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# Which answer resolves which reading of which question?

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## 1 Introduction

Multiple *wh*-questions are considered to give rise to at least two types of reading, the pair-list reading and the single-pair reading. The target article focuses on the pair-list reading, noting in fn. 8 that it is not entirely clear if the single-pair reading is to be accounted for as a separate reading. In this commentary, I will argue that the single-pair reading needs to be given a separate semantic representation, based on the observation that certain constructions only receive single-pair readings. The clearest among these, in my opinion, is nested *which*-phrases such as *which novel by which English author* (Elliott 2016; Higginbotham and May 1981). I will then discuss how this can be achieved in the proposed framework of dynamic inquisitive semantics, InqD.

Before getting to single-pair readings, I will start with a brief review of the target article's analysis of pair-list readings, and in so doing I will touch upon a couple of theoretical issues that the target article does not explicitly address. I do not think these issues pose any challenge specific to the target article's proposals, but they at least point to some aspects of the proposed theory that could be further refined, and more generally, I hope the discussion will contribute to our understanding of the semantics and pragmatics of *wh*-questions.

## 2 Pair-list answers to multiple *wh*-questions

For multiple *wh*-questions, the target article mainly focuses on pair-list answers such as (1).

- (1) Q: Which boy read which novel?  
A: Andy read *Animal Farm*, Bob read *Bleak House*, and Chris read *Cold Comfort Farm*.

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Let us briefly review the target article's analysis of the meaning of multiple *wh*-questions. (1Q) will have the following translation in the intermediate language.

$$(2) \quad \dagger \left( \begin{array}{l} [u_1]; \text{boy}\{u_1\}; \mathbf{atom}\{u_1\}; [u_2]; \text{novel}\{u_2\}; \mathbf{atom}\{u_2\}; \text{read}\{u_1, u_2\}; \\ \max^*\{u_1\}; \max^*\{u_2\}; ?u_1u_2 \end{array} \right)$$

Instead of going over the technical details of (2), I will give an informal paraphrase here. The argument of the  $\dagger$ -operator is a sequence of updates that will eliminate all information states  $s$  in the input context  $c$ , except for those where the following are both true for each possibility  $\langle w, G \rangle \in s$ :

1. There is a boy  $x$  in  $w$  and there is a novel  $y$  in  $w$  that  $x$  read in  $w$ .
2. There is a function from the maximal set of boys in  $w$  that read in  $w$  a novel or novels in  $w$  to the maximal set of novels in  $w$  that were read in  $w$  by a boy or boys in  $w$ , or more simply: Each boy in  $w$  that read in  $w$  a novel in  $w$  read in  $w$  only one novel in  $w$ .

If  $s$  is not eliminated by this series of updates, the set  $G$  of assignments of each  $\langle w, G \rangle \in s$  will be updated to  $G'$  so that it will differ from  $G$  only in that for each  $g' \in G'$ ,  $g'(u_1)$  is an atomic boy in  $w$ ,  $g'(u_2)$  is an atomic novel in  $w$  that  $g'(u_1)$  read in  $w$ ,  $G'(u_1)$  is the maximal set of boys in  $w$  that read a novel in  $w$  and  $G'(u_2)$  is the maximal set of novels in  $w$  that were read in  $w$  by a boy or boys in  $w$ . The  $\dagger$ -operator ensures that no  $s$  in the input context  $c$  will be eliminated. Each information state  $s'$  of the output context  $c'$  represents a possible way of resolving the question, which can be seen as a proposition (*qua* an information state) that may function as an answer to the question.

This analysis captures the felicity of the pair-list answer to the multiple *wh*-question in (1) in the following manner. Let us tentatively focus on the most straightforward kind of input context where it is commonly known that the only relevant boys are Andy, Bob, and Chris, and they each have read one of three novels, *Animal Farm*, *Bleak House*, and *Comfort Farm*, but which boy read which novel is not commonly known. Then, the question in (1Q), whose meaning is represented in (2), turns  $c$  into an inquisitive one  $c'$  whose maximal information states, or 'alternatives', differ from one another with respect to which boy read which novel. The pair-list answer in (1A) resolves the question so raised by eliminating all these alternatives (and their subsets) but the one that is compatible with what the answer says.

### 3 Felicity conditions of *which*-phrases

Nothing in the target article's analysis forces the boys or the novels to be identifiable in the common ground, so, taken at face value, the analysis predicts the question to remain felicitous, even when we change the input context to one where it is not

commonly known who the relevant boys are and/or what the relevant novels are. This seems to be empirically wrong, as the infelicity of (3) suggests.

- (3) A: I went to the library and saw some boys reading a book.  
B: #Which boy was reading which book?

Fortunately for the target article, this issue is arguably orthogonal to its core proposal we reviewed, because the issue has to do with general felicity conditions associated with *which*-phrases, and the target article's theory can most probably be supplemented with a theory of the felicity conditions without significant modification. Having said this, however, the current literature does not seem to contain an empirically satisfactory theory of the felicity conditions of *which*-phrases, as we discuss below.

*Which*-phrases are often said to be obligatorily *discourse-linked*, or *D-linked* (Dayal 2016, 2017; Kroch 1998; Pesetsky 1987, among others). Pesetsky (1987: p. 107f), who coined this widely used term, remarks: "When a speaker asks a question like *Which book did you read?*, the range of felicitous answers is limited by a set of books both speaker and hearer have in mind. If the hearer is ignorant of the context assumed by the speaker, a *which*-question sounds odd." Pesetsky provides no further data to back this up. Dayal (2017) pointed out, however, that the felicity of (4) suggests that Pesetsky's condition is too strong.

- (4) A: I bought a book to give to David on his birthday.  
B: Which book did you buy? (adapted from Dayal 2017: (5))

In asking her question, B may, but crucially need not, have a specific set of books in mind, and furthermore, even if B had a specific set of books in mind, A would not have to be able to identify them.

Dayal (2017) proposes a weaker condition that only requires the domain of quantification of a *which*-phrase to be 'potentially familiar'. For instance, the use of the *which*-phrase in (4B) is felicitous because it is possible that the true answer to this *wh*-question will mention a book that is 'familiar' to B in some sense. This condition, however, seems to me to be too permissive. I cannot see how it could correctly rule out the following infelicitous example, for instance

- (5) A: I met an Asian guy at David's birthday party last week.  
B: #Which Asian guy did you meet?

In the given context, the true answer could potentially contain the name of someone familiar to B, say, a former classmate of B's, or of a celebrity whose name and face B would recognise, and that is not particularly unlikely from B's perspective, because that could well be the reason why A mentioned the Asian guy to begin with.

I think it is fair to say that there is currently no empirically satisfactory theory of the felicity conditions of *which*-phrases. I cannot offer a fully worked out alternative theory here, but I would like to propose the following rough characterisation: A *wh*-question containing a *which*-phrase asks for a way to identify the relevant individual(s) with some referring expression, and the speaker who uttered a *which*-phrase must have a ‘good idea’ about what referring expressions may be used in possible answers.

Although informal at this point, this condition explains the contrast between (4) and (5) as follows. On the assumption that B at least has some basic knowledge of literature, she should have some ideas about possible book titles. In fact, if it so happens that she is ignorant about books, the question becomes infelicitous, as illustrated by the following variant of (4).

- (6) A: I bought a Mongolian novel and a fountain pen to give to David on his birthday.  
 B: Which Mongolian novel did you buy?

The use of the *which*-phrase here suggests that B has some knowledge of Mongolian novels, as expected (see Kroch 1998: p. 24 for related discussion). By contrast, in the case of (5), while B might know the names of some Asian guys, the vast majority of possible names are unknown to B. Certainly, the difference between the two examples is largely a matter of degree, which is exactly the part of the analysis I cannot make precise at this point.

Let me highlight the essential differences from the previous accounts mentioned above. Firstly, Pesetsky’s (1987) idea of D-linking requires the domain of quantification be commonly known to the interlocutors, which is too strong, as Dayal (2017) pointed out. Dayal’s condition only concerns the questioner’s mental state, but as we saw above, is too weak. The condition I am putting forward is also a condition on the questioner’s mental state, like Dayal’s, but differs from it in two respects. For one, it is about the questioner’s familiarity with linguistic expressions, rather than with their referents. We will see below some examples where this assumption is crucial. Secondly, the condition requires the questioner to have a ‘good idea’ about what these referring expressions are, which we could think of as knowing ‘many’ of them, so this is stronger than Dayal’s merely existential condition.

Now, questions with *which*-phrases can be answered by other types of referring expressions than proper names as well. To illustrate, suppose that you and your friend are in a small restaurant in a fishing village in Japan, browsing the menu. The menu is entirely in Japanese, and neither of you speak or read the language. Luckily, however, the menu has some pictures, although you do not recognise any of the dishes. You have agreed to order one dish each, among the ones with pictures. In this context, you can ask your friend, *Which dish are you ordering?*, even though you have

no idea what the names of the dishes are. We can explain the felicity of these examples on the assumption that the answer will probably contain a demonstrative expression, like *this one* with an accompanying pointing gesture. Generally, in contexts where possible answers refer to individuals that could be referred to with demonstrative expressions, *which*-phrases are felicitous, as expected under the present account.

However, such cases involving (indexical uses of) demonstratives are not very informative for the purposes of adjudicating among the analyses. It is more useful to look at cases where the possible answers are only introduced linguistically, as in (7).

(7) A: Last week I wrote two conference abstracts. One is about homogeneity and one is about free choice. I submitted one of them to *XPRAG* and the other one to *Sinn und Bedeutung*.

B: Which abstract did you submit to *XPRAG*?

The felicity of this particular example is not surprising under any of the three analyses under discussion, but contrasts it with (8), which is minimally different from (7) in that the two abstracts are about the same topic this time.

(8) A: Last week I wrote two conference abstracts, both about homogeneity. I submitted one of them to *XPRAG* and the other one to *Sinn und Bedeutung*.

B: #Which abstract did you submit to *XPRAG*?

Unlike in the previous context, the *wh*-question is infelicitous, but this cannot be due to the *which*-phrase being unable to be D-linked, because the same *which*-phrase can be D-linked in (7). Likewise, it would be difficult to maintain that the abstracts are somehow not familiar enough to B in the context of (8), but are sufficiently familiar to B in the context of (7). On the other hand, according to my analysis, the infelicity is expected, given that B has no clue as to what kind of referring expression A could use to answer the *wh*-question.

To summarise, the pragmatic conditions associated with *which*-phrases are about whether or not the questioner can form expectations about how the true answer will be phrased. I think it is not particularly surprising that these conditions exist, given the assumption that *which*-phrases are used to elicit answers with referring expressions. Intuitively, certain referring expressions are simply uninformative, if one of the interlocutors is not familiar with them. For instance if I think you might not know the Asian guy I met at David's birthday party, I will probably not use his name without explanation, as in *I met Yu Xiang at David's birthday party last week*, even if the utterance is true. Now, if one uses a *which*-phrase in a context where the true answer to the *wh*-question is expected to contain a proper name, it makes pragmatic sense for one to presuppose that at least many of the possible answers are informative enough.

Coming back to the analysis proposed by the target article, as I already remarked, the relevant pragmatic conditions of *which*-phrases could probably be added without significant modifications, so as to account for the infelicity of examples of single *wh*-questions like (9) as well as examples of multiple *wh*-questions like (3) above, independently of how it accounts for multiple *wh*-questions.

- (9) A: I went to the library right before it closed, and saw exactly one boy there.  
B: #Which boy was it?

I will not demonstrate here how the felicity conditions can be stated in the target article's framework and I also need to leave it undiscussed how and why they seem to have certain syntactic consequences (see Dayal 2016; Kroch 1998; Pesetsky 1987, among others). However, before moving on, one additional observation is worth mentioning: As the following examples illustrate, the felicity conditions are affected by embedding grammatical contexts, which suggests that they give rise to a projection problem.

- (10) A: I went to the library right before it closed, and saw exactly one boy there.  
B<sub>1</sub>: #Tell me which boy it was.  
B<sub>2</sub>: The librarian should be able to find out which boy it was.
- (11) A: I went to the library right before it closed, and saw some boys reading books there.  
B<sub>1</sub>: #Tell me which boy was reading which book.  
B<sub>2</sub>: The librarian should be able to find out which boy was reading which book.

## 4 Functional readings

We saw above that answers to *wh*-questions with *which*-phrases may contain all sorts of referring expressions. Likewise, for multiple *wh*-questions, pair-list answers are just one possible form of felicitous answers. For instance, (12A) can function as an acceptable answer, at least in some contexts.

- (12) Q: Which boy read which novel?  
A: Each boy read the novel that his teacher recommended.

In the following discussion I will call answers to multiple *wh*-questions like (12A) that involve bound pronouns *functional answers*.

According to the proposed analysis, whether (12A) resolves the question and thus counts as a felicitous answer to it depends on the context. For instance, it will be as

informative as the pair-list answer in (1A) if it is commonly known that Andy's teacher recommended *Animal Farm*, Bob's *Bleak House*, and Chris's *Comfort Farm*, because in such a context, the two forms of answer will be simply contextually equivalent. If, on the other hand, there is no information whatsoever about which novel the boys' teachers recommended, then the analysis predicts that (12A) will provide no information about the identity of the novels the boys read, and therefore should not lead to resolution of the issue that (12Q) gives rise to. There are also a number of intermediate cases where the context contains some information about what novels the boys' teachers recommended. In those cases, the answer (12A) could eliminate some but not all of the alternatives that the question gives rise to, so it should be perceived as a partial answer, rather than a complete answer.

It might not be immediately clear if these predictions are on the right track. However, the following example poses a clear issue. Suppose that it is known that each of the three boys asked their parents to recommend to them a novel to read during the summer holidays. Given this background, the following exchange is acceptable, even if nothing is known about which novels the boys' parents recommended.

(13) Q: Which boy read which novel first?

A: Each boy read the one that his mother recommended first.

This issue is part of a general issue that also applies to single *wh*-questions as well, and the literature already contains a reasonable solution to it, which I believe is compatible with the target article's theory. Let us review this solution now, and revisit (13) after that.

## 4.1 Questions about individual concepts

As pointed out by Aloni (2001), among others, different answer forms to single *wh*-questions are acceptable in different contexts, even if their extensions are identical. She illustrates this point with the following example.<sup>1</sup>

(14) *Context: It's 2001 and your daughter Priscilla is doing her homework. She asks you:*

Q: Who is the president of Mali?

A<sub>1</sub>: Konaré.

A<sub>2</sub>: [You fly to Mali, kidnap Konaré, bring him in your living room, and say:]

#This guy. (adapted from Aloni 2001: p. 9)

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<sup>1</sup> Alpha Oumar Konaré was President of the Republic of Mali between June 1992 and June 2002.

To explain this observation, Aloni proposes that a conversational context may specify what kind of intensional meaning the answer should have for it to count as a good answer to the question. In the context in (14), Priscilla is asking which proper name refers to the president of Mali, and consequently the demonstrative expression *this guy* cannot felicitously settle this question. In other contexts, a demonstrative expression may be used as a felicitous answer and a proper name may be an infelicitous answer, for example, when someone is looking for the president of Mali at a party with many heads of state, but does not know what he looks like.

Based on this and other related observations, Aloni proposes that the meanings of *wh*-questions need to be analysed as questions about intensional objects. For example, a *wh*-question containing *what* will be asking not about an individual or individuals, but about an individual concept or individual concepts, which are functions from possible worlds to individuals.

By way of illustration, let us consider the following example.

- (15) Q: Which novel did Andy read?  
 A<sub>1</sub>: *Animal Farm*.  
 A<sub>2</sub>: The one that his mother recommended.

The target paper would analyse (15Q) as follows. Let  $a$  be a discourse referent that refers to Andy by all assignments.

- (16)  $\dagger([u_1]; \text{novel}\{u_1\}; \mathbf{atom}\{u_1\}; \text{read}\{a, u_1\}; \text{max}^*\{u_1\}; ?u_1)$

The sequence of updates that appears as the argument of  $\dagger$  in this formula eliminates all information states  $s$ , unless for each  $\langle w, G \rangle \in s$ , Andy read in  $w$  exactly one novel in  $w$ . If  $s$  is not eliminated, then each  $\langle w, G \rangle \in s$  gets updated to  $\langle w, G' \rangle$  so that  $G'$  will differ from  $G$  at most in that for each  $g' \in G'$ ,  $g'(1)$  is the novel that Andy read in  $w$ .

This analysis runs into an issue analogous to the issue for multiple *wh*-questions pointed out above. Suppose that it is commonly known that Andy's parents recommended to him different novels, and that he read one of them during the summer holidays, but there is no information about what the recommendations were. Then the answer in (15A<sub>2</sub>) should not be able to resolve the question.

We can fix this issue by adopting Aloni's (2001) idea that *wh*-questions are questions about individual concepts, rather than about individuals. In order to implement it in the style of the target article, however, we would have to extend the intermediate language with proper intensionalisation. This could certainly be done, but I will not attempt to do so here to save space, and just talk directly about the model-theoretical interpretations. Let  $I$  be a set of contextually relevant individual concepts such that for each  $w \in \{w | \langle w, G \rangle \in \text{INFO}(c) \text{ for some } G\}$ , for each  $i, j \in I$ ,



$i(w) \neq j(w)$ . We want a condition like this on sets of individual concepts that *wh*-questions operate on, so that distinctness of individual concepts will amount to distinctness of individuals, at least contextually.<sup>2</sup> We want the relevant sequence of updates to eliminate all information states  $s \in c$ , unless for each  $\langle w, G \rangle \in s$ , there is exactly one  $i \in I$  such that  $i(w)$  is a novel in  $w$  that Andy read in  $w$ . If  $s$  is not eliminated, then each  $\langle w, G \rangle \in s$  will be updated to  $\langle w, G' \rangle$  so that  $G$  and  $G'$  only differ in that for each  $g' \in G'$ ,  $g'(1) = i$ .

By assumption, different conversational contexts may make different sets of individual concepts relevant, for example, a set of rigid designators such as

$$\{\lambda w. \textit{AnimalFarm}, \quad \lambda w. \textit{BleakHouse}, \quad \lambda w. \textit{ColdComfortFarm}\}$$

or a set of non-rigid designators such as

$$\left\{ \begin{array}{l} \lambda w. \text{ the novel in } w \text{ that Andy's father in } w \text{ recommended in } w, \\ \lambda w. \text{ the novel in } w \text{ that Andy's mother in } w \text{ recommended in } w \end{array} \right\}.$$

Which set of individual concepts is referenced in the question denotation will matter for which ways of referring to the relevant individual(s) will be felicitous in answering the question. When the above set of non-rigid designators is relevant, for example, one alternative will be the maximal information state  $s \in c$  such that for each  $\langle w, G \rangle \in s$ ,  $G(1) = \{\lambda w. \text{ the novel in } w \text{ that Andy's father in } w \text{ recommended in } w\}$  and Andy read in  $w$  the novel in  $w$  that Andy's father in  $w$  recommended in  $w$ , and the other alternative will be the maximal information state  $s \in c$  such that for each  $\langle w, G \rangle \in s$ ,  $G(1) = \{\lambda w. \text{ the novel in } w \text{ that Andy's mother in } w \text{ recommended in } w\}$  and Andy read in  $w$  the novel in  $w$  that Andy's mother in  $w$  recommended in  $w$ . In each of these information states  $s$ , there can be worlds  $w$  and  $w'$  where the individual concept in  $G(1)$  has different extensions, unless the input context entails otherwise. As a result, even if nothing is known about what novels Andy's parents recommended him, (15A<sub>2</sub>) will count as a felicitous answer in the sense that it eliminates one of the alternatives.

Extending the above analysis of single *wh*-questions to multiple *wh*-questions, the argument of the †-operator should now eliminate all  $s \in c$  unless both of the following are the case for each  $\langle w, G \rangle \in s$ .

- There is an individual concept  $i \in I$  such that  $i(w)$  is a boy in  $w$  and there is an individual concept  $j \in J$  such that  $j(w)$  is a novel that  $i(w)$  read in  $w$ .
- For  $i \in I$ , there is one and only one  $j$  such that  $i(w)$  read in  $w$   $j(w)$ .

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<sup>2</sup> Aloni (2001) puts a stronger condition that  $I$  be a *conceptual cover* with respect to the domain  $D$  of individuals and the set  $W$  of possible worlds, i.e., for each  $w \in W$  and for each  $d \in D$ , there is exactly one  $i \in I$  such that  $i(w) = d$ .

With the assumption that the individual concepts do not overlap in their extensions with respect to the possible worlds in  $c$ , the uniqueness in the second clause will entail that each boy read exactly one novel, as desired.

Note that this meaning is still not enough to account for the functional answer we are after. We could certainly think of  $J$  to be the set of individual concepts,

$$\left\{ \begin{array}{l} \lambda w. \text{ the novel in } w \text{ that Andy's mother in } w \text{ recommended in } w, \\ \lambda w. \text{ the novel in } w \text{ that Andy's father in } w \text{ recommended in } w, \\ \lambda w. \text{ the novel in } w \text{ that Bob's mother in } w \text{ recommended in } w, \\ \lambda w. \text{ the novel in } w \text{ that Bob's father in } w \text{ recommended in } w, \\ \lambda w. \text{ the novel in } w \text{ that Chris's mother in } w \text{ recommended in } w, \\ \lambda w. \text{ the novel in } w \text{ that Chris's father in } w \text{ recommended in } w \end{array} \right\}$$

but a set like this is not enough because in the general case it is not entailed that the three pairs of parents recommended distinct novels, which the contextual distinctness assumption mentioned above would require. We, thus, need another way of deriving a functional reading. In particular, we have to enable variable binding, and to do so, we need to consider *skolemised individual concepts*, which are functions of type  $\langle w, \langle e, \dots \langle e, e \rangle \rangle \rangle$ . Let us call the number of type- $e$  slots of a skolemised individual concept its degree. Then skolemised individual concepts of degree 0 are individual concepts *simpliciter*.

With skolemised individual concepts, we can analyse the functional answer with the following set of skolemised individual concepts of degree 1.

$$\left\{ \begin{array}{l} \lambda w. \lambda x. \text{ the novel in } w \text{ that } x\text{'s father in } w \text{ recommended in } w, \\ \lambda w. \lambda x. \text{ the novel in } w \text{ that } x\text{'s mother in } w \text{ recommended in } w \end{array} \right\}.$$

As before, we would like the skolemised individual concepts to properly distinguish individuals, but we do not enforce distinctness if the type  $e$  slots are distinct, so we require any contextually relevant set  $I$  of skolemised individual concepts of degree  $n$  to be such that for each  $w \in \{w \mid \langle w, G \rangle \in \text{INFO}(c) \text{ for some } G\}$ , for each  $d \in D^n$ , and for each  $i, j \in I$ ,  $i(w)(d) \neq j(w)(d)$ .

Then the relevant updates will eliminate all information states except those  $s \in c$  such that for each  $\langle w, G \rangle \in s$ :

- There is an individual concept  $i \in I$  such that  $i(w)$  is a boy in  $w$  and there is an individual concept  $j \in J$  such that  $j(w)(i(w))$  is a novel that  $i(w)$  read in  $w$ .
- For  $i \in I$ , there is one and only one  $j$  such that  $i(w)$  read in  $w$   $j(w)(i(w))$ .

What we have done above is modify the target article's analysis to enable a uniform treatment of pair-list answers and functional answers. According to it, the difference between the two is a matter of context, namely, which set of skolemised individual

concepts is contextually relevant, and there is no need to postulate any difference at the syntax-semantics interface.

At this moment, however, we should consider single *wh*-questions that contain quantifiers, because the literature contains more discussion about different answer forms to them, and interestingly, evidence has been raised for postulating different representations at the syntax-semantics interface for pair-list answer and functional answers to such questions. Below I will review the evidence and also point out that no comparable evidence is found for multiple *wh*-questions.

## 4.2 Single *wh*-questions with quantifiers

Single *wh*-questions containing universal quantifiers like *each* and *every* are known to admit both pair-list and functional answers, as illustrated by (17) (Chierchia 1993; Dayal 2016; Engdahl 1986; Groenendijk and Stokhof 1984; Preuss 2001, among others).

- (17) Q: Which novel did each boy read?  
 A<sub>1</sub>: Andy read *Animal Farm*, Bob read *Bleak House*, and Chris read *A Clockwork Orange*.  
 A<sub>2</sub>: (Each boy read) the novel that his mother recommended.

Given what we discussed above, it is not surprising that the intensional difference between pair-list and functional answers matters for the interpretation of (17Q), a point originally made by Groenendijk and Stokhof (1984: p. 176ff) (see also Engdahl 1986; Heim 2012). To save space I will omit examples here. Importantly, sensitivity to intensional differences of answers does not necessarily call for different representations for pair-list and functional answers at the syntax-semantics interface, as we already demonstrated above for multiple *wh*-questions.

However, another observation by Groenendijk and Stokhof (1984: p. 179ff) could be taken as suggesting that the two answer forms are based on different representations at the syntax-semantics interface. They point out that single *wh*-questions with other quantifiers than universal quantifiers such as *no*, allow for functional answers, but not for pair-list answers, as illustrated by (18).

- (18) Q: Which novel did no boy read?  
 A<sub>1</sub>: #Andy didn't read *Animal Farm*, Bob didn't read *Bleak House*, and Chris didn't read *A Clockwork Orange*.  
 A<sub>2</sub>: The novel that his father recommended to him.

Note that even if the pair-list answer is extensionally equivalent to the functional answer, it does not sound felicitous in this case.

If we gave a semantic representation like the one we have been considering, we would not be able to rule out the pair-list answer here, because as long as the functional answer is felicitous, there is no particular reason why (skolemised) rigid designators would not be felicitous, at least in some contexts. Therefore, the meaning of the *wh*-question in (18Q) needs to be one that is only compatible with functional answers, and not with pair-list answers.

However, this reasoning is not complete, because even if we have semantic representations that require functional answers, as far as the semantics is concerned, there will still be no principled way of ruling out pair-list answers that contextually entail functional answers, as possible answers. Furthermore, even if the pair-list and functional readings of single *wh*-questions containing *no* were to be analysed in terms of distinct representations at the syntax-semantics interface, it would not automatically follow that those of single *wh*-questions containing universal quantifiers and those of multiple *wh*-questions should analogously be analysed similarly.

In this connection, I should mention an observation due to Preuss (2001) that *wh*-questions that are compatible with pair-list answers show quantificational variability effects with adverbials like *for the most part*, but not *wh*-questions that require functional answers.

- (19)
- a. The teacher knows for the most part which boy read which novel.
  - b. The teacher knows for the most part which novel each boy read.
  - c. #The teacher knows for the most part which novel no boy read.
  - d. #The teacher knows for the most part which novel exactly one boy read.

This points to the conclusion that the functional readings of single *wh*-questions with *no* are to be truth-conditionally distinguished from the readings of single *wh*-questions with *each* and multiple *wh*-questions.

Similarly, Groenendijk and Stokhof (1984: p. 178f) point out that pair-list and functional answers give rise to different intuitions about partial versus complete answerhood. Concretely, consider the following context with three Dutchmen, Jeroen, Martin, and Frank. Suppose further that they all love their wife and mother, but as for the former Queen, Beatrix, Jeroen, and Frank love her but Martin does not. Against this context, consider the following *wh*-question containing *every*.<sup>3</sup>

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<sup>3</sup> Groenendijk and Stokhof (1984: p. 179) uses *Which woman does every man love?* but the point-wise uniqueness presupposition that the singular *wh*-phrase gives rise to contradicts the intended complete answer.

(20) Q: Which women does every Dutchman love?

A<sub>1</sub>: Jeroen loves his wife Jenny and his mother Ineke, Martin loves his wife Madelief and his mother Maaïke, and Frank loves his wife Fay and his mother Fenna.

A<sub>2</sub>: His wife and mother.

There is a sense in which (20a) is a partial answer, because it does not mention that Jeroen and Martin love Beatrix. On the other hand, (20b) intuitively sounds like a complete answer, despite the fact that it also fails to mention that Jeroen and Martin love Beatrix. This motivates the view that single *wh*-questions with *every* also have readings that are dedicated to functional answers.

Let us apply this test to multiple *wh*-questions relative to the same situation.

(21) Q: Which Dutchman loves which women?

A<sub>1</sub>: Jeroen loves his wife Jenny and his mother Ineke, Martin loves his wife Madelief and his mother Maaïke, and Frank loves his wife Fay and his mother Fenna.

A<sub>2</sub>: Each of them loves his wife and mother.

It seems to me that (20) and (21) diverge here. That is, while the functional answer to the single *wh*-question with *each* intuitively feels like a completely answer in (20), the same answer sounds like as partial an answer to the multiple *wh*-question as the pair-list answer in (21A<sub>1</sub>), due to its failure to mention Beatrix.

Since the target analysis does not provide an explicit analysis of single *wh*-questions with quantifiers, I cannot discuss this difference between *wh*-questions with quantifiers and multiple *wh*-questions in precise terms here, but one possible way to understand it is as follows. Single *wh*-questions with *every* have a reading that can be felicitously answered by pair-list answers, and presumably also by functional answers, but the observation in (20) suggest that it also has a reading that is dedicated to functional answers similarly to single *wh*-questions with *no*. On the other hand, multiple *wh*-questions only have the former type of representation at the syntax-semantics interface, along the lines of what we discussed in Section 4.1.

## 5 Single-pair readings

Lastly, let us turn to single-pair readings. In fn. 8, the target article mentions the possibility that the single-pair readings of multiple *wh*-questions can be subsumed under pair-list readings as cases where only one pair stands in the relevant relation. Indeed, whenever a pair-list reading is an available reading, it is not clear if there is a separate single-pair reading, because if it so happens that only one pair stands in the

relevant relation, the pair-list answer and single-pair answer should collapse to the same thing. For instance, suppose that I tell you that some of our common friends went on shopping together yesterday, and you ask me *Who bought what?* I can truthfully settle this question by saying *Becky bought a book, and that was it*, if that's what (I believe) happened. Similarly, once you have learned this state of affairs, you will no longer be able to truthfully say *I don't know who bought what*. So indeed, whenever a pair-list reading is available, it is hard to identify a single-pair reading as a separate reading.

However, there are some constructions that only allow for single-pair readings, the clearest case of which, in my opinion, is the nested *wh*-construction (see Elliott 2016; Higginbotham and May 1981).<sup>4</sup> To illustrate, consider the following example.

(22) Which novel by which English author did Andy read?

This question presupposes that Andy read exactly one novel by an English author, and cannot be felicitously answered by a pair-list answer like (23).

(23) He read *Animal Farm* by George Orwell, *Bleak House* by Charles Dickens, and *Cold Comfort Farm* by Stella Gibbons.

Why this is so is a question that I cannot answer here, but questions like (22) clearly require a semantic representation dedicated to single-pair readings.

## 5.1 Anti-presupposing single-pair answers?

Incidentally, it is sometimes considered that multiple *wh*-questions like *Who bought what?* in English do not have single-pair readings (Bošković 2001). The main evidence for this claim seems to come from judgments relative to a context where a single-pair answer is expected. For example, according to Bošković (2001: p. 1), in the following situation, it is infelicitous to ask *Who bought what?*

(24) John is in a store and in the distance sees somebody buying a piece of clothing, but does not see who it is and does not see exactly what the person is buying.

However, as noted above, multiple *wh*-questions are semantically compatible with single-pair answers. That is, if it so happens that only one person bought anything and they bought one thing, then the correct true answer will inevitably be a single-pair. Similarly, it is false to say in the above situation *The clerk doesn't know who*

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<sup>4</sup> The status of other such constructions is controversial, among which are multiple *which*-questions with superiority violations like *Which novel did which boy read?* See Dayal (2022), Bošković (2001), Kotek (2018), Nicolae et al. (2017) for discussion.

*bought what*. Therefore, it is simply not true that multiple *wh*-questions like *Who bought what?* cannot be answered by single-pair answers.

This is of course not to deny the validity of the above observation that *Who bought what?* is infelicitous in a situation like (24). Rather, I am simply contesting the interpretation of it that it is not compatible with single-pair answers. I would say that what this observation is showing us is that there are restrictions on how *who* and *what* are to be used. That is, at least in English, multiple *wh*-questions like *Who bought what?* *anti-presuppose* single-pair answers in the sense that they are infelicitous when it is presupposed in the utterance context that the true answer will be a single-pair answer.

I do not have anything insightful to say about why this might be so, but relevant facts should be re-examined in this light, including cross-linguistic variation (see Grebenyova 2004; Šimik 2010).

## 5.2 Single-pair readings in InqD

Although the target article does not discuss single-pair readings, its theory provides enough machinery to describe them. For instance, the single-pair reading of (22) can be represented in the intermediate language as (25).

$$(25) \quad \dagger \left( \begin{array}{l} [u_1]; \text{English}\{u_1\}; \text{author}\{u_1\}; \mathbf{atom}\{u_1\}; \\ [u_2]; \text{novel}\{u_2\}; \text{by}\{u_1, u_2\}; \mathbf{atom}\{u_2\}; \text{read}\{a, u_2\}; \\ \max^*\{u_1\}; \max^*\{u_2\}; \\ ?u_1; ?u_2 \end{array} \right)$$

What is crucially different here from pair-list readings is the final bit of the updates. Instead of requiring  $?u_1u_2$ , we have two separate occurrences of the  $?$ -operator. The sequence of updates in the argument of the  $\dagger$ -operator in (25) eliminates all those information states in the input context  $c$ , except those  $s \in c$  such that for each  $\langle w, G \rangle \in s$ , the following is the case.

1. There is an English author  $x$  in  $w$  and there is a novel  $y$  by  $x$  in  $w$  that Andy read in  $w$ .
2. There is exactly one English author in  $w$  whose novel or novels in  $w$  Andy read in  $w$ .
3. There is exactly one novel in  $w$  by an English author in  $w$  that Andy read in  $w$ .

Given the discussion of the preceding sections, we would like to bring in intentionality by having the discourse referents refer to skolemised individual concepts, instead of individuals, but let us not be concerned with this complication to keep the exposition simple. The important thing is that the theory is compatible with the existence of single-pair readings. However, this only answers part of the puzzle,

because what is not trivial is how to derive this reading compositionally and also to ensure that the single-pair reading is the only reading in certain constructions like nested *which*-phrases.

To complicate the issue further, we observe that nested multiple *wh*-phrases can give rise to pair-list readings with respect to other *wh*-phrases as in the following example.

- (26) Q: Which boy read which novel by which English author?  
 A: Andy read *Animal Farm* by George Orwell, Bob read *Bleak House* by Charles Dickens, and Chris read *Cold Comfort Farm* by Stella Gibbons.

To derive this reading under the target article's framework, we will need a representation like the following.

$$(27) \quad \dagger \left( \begin{array}{l} [u_1]; \text{boy}\{u_1\}; \mathbf{atom}\{u_1\}; \\ [u_2]; \text{English}\{u_2\}; \text{author}\{u_2\}; \mathbf{atom}\{u_2\}; \\ [u_3]; \text{novel}\{u_3\}; \text{by}\{u_2, u_3\}; \mathbf{atom}\{u_3\}; \text{read}\{u_1, u_3\}; \\ \max^*\{u_1\}; \max^*\{u_2\}; \max^*\{u_3\} \\ ?u_1u_2; ?u_1u_3 \end{array} \right)$$

Again, giving a translation in the intermediate language is one thing, and it is quite a different thing to derive it in a compositional manner, without overgenerating unattested readings.

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