What Mary Did Yesterday: Reflections on Knowledge-*wh*

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Reductionists about knowledge-*wh* hold that "*s* knows-*wh*" (e.g. "John knows who stole his car") is reducible to "there is a proposition *p* such that *s* knows that *p*, and *p* answers the indirect question of the *wh*-clause." Anti-reductionists hold that "*s* knows-*wh*" is reducible to "*s* knows that *p*, *as* the true answer to the indirect question of the *wh*-clause." I argue that both of these positions are defective. I then offer a new analysis of knowledge-*wh* as a special kind of de re knowledge.

1. Reductionism and Anti-Reductionism

As in most other areas, there are two camps: the reductionist camp led by Jaakko Hintikka (1975), David Lewis (1982), Steven Boër and William Lycan (1986), James Higginbotham (1996), Kent Bach (2005) and David Braun (2006 and *manuscript*),[1] and the anti-reductionist camp courageously led by Jonathan Schaffer (2007).[2]

Reductionists hold that knowledge-*wh* reduces to knowledge-*that*. Higginbotham, Bach and Braun, for example, treat "*s* knows-*wh*" as truth-conditionally equivalent to "there is a proposition *p* such that *x* knows that *p*, and *p* (truly) answers the indirect question of the *wh*-clause." Hintikka offers a similar analysis for the special case of "*s* knows who *a* is," which he takes to be equivalent to "there is

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[1] Stanley and Williamson (2001: 426) argue that "s knows *how* to A" reduces to "there is a contextually relevant way *w* which is a way for *s* to *A*, and s knows that *A* is a way for her to *A*." As we will see, this suggestion is an instance of the analysis of know-*wh* defended below. (Schaffer 2007) classifies Stanley and Williamson's proposal as reductionist. Below we will argue that it is not.

[2] As Schaffer points out, there are others who have defended a contrastivist view of knowledge-*that*, but he is, to the best of his and my knowledge, the first (and only) author to defend the anti-reductionist view of knowledge-*wh*.

someone x such that s knows that a is identical to x," Boër and Lycan treat "s knows who a is" as a species of knowledge-*that*, but what counts as knowing-*who* depends on the interests and purposes of the ascriber,[3] and Lewis treats "s knows whether a or b or c …" as equivalent to "s knows p," where "p" is the true one of the alternatives "a," "b," "c," … "Whether"-clauses are, as he puts it, "sentences expressing the same content as the true one of the presented alternatives" (1982: 50).

Following Higginbotham, let us express the reductionist view as follows:

> Reductionism: s knows-*wh* iff there is a proposition p such that s knows p, and p answers the indirect question of the *wh*-clause.

The above formulation of the reductionist view is to be understood as stating the meta-linguistic truth-conditions for utterances of "s knows-*wh*" rather than as stating the form of the proposition expressed by utterances of "s knows-*wh*." Utterances of the form "know$(x, \hat{}\pi)$" are true iff "$(\exists p)($know(x, p) & p answers $\pi)$" (Higginbotham 1996: 381), and so, knowledge-*wh* is a special case of knowledge-*that*.

Reductionists do not take knowledge-*wh* to involve knowledge of the question which p answers. Anti-reductionists think this is a mistake. They insist that knowledge-*wh* "includes the question in its logical form" (Schaffer 2007: 8):

> Anti-Reductionism: s knows-*wh* iff s knows pQ, where Q is the indirect question of the *wh*-clause, and p its true answer.

For Schaffer, utterances of "s knows-*wh*" *express* propositions of the form "s knows that pQ," where "s knows pQ" is to be read as: "s knows p, *as* the true answer to the indirect question of the *wh*-clause." As Schaffer holds that utterances of "s knows p" express propositions of the form "s knows pQ,"[4] knowledge-*that* is, for him, a special case of knowledge-*wh*.

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3   For example, Lois Lane knows who Clark Kent is in the office setting, but not in the Superman setting. You may even fail to know who you are, witness "Alice, you don't know who you are: you are the rightful heir to the Swedish throne". For a rebuttal, see Braun (2006).

4   See Schaffer (2004, 2005, 2006). Strictly speaking, Schaffer holds "s knows p" is equivalent to "s knows p rather than r," where r is determined by context. But in his (2007), he argues that "s knows p rather than r" is equivalent to "s knows pQ."

Reductionism is motivated by considerations of the following sort. If I know who is speaking at 9 a.m. today, and "Schaffer is speaking at 9 a.m. today" is the true answer to the question "who is speaking at 9 a.m. today?", then I know that Schaffer is speaking at 9 a.m. today. Trivially: if I know that Schaffer is speaking at 9 a.m. today, I know who is speaking at 9 a.m. today. So, I know who is speaking at 9 a.m. today iff I know that A, where A is the true answer to the indirect question of the "who"-complement clause.

Schaffer uses "whether"-reports to motivate anti-reductionism (to borrow Lewis' title). Consider:

(1) I know whether Bush or Janet Jackson is on television.

(2) I know whether Bush or Will Ferrell is on television.

Schaffer envisages that if Bush is on television, reductionists will be committed to the equivalence of both (1) and (2) to "I know that Bush is on television." But, says Schaffer, this can't be right, for it is much harder to determine whether Bush or the impersonator Will Ferrell is on television than it is to determine whether Bush or the pop-queen Janet Jackson is, which is to say, (1) may be true while (2) is false. As (1) and (2) may differ in truth-value, (1) and (2) cannot both be equivalent to "I know that Bush is on television."

Schaffer's anti-reductionist view does not have this unfortunate result. On the anti-reductionist view, to know whether Bush or Jackson is on television, one will need to know that Bush is on television, as the true answer to "Is Bush or Jackson on television?", and to know whether Bush or Ferrell is on television, one will need to know that Bush is on television, as the true answer to the question "Is Bush or Ferrell on television?" As Schaffer puts it, "KQ_1 and KQ_2 come out as expressing different propositions: $KspQ_1$ and $KspQ_2$" (p. 8). As one may have the first kind of knowledge without having the second, the first kind of knowledge ascription is not equivalent to the second.

There are a couple of other considerations in favor of anti-reductionism. First, as Schaffer points out, taking knowledge-wh ascriptions to involve knowledge of the question "fits the role of knowledge ascriptions in indicating who has evidence, expertise, and answers" (p. 9). For such roles are question-relative. Someone may know that Bush is on television relative to the question "Is it Bush or Jackson who is on television?" but fail to know it relative to the question "Is it Bush or Ferrell who is on television?" Second, there is linguistic evidence in favor of including the question in the logical form, for instance, the possibility of anaphoric reference to the indirect

question, as in "I know why the sky is blue. It has puzzled me for years." We will return to this additional evidence for Schaffer's anti-reductionist view at the end of the paper.

2. On Schaffer's Arguments against the Reductionist View

As we have seen, Schaffer rests his case against reductionism on "whether" reports. Unfortunately, his argument carries weight only against a special version of reductionism. According to Schaffer, the reductionist holds that utterances of "s knows-*wh*" express propositions of the form "*s* knows *p*," where *p* is the true answer to the indirect question *Q* of the *wh*-clause (p. 3). While Lewis seems to endorse something like this view for knowledge-*whether*, none of the other reductionists cited above can be seen as advocates. For Higginbotham, *s* knows-*wh* iff *there is a proposition p* such that *s* knows *p*, and *p* answers the indirect question *Q* of the *wh*-clause. The analysans of Higginbotham's analysis is everything on the right-hand side of the biconditional, which is to say, the proposition that happens to make it true that there is a proposition *p* such that *s* knows it, etc. is not itself a constituent of the proposition expressed by a knowledge-*wh* ascription.

Given Higginbotham's formulation, reductionists are not committed to the equivalence of (1) [= "I know whether Bush or Jackson is on television"] and (2) [= "I know whether Bush or Ferrell is on television"]. My utterance of (1) is true iff there is a proposition *p* such that I know that *p*, and *p* answers "Is Bush or Jackson on television?", and my utterance of (2) is true iff there is a proposition *p* such that I know that *p*, and *p* answers the question "Is Bush or Ferrell on television?".

If Jackson is on television, then (1) is true iff I know she is; but (2) is false, as "Is Bush or Ferrell on television?" has no answer.[5] If Ferrell is on television, then (2) is true iff I know he is; but (1) is false, as "Is Bush or Jackson on television?" has no answer. So, reductionism (properly formulated) is not committed to the equivalence of (1) and (2).

Of course, *if* Bush is on television, (1) and (2) are true iff I know that Bush is on television. But to say that (1) and (2) have the same truth-maker if the world turns out a certain way is not to say they are equivalent. If I have a red car, then "I have a red car" and "I have a red car or a black horse" are true iff I have a red car or a blue ship. But "I have a red car" and "I have a red car or a black horse" are not equivalent.

If directed against Higginbotham's version of reductionism, Schaffer's argument is unsound. But perhaps Schaffer's point is not that (1) and (2) are equivalent but rather that "if Bush is on television, (1) and

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5   Not all questions have an answer. "What is the current king of France called?", for example, does not.

(2) are true iff I know Bush is on television'' is false because there are contexts where I know that Bush is on television yet fail to know whether Bush or Ferrell is on television. However, "if Bush is on television, (1) and (2) are true iff I know Bush is on television" is true, not false. For Schaffer accepts the following principle (p. 13).

> "Whether" Equivalence: For a fixed context c, if p is true, then "s knows whether p" is equivalent to "s knows that p."

Suppose I know Bush is on television in some context c. (3) is then true:

> (3) I know that Bush is on television.

From (3), we can then infer (by Closure: if s knows p, and s knows that p entails q, then s knows q):[6]

> (4) I know that Bush or Ferrell is on television.

By "Whether" Equivalence, we can infer:

> (5) I know whether Bush or Ferrell is on television

Since (3) is true in c, (5) is true in c. It may be argued that the mere assertion of (5) in a *low-standards* context would trigger a context-shift, which would make (5) false. But we can set aside such shifts, as the context is kept fixed. Certainly, Schaffer should have no problem with this argument, as he, like most other contextualists, thinks Closure is valid.[7]

An objection here arises. One might insist that the relevant *whether*-clauses are equivalent to different sets of alternatives. Lewis defends this line in his "Whether" Report:

> Of course, we must be careful. We must distinguish "*Holmes knows whether Green did it or Scarlet did it*" from "*Holmes knows whether*

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[6] Some prefer the following version of Closure: if s knows p, and s competently deduces q from p, while retaining knowledge of p, then s knows q. If this is the preferred version, let us add that I competently deduce q from p while retaining (implicit) knowledge of p.

[7] Most contextualists think Closure is valid. So, the skeptical argument that rests on Closure (viz. I know I have hands. If I know I have hands, then I know I am not a BIV. So, I know I am not a BIV) is valid. But, say the contextualists, in high-standards contexts, the premise of the skeptical argument is false. As the argument from (3) to (5) is just a version of the skeptical argument, contextualists should take it to be valid (and then add that (3) is false in high-standards contexts).

(Green did it or Scarlet did it)." The latter, with its straightforward disjunction, does not present "*Green did it*" and "*Scarlet did it*" as separate alternatives. Rather, it abbreviates "*Holmes knows whether (Green did it or Scarlet did it) or not-(Green did it or Scarlet did it)*," and the alternatives presented are the disjunction and its negation. If Holmes knew that it was Green or Scarlet but didn't know which, then the latter sentence would be true but the former false. (1982: 55)

If Lewis is right, then (4) is equivalent to "I know whether (Bush or Ferrell is on television) or not-(Bush or Ferrell is on television)," and not to "I know whether (Bush is on television or Ferrell is on television)." However, if we accept "Whether" Equivalence and assume that Bush is on television, then Lewis' point does not take hold. For by "Whether"-Equivalence and logic, *if* Bush or Ferrell is on television, then "I know whether (Bush or Ferrell is on television) or not-(Bush or Ferrell is on television)" is equivalent to "I know *that* Bush or Ferrell is on television." By another application of "whether" equivalence, *if* Bush is on television, then "I know that Bush or Ferrell is on television" is equivalent to "I know whether Bush or Ferrell is on television."

The only way to reject the above argument is to reject "Whether" Equivalence or Closure. But, as Schaffer acknowledges, both principles are very compelling. Hence, it is highly plausible that for fixed contexts, if (3) is true, then (5) is as well.

But if (5) is true, then *either* I know that Bush is on television, *or* I know that Ferrell is on television. Since Ferrell is *not* on television, I do not *know* that he is. It follows that I know that Bush is on television. But (5) = (2). So, *keeping the context fixed*, if Bush is on television, then (2) iff I know Bush is on television. By the same reasoning, we can infer that if Bush is on television, then (1) iff I know that Bush is on television. So, keeping the context fixed, if Bush is on television, (1) and (2) are true iff I know Bush is on television.

Schaffer's argument against reductionism is unsound. But if it fails, why do we find it compelling? The answer is that we find it compelling because we have a natural tendency to evaluate (1) and (2) in different contexts. When we seek to determine how difficult it is to come to know whether Bush or Ferrell is on television, we consider a high-standards context. When we seek to determine how difficult it is to come to know whether Bush or Jackson is on television, we consider a low-standards context. In high-standards contexts (in which Bush is on television), it is very difficult to come to know whether Bush or Ferrell is on television. But we tend to forget that in such high-standards contexts it is equally difficult to come to know whether Bush or Jackson is on television. The reason: in high-standards contexts it is exceedingly difficult to come to know that Bush is on television (even if he is). Likewise, in

low-standards contexts (in which Bush is on television), it is relatively easy to come to know whether Bush or Jackson is on television. What we tend to forget is: in low-standards contexts it is just as easy to come to know that Bush is on television (if he is) and hence, (by Closure and "whether" equivalence), it is just as easy to come to know whether Bush or Ferrell is on television.

3. Against Reductionism and Anti-Reductionism

At this point, it may seem that the case against reductionism is too weak to settle the dispute between reductionism and anti-reductionism (as formulated above). Luckily, we need not settle the dispute, for, as we will see, neither reductionism nor anti-reductionism makes the grade.

First, let us throw some fuel on Schaffer's fire. We are at a party, and you want to know why John is upset. John is upset because Mary left. Alice knows Mary left but doesn't know that her leaving made John upset. The following exchange transpires:

> You: Why is John upset?
>
> Me: I don't know. But I am sure that Alice knows.
>
> You (to Alice): Why is John upset? Do you know?
>
> Alice: No, I don't. I know Mary left. But I don't know if that's why John is upset.

As Alice doesn't know that John is upset *because* Mary left, her response is entirely appropriate. Yet, on a reductionist treatment of knowledge-*why*, "Alice knows why John is upset" is equivalent to "there is a proposition p such that Alice knows that p," and p answers the question "why is John upset?" If "Mary left" answers the question "why is John upset?", then reductionism is in trouble. For, as the exchange shows, Alice doesn't know why John is upset.

Of course, the exchange also shows that Alice's claim "I know Mary left" does not answer your question. But reductionists *do* have reason to worry. Suppose Alice knows Mary left but mistakenly believes that John is upset because he flunked logic. Moreover, suppose Alice wishes to deceive you. In response to your question "Why is John upset? Do you know?" Alice says "Mary left without him. That's why he is upset." As it turns out, John *is* upset because Mary left. Alice knows *that* Mary left, and "Mary left" truly answers the question "Why is John upset?". So, given reductionism, Alice knows *why* John is upset.

But intuitively, she doesn't know this (after all, she mistakenly believes John is upset because he flunked logic).

There is a possible reply available to the reductionist.[8] She might insist that "Mary left" doesn't answer the question "why is John upset?" Perhaps only "John is upset because Mary left" answers the question. However, this suggestion rests on the highly problematic thesis that the propositions expressed by contextually appropriate responses to questions may not be true answers (cf. Braun (2006) who thinks even inappropriate true answers are answers). But let us grant, at least for argument's sake, that this reply is open to the reductionist. There is then a different case against reductionism. Suppose John mistakenly believes that Mary is leaving because she dislikes her department, and suppose John knows that Mary has accepted a job in California. If "Mary has accepted a job in California" answers the question "what are Mary's reasons for leaving?", then John knows what Mary's reasons for leaving are, in spite of the fact that he mistakenly believes she is leaving because she dislikes her department.

Another case: suppose Alice knows that her student Mary left at 1 AM. Alice doesn't know whether her students Bob and Carl also left at 1 AM. So, Alice doesn't know which ones of her students left at 1 AM. Yet if "Mary left at 1 AM" answers the question "which ones of Alice's students left at 1 AM?", then reductionism predicts that Alice knows which ones of her students left at 1 AM, despite the fact that she doesn't know whether Bob and Carl also left at 1 AM.

Schaffer's view has none of these consequences. For on his view, one can know that Mary left without knowing that Mary left, *as* the true answer to the question "why is John upset?" Likewise, one can know that Mary has accepted a job in California without knowing that she has accepted a job in California, *as* the true answer to the question "what are Mary's reasons for leaving?", and one can know that Mary left at 1 AM without knowing that Mary left at 1 AM, as the true answer to the question "which ones of Alice's students left at 1 AM?".

But Schaffer's anti-reductionism has problems of its own. For Schaffer, utterances of "*s* knows-*wh*" *express*, relative to context, propositions of the form "s knows pQ," where Q is the indirect question of the *wh*-clause and p its true answer. Here is one place where he expresses this view: "KQ_1 and KQ_2 come out as *expressing* different propositions: $KspQ_1$ and $KspQ_2$" (p. 8, italics added).

I find this view rather suspect.[9] Suppose I say "I know who stole my car," and John stole my car. Since "John stole my car" is the true answer

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8   Thanks to Ian Rumfitt here.

9   For a related objection to Schaffer's view, see Bach (2005).

to the question "Who stole my car?", my utterance expresses the proposition that I know that John stole my car. But suppose I have never heard of John and in fact believe Henry stole my car. How, then, is it possible for my utterance to express a proposition that has John as a constituent?

It might be suggested that utterances of "s knows-*wh*" are of the form "*s* knows *pQ*," where "*p*" is a pure indexical which is assigned a value by context (independently of what the speaker believes). For example, in our example the pure indexical "*p*" is assigned whichever proposition is the true answer to the question "Who stole my car?" Since "John stole my car" is the true answer to that question, "*p*" is assigned the proposition that John stole my car.

I highly doubt that proposition-denoting expressions are pure indexicals. But suppose I am wrong about this. There is then a different worry about Schaffer's view. According to Schaffer, utterances of "*s* knows-*wh*" *express*, relative to a context, propositions of the form "*s* knows *pQ*," where *Q* is the indirect question of the *wh*-clause, and *p* its true answer. But not all questions have a single true answer, even within a fixed context (Groenendijk and Stokhof 1994).[10] Consider:

(6) John knows where one can buy an Italian newspaper.

The indirect question of the *wh*-clause is "where can one buy an Italian newspaper?". But there is no single answer to this question. In my current context, "one can buy an Italian newspaper in Walgreen," "one can buy an Italian newspaper in Target," "one can buy an Italian newspaper in Schnucks," "one can buy an Italian newspaper in Straubs," and ... answer the question equally well.

Schaffer may suggest that we substitute the predicate "is one of its true answers" for "is the true answer." That gives us:

> Anti-Reductionism (revision 1): Utterances of "*s* knows-*wh*" express propositions of the form "*s* knows *pQ*," where *Q* is the indirect question of the *wh*-clause, and *p* one of its true answers.

But revision 1 only makes things worse. Suppose "one can buy an Italian newspaper in Walgreen" and "one can buy an Italian newspaper in Target" are true answers to the question "where can one buy an Italian newspaper?".

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10   Schaffer (footnote 3) acknowledges that questions may have more than one true answer, but he replies "I will continue to speak of "knowing the answer" in the main text for colloquial purposes, but "knowing *an* answer" is more accurate in general. Nothing of substance will turn on this."

If we suppose that both Walgreen and Target carry Italian newspapers, (6) is equivalent to:

> (7) John knows that one can buy an Italian newspaper in Walgreen, as a true answer to the question "where can one buy an Italian newspaper?"

and to

> (8) John knows that one can buy an Italian newspaper in Target, as a true answer to the question "where can one buy an Italian newspaper?"

But (6) may be true, while either (7) or (8) is false. So, (7) and (8) cannot both be equivalent to (6).

Faced with this problem, the anti-reductionist may suggest the following revision:

> Anti-Reductionism (revision 2): utterances of "s knows-wh" express propositions of the form "s knows p or q or r or …Q," where Q is the indirect question of the wh-clause and p, q, r, … its true answers.

This would mark an improvement in the anti-reductionist position. If we assume that Walgreen, Target and Schnucks have Italian newspapers in stock, (6) is equivalent to:

> (9) John knows that one can buy an Italian newspaper in Walgreen or that one can buy an Italian newspaper in Target or that one can buy an Italian newspaper in Schnucks, as true answers to the question "Where can one buy an Italian newspaper?"

However, trouble arises when the indirect question can be answered in more than a few ways in a given context. Consider, for instance:

> (10) John knows who attended the lecture.

In almost any context, there will be a considerable number of true answers to the question: "which students attended the lecture?", for example, "Bill and Mary attended," "two undergraduates attended," "two undergraduates in red shirts attended," "my friends from high school attended," "two of Scott Soames' students attended," …. The

answers just cited may even be correct if sixty people attended the lecture (witness the felicity of "A: who wants ice cream? B: I do."). On the revised anti-reductionist view, (10) is thus equivalent to:

> (11) John knows Bill and Mary attended the lecture or that two undergraduates attended the lecture or that two of Scott Soames' students attended the lecture or …, as true answers to the question "Who attended the lecture?"

As it is unlikely that we could provide a complete and exhaustive list of properties instantiated by Bill and Mary (and other attendants), (11) is unlikely to be finite. While finite sentences may be equivalent to infinite ones, it is reasonable to suppose that a proper truth-conditional analysis of knowledge-*wh* should be finite. Otherwise the content of knowledge-*wh* ascriptions would go beyond what our finite minds can grasp. As the anti-reductionist view (as it stands) cannot guarantee that it does not, it should be rejected.

There is, of course, a natural way for Schaffer to avoid both worries. Let utterances of "*s* knows-*wh*" express propositions of the form "there is a proposition *p* such that *s* knows that *pQ*," where the propositional function expression "*s* knows *pQ*" means "*s* knows *p* as an answer to *Q*." As we will see, this is remotely similar to the analysis we will propose below. But, as we will also see, linguistic evidence does not support the view that knowledge-*wh* involves a question at the level of logical form, and so does not support anything like Schaffer's position.

4. Pseudo-Clefts

The clue to how to analyze knowledge-*wh* comes from knowledge-*what* ascriptions. As illustrated by the following argument, knowledge-*what* ascriptions are closely related syntactically and semantically to the pre-copular constituents of so-called pseudo-cleft sentences:

> A: John knows what Mary did at 3 p.m.

> B: What Mary did at 3 p.m. was feed the dog.

> C: So, John knows that Mary fed the dog at 3 p.m.

As the pre-copular clause "what Mary did at 3 p.m." in (B) is the complement of "John knows" in (A), it seems that to give an adequate semantics for knowledge-*what* sentences, we will need to determine the semantic status of the pre-copular constituents of pseudo-cleft sentences.

The two most popular semantic theories of pseudo-cleft-sentences are the movement-based approach and the question-in-disguise theory.[11] On the movement-based approach, (B) is of the same form as "Mary fed the dog at 3 p.m." On the question-in-disguise theory, (B) is at the level of logical form a question/answer pair, where part of the question/answer pair is elided, as in: "What Mary did at 3 p.m. was? Feed the dog."

Both of these theories of pseudo-clefts were developed as responses to the so-called connectivity problem. The connectivity problem is this. For a linguistic item to be syntactically bound by another, it must be c-commanded by it. On standard binding theory, a noun phrase c-commands another if and only if the first branching node in a syntactical tree dominating it also dominates the other (for discussion, see Neale 1990: 124ff; Brogaard 2007a). Consider, for instance:

(12) Every boy likes himself.

The quantified noun phrase "every boy" and the verb phrase "likes himself" are both dominated by the very first branching node in a tree diagram for (12). Hence, "every boy" c-commands everything in the verb phrase "likes himself." Since the pronoun "himself" is thus c-commanded by "every boy," it is possible for "every boy" to syntactically bind it.

But trouble arises with pseudo-clefts, such as (13):

(13) What every student admires most is his mother.

Like (12), (13) seems to have a bound variable reading, where the quantified noun phrase "every student" syntactically binds "his." However, if (13) is indeed a normal copular sentence, as the surface grammar indicates, then this is not possible. For the first branching node dominating "every student" then does not dominate "his." The first branching node dominating "every student" is "what every student admires most," but the latter does not dominate "his." Hence, if "every student" is located in the pre-copular clause and "his" in the post-copular clause at the level of logical form in the way indicated by the surface structure of the sentence, then "his" is not c-commanded by "every student," and so cannot be bound by it.

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11   For a defense of a movement-based approach, see e.g. Boskovic (1997), Meinunger (1998), Heycock and Kroch (2002). Heycock and Kroch (1999) offer a variant of this approach, according to which the derivation process of a connected sentence occurs after reaching the level of logical form. The Question in Disguise Theory has been defended by e.g. Den Dikken et al (2000) and Schlenker (2003).

The movement-based approach and the question-in-disguise theory both posit a level of logical form at which the pre- and post-copular constituents stand in the right relationship for binding to take place. On the movement-based approach, the pre- and post-copular constituents are linked by syntactic movement. The movement posited is very similar to the well-understood syntactic movement posited by the rule known as "Quantifier Raising." Quantifier Raising predicts, among other things, that the quantifier phrase "two flamingos" in

(14) Robin saw two flamingos.

raises and binds a variable that was left behind as a trace, thus yielding "[two flamingos$_i$](Robin saw t_i)." Defenders of the movement-based approach hold that "his mother" in (13) undergoes a similar kind of movement, but here to a position inside the pre-copular clause, thus ultimately yielding the simple-sentence paraphrase:

(15) Every student admires his mother most.

In (15) "every student" and "his" are in the right syntactic relationship for binding to take place. Thus, if (13) and (15) have the same logical form, then it is straightforward to explain the appearance of a bound variable reading in the case of (13).

On the question-in-disguise theory, pseudo-clefts like (13) are question-answer pairs, where a part of the pair is elided. Thus, pseudo-clefts are not assumed to have the same logical form as their simple-sentence paraphrases. Instead, the simple-sentence paraphrases are claimed to be present in the post-copular position. (13), for example, is assumed to have roughly the following underlying form:

(16) What every student admires most is? Every student admires his mother most.

Following Jeroen Groenendijk and Martin Stokhof (1983, 1994),[12] the question-in-disguise theorists take the possible (complete) answers to a question in a given context of utterance to form an exhaustive set of mutually exclusive propositions that are determined by the question itself. Giving an answer to a question is regarded as making a choice from this set of mutually exclusive possibilities. The extension of a question in a given context of utterance (if it has one) is thus its unique, true and complete answer in that context. For example, if

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[12]   See also Engdahl (1986).

David likes Rebecca, then the extension of "What does David like?" is the intension of "David likes Rebecca." Hence, an utterance of (13) simply states that the extension of "What does every student admire most?" is the intension of "every student admires his mother most," which is true just in case "every student admires his mother most" is the unique, true and complete answer to "What does every student admire most?" in the context of utterance.

The question-in-disguise theory is made plausible by the fact that full answers may appear in the post-copular clause at the level of phonological form. Consider, for instance:

(17) What I did then was I called the grocer.

Here "I called the grocer" is the full answer to the question "what did you do then?"

Even so, the movement-based approach seems initially preferable to the question-in-disguise theory. For, unlike the pre-copular clauses of pseudoclefts, noun phrases like "the person John likes" do not appear to be concealed questions. Yet connectivity problem arises not only for pseudo-clefts but also for sentences containing such noun phrases, for instance:

(18) The person every student admires most is his mother.

However, it has recently been argued that noun phrases can, and in fact ought to, be interpreted as concealed questions in certain environments (Schlenker 2003). Consider, for instance, the following dialogue:

A: What is the only thing he didn't do?

B: The only thing he didn't do? Buy any wine.

The first part of B's reply here seems to function as an abbreviated question ("what is the only thing he didn't do?"), and the second part of B's answer seems to function as an abbreviated answer ("he didn't buy any wine"). It may thus be suggested that "the person every student admires most" in (18) functions as a question, part of which has been elided (Schlenker 2003). On this proposal, (18) has roughly the following underlying form:

(19) The person every student admires most is? Every student admires his mother most.

which, like (18), is true just in case every student admires his mother most.

5. Scope Issues

The syntactic approaches to the connectivity problem appear to provide a quite elegant solution to the connectivity problem. Unfortunately, both sorts of approaches face serious difficulties (see Brogaard 2007a). One problem with the syntactic approaches is that they make the wrong predictions in cases like:[13]

      (20) The person every student wants Lisa to marry is himself.

More precisely: they predict that the following connected clause can be found at the level of logical form:

      (21) *Every student wants Lisa to marry himself.

However, this would be extremely odd, since (21) is ungrammatical.

  A second problem is that the scope-behavior of focus constructions and their simple-sentence paraphrases is very different.[14] Consider, for instance:

      (22) What some student admires is every teacher.

      (23) Some student admires every teacher.

      (24) The person John didn't give a raise was a faculty member.

      (25) John didn't give a faculty member a raise.

In the pseudo-cleft in (22) the quantified noun phrase "every teacher" is unable to take wide scope over the existentially quantified noun phrase "some student." That is, it is not possible that a different student admires each teacher. The simple-sentence paraphrase, on the other hand, exhibits a scope ambiguity. In the copular sentence in (24) the indefinite description "a faculty member" is unable to take wide

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[13]   Similar examples can be found in Den Dikken et al (2000: note 29), and Sharvit (1999).

[14]   The failure of a universal quantifier in the predicative position to take scope over an existential quantifier inside the pre-copular constituent of a *wh*-cleft, as in (22), was first noticed by Williams (1994: 60). For discussion, see also Heycock and Kroch (1999).

scope over the negation. But in the simple-sentence paraphrase a wide-scope reading is available.

It seems, then, that the scope behavior of determiner phrases in copular sentences and in their simple-sentence paraphrases is quite different. But this is strange if, as suggested on the movement-based approach, the post-copular constituent moves into a pre-copular position at the level of logical form by a rule very similar to that of Quantifier Raising.

Scope considerations also create trouble for the question-in-disguise theory. For the question-in-disguise theory predicts that the simple-sentence paraphrases are the unique, true and complete answers to the disguised questions in the pre-copular positions. But since the simple-sentence paraphrases exhibit a scope-ambiguity, they are clearly not the unique, true and complete answers to the disguised questions.

It may be replied that this problem goes away if answers can belong to various different semantic types. For example, if ''every teacher'' might be an appropriate answer to ''What does some student admire?'', then the lack of a wide-scope reading for ''every teacher'' can be explained by the fact that ''every teacher'' does not undergo syntactic movement.[15]

The short answer version of the question-in-disguise theory is made plausible by the fact that short answers are more closely tied to particular questions than full sentential ones. For example, ''John invited Peter and Mary'' can be an answer both to ''who invited Peter and Mary?'' and ''who did John invite?'' But ''John'' answers only the first, not the second.

However, there are two problems with the short-answer proposal. First, copular sentences seem to have the very same virtue as shorts answers. For example, while ''John invited Peter and Mary'' can be an answer both to ''who did John invite?'' and ''who invited Peter and Mary?'', ''the people John invited were Peter and Mary'' is appropriate only in response to the first question, not the second. Thus, the same evidence that corroborates the short-answer proposal also corroborates a view of answers as full sentences. But if copular sentences may serve as answers, then the question-in-disguise theory does not by itself provide a solution to the connectivity problem.

Second, if the post-copular constituents of copular sentences are short answers (falling under a semantic type other than the sentential one), then the question-in-disguise theory loses its motivation. For on a short answer version of the question-in-disguise theory, an unconnected sentence like

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[15]   For discussion, see e.g. Yoo (2003).

(26) The person every student admires most is his mother.

does not contain a connected clause in the post-copular position or anywhere else. But it was the appearance that sentences like (26) do contain a connected clause at the level of logical form that motivated the question-in-disguise theory in the first place. In short: neither the movement-based approach nor the question-in-disguise theory seems motivated as an account of the connectivity effects found for copular constructions.

6. *Wh*-Clauses as Definite Descriptions

The main piece of evidence against taking the surface division between the pre- and post-copular clauses in copular sentences to be syntactically real is that the pre- and post-copular clauses seem connected. However, the connectivity effects found in copular sentences can be explained on the assumption that binding is not always a syntactic phenomenon. Consider:[16]

(27) What John is is proud of himself.

The post-copular constituent behaves as if it occupied a position in the pre-copular *wh*-clause. However, there is no reason to assume that it in fact occupies a pre-copular position. Following Emmon Bach and Barbara Partee (1980), Partee (1986), A. Szabolsci (1987), and Pauline Jacobson (1994), "what John is" is a special kind of indefinite description which is the result of quantification into predicate position.[17] The predicate "proud of himself" is a property designator rather than an expression with predicate-type semantic value. In other words, "what John is is proud of himself" does not say that a salient property of John has the property of being proud of self, which it would if "proud of himself" had a predicate-type semantic value. Rather, it says that a salient property of John is identical to the property of being proud of self. "What John is" is thus of the form "$\exists x.x(\text{John})$," whereas "proud of himself" is of the form "$\iota x.x$ is identical to proud-of-self." (27) is interpreted as meaning "there is a salient x such that x is a property of John, and x is identical to the property *proud of self*." This is equivalent to "a salient property of John is the property of being proud of self."

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[16] Clauses with a property-denoting subject and an entity-denoting post-copular element are also known as "specificational clauses." For discussion, see Mikkelsen (2004).

[17] Partee thinks "what John is" is a referring term of type e. If, however, descriptions are quantifiers, then "what John is" is of type $<<e, t>, t>$.

Some post-copular constituents do get assigned a predicate reading, for instance, "What John is is admirable." Here "is admirable" is a property of a property John has. Other pseudo-clefts are ambiguous between the two readings, for instance, "what John is is boring." On one reading, it means that John is boring. On the other, it means that John has a property that is boring. The ambiguity can be explained on the assumption that the "is" in "is boring" can be read either as the "is" of identity or the "is" of predication. On the identity reading, the sentence says that a salient property of John is identical to *boring*. On the predicational reading, it says that the property *boring* is a property of a salient property of John. In the first case, "boring" undergoes a type-lowering of the sort "red" undergoes in "John's favorite color is red" (i.e., a type-shift from predicate type $<e, t>$ to type e). The latter cannot be interpreted as meaning that John's favorite color has the property of being red, but must be interpreted as meaning that John's favorite color is identical to the property red. "Proud-of-himself" as it occurs in "What John is is proud of himself" undergoes a similar sort of type-shift (see Partee 1986). Type-lowering processes also explain the felicity of "Mary's dress is the color of the sky." The latter cannot be interpreted as meaning that Mary's dress is identical to blue (if the sky is blue) but must be interpreted as meaning that Mary's dress has the property of being blue. "The color of the sky" here shifts from quantifier type $<<e, t>, t>$ to predicate type $<e, t>$.

Similar considerations extend to "what Mary did at 3 p.m. was feed the dog." The latter is true iff there is a salient x such that Mary did x at 3 p.m. and x is a dog feeding. "What Mary did at 3 p.m." is an indefinite designator which, if it denotes anything, denotes a salient action performed by Mary at 3 p.m., and "feed the dog" denotes the set of dog feedings (or perhaps feedings of *the* dog). The pseudo-cleft is true iff a salient action performed by Mary at 3 p.m. is a member of the set of dog feedings.

So far, so good. Unfortunately, the proposal just outlined has a serious flaw: if "*what-F*" is a quantified expression, then we should expect the quantifier to be able to take wide as well as narrow scope with respect to attitude operators such as "*s* knows," "*s* remembers," and "*s* realizes." But in fact it only takes wide scope: "John remembers what Mary did at 3 p.m." cannot be read as saying that John remembers that there is something Mary did at 3 p.m. Likewise, "Mary knows why Amy left" cannot be read as saying that Mary believes that there is a reason why Amy left, but can only be read as saying that for some reason r, Mary knows r is why Amy left. Such considerations suggest that "what Mary did at 3 p.m." has the form "Mary did x at 3 p.m.," which is to say, "what Mary did at 3 p.m." has a predicate-type semantic value.

When "what Mary did at 3 p.m." occurs in argument position rather than predicate position, grammaticality requires existential closure,[18] which then yields the indefinite description interpretation outlined above.

The analysis just outlined can be extended to account for pseudo-clefts with quantified noun phrases (Jacobson 1994). Compare (28) with (29).

> (28) What Mary did at 3 p.m. was feed her dog.

> (29) What every student did at 3 p.m. was feed her dog.

Unlike the pre- and post-copular constituents in (28), the pre-copular constituent in (29) cannot be interpreted as denoting the salient action every student performed at 3 p.m. But it can be interpreted as a designator denoting a function.[19]

Imagine being asked the following question: "what is the (salient) function f such that the input is the set of actions and the output is the set of actions every student performed at 3 p.m." If indeed every student fed her dog at 3 p.m., the correct answer is "the feeding-of-one's dog function" (on female individuals, if "her" is gendered). So, the pre-copular constituent may be understood as denoting the function f from entities x in the domain to things y such that every student x did y at 3 p.m. The post-copular constituent, on the other hand, may be understood as denoting the feeding of one's dog function. (29) is thus true if and only if the function from entities x in the domain to entities y such that every student x did y at 3 p.m. is the feeding-of-one's-dog function. The appearance of binding is due to the fact that a function denoted by the post-copular constituent is identical to the function denoted by the pre-copular clause.

Jacobson's approach also explains the connectivity effects that arise for other copular constructions (for discussion see Brogaard 2007a). Consider:

> (30) The woman that every Englishman admires most is his mother.

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[18] As Jacobson (1994) points out, we might treat pseudo-clefts with a pre-copular *wh*-clause as inverted. But we would still need to posit existential closure in cases such as "what Mary wants is what John bought."

[19] This idea has been developed in detail in e.g. Jacobson (1994) and Sharvit (1999). It rests on a variable-free approach to binding proposed in Quine (1966). Jacobson's goal is to develop a general variable-free approach to binding. That is not my intention. I am simply using Jacobson's idea to account for the appearance of binding in sentences with a clear functional interpretation, such as "the person every student admires is his mother."

The pre- and post-copular constituents in (30) cannot be interpreted as definite descriptions denoting individuals. But they can be interpreted as definite descriptions denoting functions. The pre-copular constituent may be understood as denoting a function from women to individuals x such that every Englishman loves x. The post-copular constituent, on the other hand, may be understood as denoting the mother-of function (on male individuals). The sentence is thus true if and only if the function from women to individuals every Englishman loves most is the mother-of function (on male individuals).

The semantic approach to the connectivity problem offers a straight-forward explanation of why quantified noun phrases in copular con-structions lack ordinary scope-taking properties. Unlike "some student admires every teacher," "what some students admires is every teacher" cannot be interpreted as meaning that some student or other admires every teacher. But this is a straightforward consequence of the semantic approach to binding. If there is no syntactic binding, then there is no movement of any of the post-copular constituents. So, "every teacher" cannot take wide scope with respect to "some student."

7. Knowledge-*Wh* as De Re Knowledge

We now have an answer to the question of the semantic status of pre-copular constituents of pseudo-clefts. As the pre-copular constituents of pseudo-clefts occur as *wh*-complement clauses of "know" and the pre-copular constituents of pseudo-clefts are predicates, it is natural to think that *what*-complement clauses are predicates.

Moreover, if "*what-F*" functions as a predicate when it occurs as the complement clause of "know," then it is only natural to think that "*why-F*," "*when-F*," and "*where-F*" also function as predicates when they occur as the complement clauses of "know." Of course, many *wh*-clefts with "why," "who," "where," and "when" are only marginally acceptable, witness "why John is upset is that Mary left" and "where the talk is is in room 223." But some are alright, for instance "where we thought he'd end up was in Detroit," "where he lives is on the other side of the ocean," "where he lives is quite arid," and "who we thought he would end up marrying was Alisa Brown" (see Partee 1986: 200). Moreover, inverted *wh*-clefts with "when," "where," "why" and "who" are usually quite natural-sounding, witness "3 o'clock is when the talk is," "room 223 is where the talk is," "that Mary is leaving is why John is upset," and "the president of the APA is who John is," which is easily explained on the assumption that *wh*-clauses are predicates.

If *wh*-clauses are predicates, then *wh*-clauses are, semantically, on a par with definite and indefinite noun phrase complement clauses (e.g.

"the reasons Mary left" or "a place that sells Italian newspapers").[20] In fact, there is some reason to think that *wh*-complement clauses are the full versions of noun-phrase complement clauses (Heim 1979). Noun phrase complement clauses are ambiguous between an objectual and a non-objectual reading. For example, "Dorothy knows the way to Kansas" can be translated in German as either "Dorothy kennt den Weg nach Kansas" or "Dorothy weisst den Weg nach Kansas."[21] The former conveys familiarity with the way, while the latter just conveys basic knowledge of the directions. The ambiguity is particularly salient in the case of "Alice has forgotten the capital of New York," which can be interpreted as meaning that Alice no longer has memories of the capital of New York, or as meaning that she has forgotten what the capital of New York is. On the second reading, the embedded descriptions are also known as *concealed question*s.

If *wh*-clauses and concealed questions are predicates, a correct account of knowledge-*wh* and knowledge-*the/a* emerges on the further assumption that "*s* knows that" takes narrow scope with respect to a wide-scope quantifier. For example, "Dorothy knows the way to Kansas" cannot be interpreted as meaning that Dorothy knows that there is some *w* such that *w* is the way to Kansas, but it can only be interpreted as saying that there is some *w* such that Dorothy knows that *w* is the way to Kansas. The de dicto reading is ruled out because on this reading, "Dorothy knows the way to Kansas" may be true in virtue of the fact that Dorothy knows that for some *w*, *w* is the way to Kansas but fails to have any basic knowledge of the directions. It is easy to explain why the de dicto reading is unavailable on the assumption that concealed questions and *wh*-clauses are predicates, for if a sentence requires existential closure for grammaticality, the closure is text-wide (for discussion, see e.g. Heim 1982).[22]

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[20]   For a treatment of descriptions as predicates, see Fara (2001, 2006). For critical discussion of the descriptions-as-predicates thesis, see Brogaard (2007b). Nathan (2006) argues for a similar analysis of concealed questions. According to him, concealed questions CQ denote the unique (maximal) proposition such that, for some *x*, the proposition expresses *x* is CQ. If Mary's reason for leaving is that she dislikes her department, then "John knows Mary's reason for leaving" is equivalent to "John knows that "Mary dislikes her department" is her reason for leaving." However, this analysis fails when the concealed question admits of a pair-list reading, as in "John knows the name of every student."

[21]   Thanks to Kai von Fintel and Adam Tailor here.

[22]   There is at least one exception to the hypothesis that existential closure is text-wide. Sentences that admit of a pair-list reading allow a universal quantifier to take wide-scope, as in "John knows the name of every student." See e.g. Fox (*Forthcoming*) and Brogaard (2008). Thanks to Jim Higginbotham, Peter Lasersohn and Robert May here.

On the assumption that *wh*-clauses and concealed questions are predicates and that "*s* knows that" takes narrow scope, we can assign to knowledge-*wh* and knowledge *the/a* ascriptions the following logical forms:

> Logical form (know-*the F(s)*): $\exists x(s$ knows(x is the $F(s)$))

> Logical form (know-*an F*): $\exists x(s$ knows(x is an F))

> Logical form (know-*wh-F*): $\exists x(s$ knows(x is *wh-F*)).

The following are instances of these schemas (on plural quantification, see e.g. Boolos 1984 and Brogaard 2007c):

> Knowledge-*the*

> "I know John's reasons for leaving:" For some *Rs*, I know that the *Rs* are John's reasons for leaving.

> "Dorothy knows the way to Kansas:" For some *w*, Dorothy knows that *w* is the way to Kansas.

> Knowledge-*a*

> "John knows a place that sells Italian newspapers:" For some *l*, John knows that *l* is a place that sells Italian newspapers.

> Knowledge-*wh*

> "John knows what Mary did at 3 p.m.:" for some *e*, John knows that *e* is what Mary did at 3 p.m.

> "John knows where one can buy an Italian newspaper:" for some *l*, John knows that *l* is where one can buy an Italian newspaper.

> "John knows who attended the lecture:" for some *Ss*, John knows that the *Ss* are who attended the lecture.[23]

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[23] Just like "which" clauses, "who" clauses semantically imply maximality. "Who attended the lecture" can be paraphrased as "the (only) ones who attended the lecture" and "which ones of Alice's students attended the lecture" can be paraphrased "the (only) ones of Alice's students (that) attended the lecture." Just as "the president" is true of Bush iff Bush is president, and no one else is (see Fara 2001), "who attended the lecture" is true of *S* iff *S* attended the lecture, and no one did. Thanks to Paul Egré here.

> "John knows why Mary is upset:" for some r, John knows that r is why Mary is upset.

> "Alice knows which ones of her students left": for some Xs, Alice knows that the Xs are which [the only] ones of her students (that) left.

In attitude contexts "Where one can buy an Italian newspaper" denotes the property of being a place at which one can buy an Italian newspaper, "who attended the lecture" denotes the set of people who attended the lecture, "why Mary is upset" denotes the property of being a reason that Mary is upset, and "which ones of her student (that) left" denotes the property of being a group of Mary's students that left.

The domain of quantification is, of course, likely to be contextually restricted. For example, if Mary fed the dog at 3 p.m. and smoked a cigarette at 3 p.m., but if the cigarette-smoking is not salient in the context, then John knows what Mary did at 3 p.m. iff John knows that Mary fed the dog at 3 p.m.

The account just offered does not straightforwardly apply to knowledge-*whether*, for where "*e* is what Mary did at 3 p.m." is well-formed, "*p* is whether *q* or *r*" is not. At first glance, it may seem that knowledge-*whether* is of different species. We can, however, offer the following paraphrase which is reasonably close to the ones already offered for the other instances of knowledge-*wh*:

> *s* knows whether *q* or *r*: for some *p*, *s* knows that *p* is a true proposition identical to *q* or *r*.

We have a unified proposal if we assume that *whether*-clauses of the form "whether *q* or *r*" are predicates with the meaning "is a true proposition identical to *q* or *r*."[24]

The account offered extends to knowledge-*how*. We can offer the following logical form for "*s* knows how to *F*:"

> *s* knows how to *F*: for some *w*, *s* knows that *w* is how to *F*.

This is very similar to the proposal offered by Stanley and Williamson (2001). According to them, "*s* knows how to *F*" is true iff for some contextually relevant way *w* which is a way for *s* to *F*, *s* knows that *w* is a way for her to *F*". If we require that the way *w* be contextually salient, the Stanley/Williamson proposal reduces to the proposal we have

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[24]   Thanks to Matt McGrath here.

offered. And we now have an explanation of why this proposal is correct.[25] It is correct, because "how to F" functions semantically as a predicate.

One might wonder why one should treat knowledge-*wh* and knowledge-*how* in the same way, given that "how" is not superficially *wh*-word. The answer is simply that it is a fluke that English does not use a *wh*-word to express knowledge-*how*. In other languages (e.g. Danish), "*s* knows how to F" has the form "*s* knows *wh-p*," where "*wh*" is the equivalent of a *wh*-word, and "*p*" is a sentence.

Is the proposal we have offered reductionist? There is an important sense in which it is. Knowledge-*wh* reduces to a de re form of knowledge-*that*.[26] But it is very different from the view we called "reductionist" above. On this latter view, *s* may know why John is upset without knowing, for some *r*, that *r* is why John is upset. On the proposal offered here, knowing John is upset is to know, for some *r*, that *r* is why John is upset. The same holds for the other instances of knowledge-*wh*.

Given the present proposal, it is straightforward to explain why the following argument form is valid in contexts where there is something that is both salient and what Mary did at 3 p.m.

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[25]   Several commentators have voiced their suspicions about my account of knowledge-*how*. Here is an apparent counterexample. If I never practiced playing the piano but took numerous theory-lessons, someone may truly say "Brit doesn't know how to play the piano." Yet it is true that for some *w*, I know that *w* is how to play the piano. Mike Barber has suggested to me in conversation that knowledge-*how* is "ambiguous" between practical knowledge and knowledge de re (in my sense). I think that is essentially correct. But I think the ambiguity in question is an ambiguity between subject-centered and generic uses of knowledge-*how* ascriptions. "Brit knows how to play the piano" may be read as saying that Brit knows how ONE may play the piano, or as saying that Brit knows how BRIT may play the piano.

[26]   More precisely: knowledge-*wh* reduces to a form of knowledge-*that* where "know" takes narrow scope with respect to an existential quantifier. I do not mean to suggest that the propositional function cannot be known under certain guises. It clearly can, as "Alice, you don't know who you are: you are the rightful heir to the Swedish throne" illustrates. On the present account, "you don't know who you are" reduces to "there is someone *x* such that you don't know you are *x*" (perhaps under the guise "rightful heir to the Swedish throne"). The wide-scope reading, viz. "you don't know that there is an *x* such that you are *x*," is unavailable. The observation that the narrow-scope reading is the only acceptable one for know-*wh* underscores a familiar point, namely that de re knowledge in the acquaintance sense cannot be equated with de re knowledge in the syntactic sense. To know that you are *x*, for some *x*, is to know that you are *x* under a certain guise. To know that the talk takes place at *x*, for some location *x*, is to know that the talk takes place at *x* under a certain guise (eg., "room223," "John's house," "Cocca Beach"). To know that the talk takes place at *x*, for some time *t*, is to know that the talk takes place at *t* under a certain guise (e.g. "today," "on Jan 15," "the day after tomorrow").

A: John knows what Mary did at 3 p.m.

B: What Mary did at 3 p.m. was feed the dog.

C: So, John knows that Mary fed the dog

(A) states that for some salient *e*, John knows *e* is what Mary did at 3 p.m. (B) states that for some salient *e*, *e* is what Mary did at 3 p.m. and *e* is a dog feeding. From this it follows (if no other relevant entity satisfying the predicate is salient) that John knows that Mary fed the dog at 3 p.m.

8. Concluding Remarks: Linguistic Evidence and the Conceptual Role of Knowledge

For our proposed analysis of knowledge-*wh* to be adequate, it should be able to explain the linguistic evidence in favor of thinking that knowledge-*wh* ascriptions include an indirect question (see Schaffer 2007). One role for knowledge ascriptions is indicating who has evidence, etc. Such roles are question-relative. One person may be able to tell apart Bush from his impersonator, another may be able to tell apart Bush from Janet Jackson. Both have evidence for thinking Bush is on television, but the former has it relative to alternatives made salient by the question "is it Bush or Ferrell who is on television?", the latter has it relative to alternatives made salient by the question "is it Bush or Jackson who is on television?" As the roles of knowledge ascriptions are question-relative, it is natural to think that there is an indirect question in the logical form of sentences used to make *wh*-knowledge ascriptions.

However, the thesis that *wh*-complement clauses are predicates inherits this virtue. For any *wh*-complement phrase, there is a corresponding question that (in most cases) results from syntactic movement of the constituents in the *wh*-complement clause.[27] Since different questions can be derived from different *wh*-complement clauses, the truth-value of knowledge-*wh* ascriptions will be question-relative. So, if the salience of a given question-related alternative may shift the context, and an assertive utterance of a *wh*-knowledge sentence makes the question-related alternative salient, then an assertive utterance of a *wh*-knowledge sentence may shift the context.

What of the linguistic evidence in favor of the thesis that there is a question implicit in the logical form of *wh*-knowledge ascription

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[27] In "Mary is what?" the *wh*-word "what?" moves to a wide-scope position, yielding "What Mary is *t*," and NP-VP inversion yields "What is Mary?"

sentences? (Schaffer 2007) One piece of evidence is that from "*s* know-*wh*" we can infer that there is a question that *s* knows the answer to. For example, from "John knows where the talk is" we can infer that John knows the answer to the question "where is the talk?" Another piece of evidence is that from "*s* knows-*wh*," and the assumption that the *wh*-clause corresponds to a question *Q* with property *F*, we can infer that *s* knows the answer to a question with property *F*. For example, if John knows what Mary did yesterday', and "what did Mary do yesterday?" is a good question, then we can infer that John knows the answer to a good question. A third piece of evidence is that pronouns can be ana-phoric on the "*wh*" clause, as in "I know why the sky is blue. It is a tricky question."

However, these data are equally well explained on the hypothesis that there is a question *Q* corresponding to every *wh*-complement clause such if *s* knows the intension of the *wh*-complement clause, *s* knows the answer to *Q*. However, as we have seen, to say that there is a question *Q* corresponding to every *wh*-complement clause is not to say that there is literally a question in the logical form of every *wh*-knowledge sentence, but only that a question can be derived from the complement clause.

On the proposed account of knowledge-*wh*, it is easy to explain the context-sensitivity of knowledge-*whether* ascriptions. "I know whether Bush or Ferrell is on television" is equivalent to "for some *p*, I know that *p* is a true proposition identical to *Bush is on television* and *Ferrell is on television*." As the latter may be true in low-standards contexts but false in high-standards contexts, the truth-value of "I know whether Bush or Ferrell is on television" depends on context in just the way the truth-values of "I know that Bush is on television" and "I know that Ferrell is on television" do.[28]

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