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Why Short-form Functional Reading Answers are Not Possible in Multiple Wh-questions

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Abstract

This paper provides an account for the unavailability of short-form functional reading answers to multiple *wh*-questions, contrary to their availability with *wh*-questions with a quantifier. I propose that a question is interpreted as either a set of propositions or a single proposition and that the former admits long-form answers while the latter admits short-form answers. I also argue that the short-form answer is not just an elided form of the long-form answer, but rather is derived by a second Q-operator, Q2, which requires an individual in w' identical to an individual in w, contrary to the case of long-form answers. Importantly, I show the semantics of short-form answers (involving Q2) is not compatible with multiple *wh*-questions (because of a type mismatch), but is compatible with functional readings in *wh*-questions with a quantifier.

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Jungmin Kang[*]

1 Puzzle

As noted by Wachowicz (1974), Comorovski (1996), Dayal (2002), Bošković (2003) and many others, multiple *wh*-questions such as (1) admit a pair-list reading, as in (2).

(1) Which student turned in which paper?
(2) Mary turned in her syntax paper, John turned in his semantics paper,…

Wh-questions with a quantifier, as in (3), admit similar interpretations as the one in multiple *wh*-questions; thus the question in (3) admits the pair-list reading in (4a), as is the case in the multiple *wh*-question (1), in addition to the functional readings in (4b-c).

(3) Which professor does every student like?
(4) a. John likes Prof. Smith, Mary likes Prof. Brown,…   Pair-list reading answer (PL)
     b. Every student likes his advisor   Long-form functional reading answer (LFR)
     c. His advisor   Short-form functional reading answer (SFR)

It has often been argued that the pair-list reading in (4a) is not a reading in its own right but a special case of the functional reading in (4b) (cf. Engdahl 1986 and Chierchia 1991, 1993 among many others). Similarly, Dayal (1996, 2002) argues that the pair-list reading in multiple *wh*-questions, as in (2), is also interpreted as a functional reading, assuming Engdahl (1986) and Chierchia (1991, 1993).

If this is right, we expect that the multiple *wh*-question in (1) will admit a functional reading such as (4b), in addition to the pair-list reading, and this is in fact the case:

(5) Q: Which student turned in which paper?
     A: Every student turned in his paper.   (Comorovski 1996)

However, there is a restriction in multiple *wh*-questions in terms of the kind of functional reading answer that is available, which has gone unnoticed. Let's consider the contrast between (6b) and (6c). As an answer to the multiple *wh*-question in (6a), the long-form functional reading answer can be given (6b) while the short-form functional reading answer (6c) cannot.[1]

(6) a. Which student turned in which paper?
     b. Every student turned in his midterm paper.   LFR
     c. *His midterm paper.   SFR

The following illustrate the same point.[2]

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[1] The unavailability of the short-form functional reading answer to multiple *wh*-questions holds regardless of whether a language allows *wh*-movement (e.g., the English type, the Chinese type, and the French type (see Bošković 2002)).
[2] This puzzle appears unrelated to superiority effects and D-linking. In (i), which shows a superiority effect, the short form functional reading answer is not possible. Also, in (ii), with bare *wh*-phrases, the short form functional reading answer is disallowed.

(i) Q: Which paper did which student turn in?
     A1: Every student turned in his midterm paper.   LFR
     A2: *His midterm paper.   SFR

(7) a. Which philosopher likes which linguist?
     b. Every philosopher likes his rival linguist.   LFR
     c. *His rival linguist.   SFR
(8) a. Which student knows where Mary bought which book?
     b. Every student knows where Mary bought his linguistics book.   LFR
     c. *His linguistics book.   SFR
(9) a. Which linguist will be offended if we invite which philosopher?
     b. Every linguist will be offended if we invite his rival philosopher.   LFR
     c. *His rival philosopher.   SFR
(10) a. Which student believes that Mary read which book?
     b. Every student believes that Mary read his linguistics book.   LFR
     c. *His linguistics book.   SFR

One could conjecture that (6c) is ungrammatical since it does not give enough information to answer the question; the question includes two *wh*-phrases but the answer only gives information about one *wh*-phrase. As (11) shows, however, even when the answer provides information for both *wh*-phrases, (11b) is not acceptable.

(11) a. Which philosopher likes which linguist?
     b. *Every philosopher, his rival linguist.

Regarding the puzzle at hand, there seem to be two possible solutions: (i) the short answer is an elided form of the long answer, and the SFR in multiple *wh*-questions is not possible due to parallelism, following Merchant's (2004) ellipsis analysis; (ii) the short answer is not just an elided form of the long answer, but an answer in its own right (which, for some reason, is incompatible with multiple *wh*-questions). In this paper, I show that a Merchant-style ellipsis analysis is not sufficient to account for the unavailability of the short-form functional reading answer to multiple *wh*-questions. I pursue an analysis along the lines of (ii).

2 Problems with Merchant (2004)

According to Merchant (2004), the short-form functional reading answer in (12) is derived from the long form by eliding the TP that is parallel to the TP in the antecedent.

(12) Q: $[_{CP}$ Who$_1$ $[_{TP}$ does every philosopher like $t_1]]$
     A: $[_{FP}$ his rival linguist$_1[_{CP}$ $[_{TP}$ ~~every philosopher like t_1~~ $]]]$

    One possibility then is that the short-form functional reading answer cannot be produced in multiple *wh*-questions since it does not satisfy parallelism, as shown in (13).

(13) Q: $[_{CP}$ which philosopher$_1$ $[_{TP}$ t_1 likes which linguist$]]$
     A: *$[_{FP}$ His rival linguist$_2$ $[_{CP}$ $[_{TP}$ ~~every philosopher likes t_2~~ $]]]$

However, parallelism does not seem sufficient to account for the unavailability of the short-form functional reading answer. According to Merchant (2004), the multiple *wh*-question in (14) can have a short-form pair-list reading; however, Jacobson (2009) points out that multiple *wh*-questions do not generally produce a short-form pair-list reading. My consultants do not allow it either, as in (15). If we assume Merchant's judgments, we should expect the question in (15) to admit *every philosopher his rival linguist* as an answer, contrary to fact; there is no difference between (14) and (16) in terms of parallelism.

(ii) Q: Who turned in what?
      A1: Every student turned in his midterm paper.   LFR
      A2: *His midterm paper.   SFR

(14) Q: Which lawyer said he was representing which war criminal?
   [$_{CP}$ which lawyer$_1$ which war criminal$_2$ [$_{TP}$ t$_1$ said he was representing t$_2$]]
   A: [$_{FP}$ Cochran Milosevic$_1$, and Dershowitz Sharon$_2$ [$_{CP}$ [$_{TP}$ ~~t$_1$ said he was representing t$_2$~~]]]
(15) Q: Who likes whom?
   A: *Mary, John, Peter, Bill, …
(16) Q: Which philosopher likes which linguist?
   [$_{CP}$ which philosopher$_1$, which linguist$_2$ [$_{TP}$ t1 likes t2]]
   A: *[$_{FP}$ every philosopher$_1$, his rival linguist$_2$ [$_{CP}$ [$_{TP}$ ~~t1 likes t2~~]]]

Merchant's (2004) ellipsis analysis thus over-generates the availability of short form answers to multiple *wh*-questions.

3. Analysis

3.1 Proposal

In the literature, there are two approaches regarding the semantics of questions. The first one is that the meaning of a question is a set of propositions, suggested by Karttunen (1977), which we have already seen. On the other hand, Groenendijk and Stokhof (1982, 1984) argue that the meaning of a question is a single proposition. Under this approach, the answer to the question in (17a) is the proposition that the set of people who John loves is exactly what it is in the actual world. In other words, (17a) denotes the set of possible worlds w' such that the set of people who John loves in w' is the same as the set of people who John loves in w, as illustrated in (17b).

(17) a. Who does John love?
   b. λw' [{ x: John loves x in w'} = {x: John loves x in w}]

If we assume that the grammar has both the system proposed by Karttunen and the system proposed by Groenendijk and Stokhof, the meaning of a question can correspond to either a single proposition or a set of propositions. I suggest that this is in fact the case, and that long answers are derived from the questions whose meaning is a set of propositions, while short answers are derived from the questions whose meaning is a single proposition. Importantly, I show that the semantics of short-form answers is not compatible with multiple *wh*-questions while it is compatible with *wh*-questions with a quantifier, as shown in (18).

(18)

	Long-form Answers	Short-form Answers
The semantics of a question	Karttunen-style	Groenendijk and Stokhof - style
Multiple *wh*-questions	✓	*
Wh-questions with a quantifier	✓	✓

Specifically, I propose that short-form answers in *wh*-questions are derived by a Q-operator that selects two properties and requires an individual in w' that is identical to an individual in w; this is in contrast to the selection of a proposition, which is assumed for Q-operators under Karttunen's (1977) semantics for questions. Thus, I argue that there are two types of Q-operators, Q1 for long-form answers and Q2 for short-form answers, as illustrated in (19-20).[3]
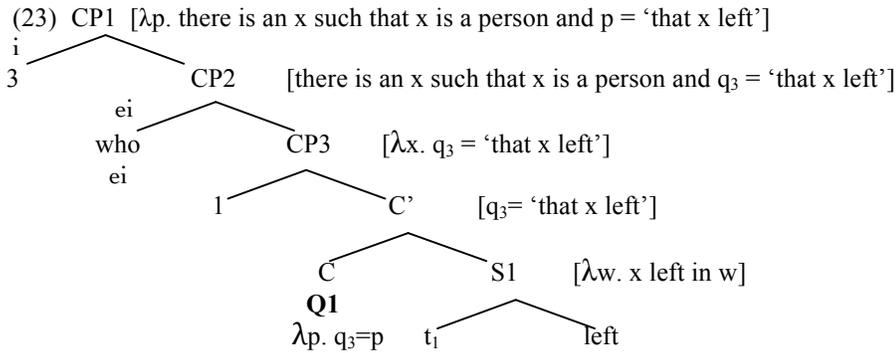
(19) $[\![Q1]\!] = \lambda p. q = p$

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[3] In (20), we could use Max or Iota; I use Iota for convenience. Type σ stands for any type.

(20) $[\![Q2]\!] = \lambda P1.\lambda P2.\lambda w'. \iota x_\sigma[P1(w')(x)\&P2(w')(x)] = \iota x_\sigma[P1(w)(x)\&P2(w)(x)]$

For example, the *wh*-question in (21a) admits both short-form and long-form answers. When the *wh*-question in (21a) admits a long-form answer, as in (21b), the meaning of the question is a set of propositions (following Karttunen 1977), as in (22).

(21) a. Who left?
     b. John left.   Long-form Answer
     c. John   Short-form Answer
(22) a. $\{p: \exists x [p = \text{'that x left'}]\}$
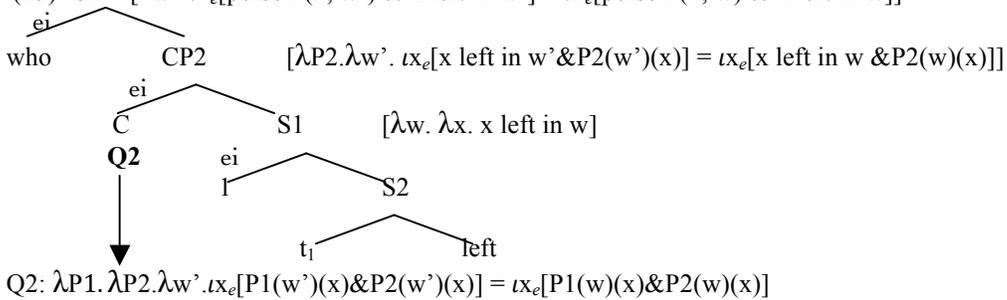   b. {'that John left', 'that Mary left,'…}

(23) shows the computation of the long form answer in (21b); following Heim and Kratzer (1998), I use Intensional Functional Application (IFA).

(23) CP1 [λp. there is an x such that x is a person and p = 'that x left']
  i
  3   CP2   [there is an x such that x is a person and q_3 = 'that x left']
      ei
     who   CP3   [λx. q_3 = 'that x left']
      ei
      1   C'   [q_3= 'that x left']
              C   S1   [λw. x left in w]
             Q1
          λp. q_3=p t_1 left

On the other hand, when (21a) produces the short-form answer, as in (21c), the meaning of the question is a proposition, as illustrated in (24). In other words, the answer to the question can be the proposition that the person who left in w' is exactly who it is in the actual world, i.e. the person who left is John. As for the short answer, however, I argue that we get the short-form answer *John* by eliding *the person who left is* in the answer.

(24) $\lambda w'. \iota x_e[\text{person} (x, w') \& x \text{ left in } w'] = \iota x_e[\text{person} (x, w) \& x \text{ left in } w]$
(25) CP1 [$\lambda w'. \iota x_e[\text{person} (x, w') \& x \text{ left in } w'] = \iota x_e[\text{person} (x, w) \& x \text{ left in } w]$]
  ei
who   CP2   [$\lambda P2.\lambda w'. \iota x_e[x \text{ left in } w'\&P2(w')(x)] = \iota x_e[x \text{ left in } w \&P2(w)(x)]$]
      ei
     C   S1   [$\lambda w. \lambda x$. x left in w]
   Q2 ei
         1   S2
             t_1 left
Q2: $\lambda P1. \lambda P2.\lambda w'.\iota x_e[P1(w')(x)\&P2(w')(x)] = \iota x_e[P1(w)(x)\&P2(w)(x)]$

(25) shows how the short-form answer is derived in the *wh*-question. Notice that in (25), the binding index gets inserted in a different place from that in (23). Under standard assumptions, this abstraction is motivated by movement and the binding indices get inserted just below the moved elements. This is the case in (23), but not in (25). As for the binding index in (25), I argue that Q2's (type) requirement allows us to insert indices below the Q-operator (Q2), similar to the case of IFA, which is motivated by type theory.

3.2 Discussion

Consider now the functional reading answers to *wh*-questions with a quantifier, as in (26).

(26) a. Who does every Italian male love?
    b. Every Italian male loves his mother.   LFR
    c. His mother.   SFR

I argue that Chierchia's semantics for the functional reading answers to *wh*-questions with a quantifier, which involves Q1, produces long-form functional reading answers as follows:

(27) a. Who does every Italian male love?
    b. p: $\exists$f [p ='that every Italian male$_x$ loves f(x)']}
    c. {'that every Italian male loves his mother', 'that every Italian male loves his father,'…}

Now, I apply Chierchia's functional reading to the proposed system (involving Q2 in (28b)) for short-form answers. This results in the semantics in (28a) for the short-form functional reading.[4] Again, from this computation we get the short-form functional reading answer *his mother* by eliding *the person who every Italian male loves is* in the answer.

(28) a. λw'. ιf[PERSON (f, w') & [every Italian male$_x$ loves f(x) in w']] = ιf[PERSON (f, w) & [every Italian male$_x$ loves f(x) in w]]
    b. λP1.λP2.λw'. ιf[P1(w')(f)&P2(w')(f)] = ιf[P1(w)(f)&P2(w)(f)]

Now let's turn to the puzzle of the unavailability of short-form functional answers to multiple *wh*-questions, as shown in (29).

(29) Q: Which philosopher likes which linguist?
    A: Every philosopher likes his rival linguist.   LFR
    A: *His rival linguist.   SFR

First, I assume Reinhart's (1997) choice function for the pair-list reading (functional reading) in multiple *wh*-questions, as in (30). However, I argue that this semantics only holds for the long-form answer, parallel to Chierchia's functional reading.[5] From this derivation of the pair-list reading, the speaker can construct functional reading answers such as *every philosopher likes his rival linguist*.

(30) a. [Which philosopher [t likes which linguist]]
    b. {p: $\exists$<x,f> [CH(f) & philosopher(x) & p = x likes f(linguist)]}
    c. {a likes b, c likes d, a likes d, c likes b,…}

As for the short-form functional reading answers, I apply Reinhart's semantics for the pair-list reading (the functional reading) in the multiple *wh*-question to the proposed system (with Q2)), as is the case of *wh*-questions with a quantifier.

Unlike the case of *wh*-questions with a quantifier however, this application does not work for the following reason. To produce the short-form functional reading answers, what Q2 needs to have from S1 is *[λw. λf. every philosopher$_x$ likes f(linguist$_x$) in w]*, as we have seen in the case of *wh*-questions with a quantifier. However, in this case what Q2 can get from S1, *[λw. λx. x likes f(linguist) in w]*, is a property of individuals rather than a property of functions, which means that it cannot yield a pair answer. This results in a type mismatch. The output of this application, the short-form functional reading answer, therefore cannot be a proper answer to the multiple *wh*-question, which accounts for the unavailability of short-form functional answers to multiple *wh*-questions.

One might point out the following alternative: to abstract over the 'f'-variable, in which case the complement of Q2 is λw.λf. x likes f(linguist)in w. However, this does not work for the follow-

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[4] PERSON(f) = for $\forall$x, f(x) is person.
[5] In (30), while *which philosopher* is an indefinite, $\exists$f is an unselective binder.

ing reasons: i) if the trace of *which philosopher* is unbound, the tree is excluded on syntactic grounds; ii) if the trace of *which philosopher* gets bound right below *which philosopher*, the tree is uninterpretable due to a type-mismatch.

To summarize, I have shown that the proposed semantics for short-form answers is compatible with *wh*-questions with a quantifier but not with multiple *wh*-questions. This straightforwardly captures the unavailability of the short-form functional reading answer to multiple *wh*-questions.

4. Conclusion

In this paper, I have proposed that a question is interpreted as either a set of propositions or a single proposition and that the former admits long-form answers while the latter admits short-form answers. I have also argued that the short-form answer is not just an elided form of the long-form answer, but rather is derived by a second Q-operator, Q2, which requires an individual in w' identical to an individual in w, contrary to the case of long-form answers. Importantly, I have shown how the proposed system accounts for the unavailability of short-form functional reading answers to multiple *wh*-questions. As we have seen, the semantics of short-form answers (involving Q2) is not compatible with multiple *wh*-questions (because of a type mismatch), but is compatible with functional readings in *wh*-questions with a quantifier.

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