-P](x) \wedge Q(x)$



The degree word *how* introduces an *f* whose values (=degrees) depend on the value that 2 gets. Supplying the answer in (18) will cause the object of *remember* to be two-many facts for Hammerly, and four-many facts for me. Just like *which*, then, *how* contains a Skolemized choice function.

As expected, both the c-command and Argument position conditions hold of *how* as well. (18a) doesn't provide an answer that maps syntacticians to numbers of facts if it is the answer to the question in (21).

- (21) How many facts should the linguist no syntactician likes remember?

That's because the syntax for (21) doesn't put *how* in the scope of *no syntactician*, and as a consequence *no syntactician* cannot bind a variable that *how* comes with.

Similarly, the contrast in (22) indicates that being in an Argument position is a prerequisite for a term to be a binder for the variable that comes with *how*.

- (22) a. How many hours of sunlight does every day contain?
 b. How many hours of sunlight did you tell me every day to get?

The expression *less than the previous day* can pick out times that depend on the value *every day* gets only in (22a); and only in (22a) is *every day* in an Argument position.

And finally, just as in *which* questions, the variable that comes with the choice function in *how* can have a different binder than a pronominal variable elsewhere in the wh-phrase. This is demonstrated by the question/answer pair in (23).

- (23) a. How many stories about himself₂ should no advisor₃ tell her₃ student?
 b. more than he needs to hear

The answer in (23b) names a function which provides degree-student pairs that vary by advisor. This happens because *how* contains a variable bound by *no advisor* — this delivers the degree part of the pair, one for each advisor — and *himself* is bound by *her student* — this delivers the student part of the pair, again, one for each advisor.

None of this would be true if Hotze (and Sigrid) weren't right all those years ago about where wh-phrases are semantically interpreted. What the conditions on binding of reflexives in (1) show is that this is because the syntax must, despite where the wh-phrase may be pronounced, put that wh-phrase in its interpreted position.

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