Singular *which*, mention-some, and variable scope uniqueness

1. Introduction. We present data that we take to support the conclusion that the uniqueness presupposition of singular *which*-questions ([1],[5],[6]) is not triggered by an answer operator, as proposed in [1], but is instead triggered by *which* itself. The key observation is that uniqueness may be introduced at a low site, below where the answer operator necessarily takes scope. Our conclusion clears the way for an attractive analysis of mention-some questions, put forward in [2].

2. A strong answer operator. The literature on questions has put forward two conflicting proposals about the notion of a complete answer. Dayal's answer operator, ANS_D, presupposes that the answer set Q contains a true proposition which entails all other true propositions, i.e. a *greatest* true element by the entailment ordering ([1]; (i)a in Appendix A below). That element is the complete answer to the question. Dayal intended ANS_D to capture the uniqueness presupposition of singular *which*-questions like (1a), which presupposes that only one member resigned. Since *which member* ranges over atomic individuals, the elements of the answer set, (1b), are not related by entailment — and the presupposition of ANS_D can only be met if there is a unique true answer. For *who*-questions like (2a), the absence of a uniqueness presupposition is correctly predicted, too. Assuming that *who* rangers over atomic and plural entities, the answer set in (2b) is closed under conjunction, and the greatest true element will name all the (possibly multiple) members who resigned.

(1) a. Which member resigned?
b. {res(Ann), res(Ben)}

(2) a. Who resigned?
b. {res(Ann), res(Ben), res(Ann)∧res(Ben)}

3. A weaker answer operator. Fox observed that ANS_D cannot accommodate *mention-some* interpretations, on which questions lack a unique complete answer. On the most natural interpretation of (3a), responses like *Ann can* and *Ben can* are *both* judged to be possible complete true answers in a world where Ann and Bill are eligible chairs. In response, Fox weakens ANS ([2]; (i)b in Appendix A). ANS_F presupposes that the answer set contain *some* proposition that is true and not entailed by any other true proposition, and returns the set of *all* such propositions. Any proposition in the set output by ANS_F is a complete answer. We call these *maximal* true answers. When the answer set is not closed under conjunction, there may be multiple maximal true answers — and mention-some results. (3a) has the answer set in (3b) on one parse. Assuming the committee can have just one chair, only the first two answers in (3b) can be true. Since neither of them entails the other, both would be maximal true answers, so the set that ANS_F returns would contain both.

(3) a. Who can chair the committee?
b. {◇chair.com(Ann), ◇chair.com(Ben), ◇[chair.com(Ann)∧chair.com(Ben)]}

4. A dilemma. The two operators make opposite predictions for the same answer sets: if an answer set does not contain conjunctions of answers, ANS_D derives uniqueness, and ANS_F mention-some — and both predictions seem right for different data. On the one hand, only ANS_D captures the uniqueness presupposition of singular *which*-questions. For an answer set like (1b), ANS_F instead yields an unattested mention-some reading. On the other hand, only ANS_F permits mention-some in (3). In [3], Fox proposes to break the impasse by revising the theory of mention-some. (See [7] for a related proposal.) In contrast, new evidence from *which*-questions leads us to take a different route, and to argue that the uniqueness presupposition of such questions comes from a source separate from ANS.

5. "Low uniqueness". On the analysis of [1], the singular *which*-question in (4a) has the answer set in (4b). Since the propositions in this set are not related by entailment, ANS_D derives the presupposition that only one of these propositions is true, i.e., that there is only one letter that could be missing in *fo _ m* (in the sense, say, that its insertion would turn *fo _ m* into an existing English noun).

(4) a. Which letter could be missing in *fo _ m*?
b. {◇missing.in(a, *fo _ m*), …, ◇missing.in(z, *fo _ m*)}

Actual intuitions indicate, however, that (4a) need not be understood as carrying such a presupposition. In particular, a response like (5) contradicts the expected presupposition. Yet (5) is not actually perceived as introducing any contradiction. This is in notable contrast to a response like *both Ann and Ben* to the singular *which*-question (1a), where such contradiction is indeed perceived.

(5) It could be *a*, and it could be *r*.

Moreover, while (4a) in the relevant reading lacks the uniqueness presupposition that is derived by ANS_D, there is evidence that the question does carry a uniqueness presupposition, viz. the presupposition that only one letter is actually missing. This uniqueness presupposition is diagnosed by the infelicity of (6), which is intuited to stem from the fact that more than one letter is shown to be missing in *f _ _ m*.

(6) #Which letter could be missing in *f _ _ m*?

Apparently, then, (4a) need not be interpreted as "What is the (unique) letter than could be missing in *fo _ m*?", but can instead mean "What could be the (unique) letter that is missing in *fo _ m*?". Since in the latter paraphrase, the uniqueness presupposition's content is confined to the scope of *could*, we refer to the relevant reading of (4a) as instantiating "low uniqueness". While (4a) is a constructed example, Appendix B provides naturally occurring examples that confirm the existence of low uniqueness. As further evidence, we add that *which*-phrases containing numerals, which also introduce uniqueness presuppositions ([5],[7]), allow for low uniqueness as well. This is illustrated by the observation that (7a) allows for a non-contradictory response of the form in (7b), in conjunction with the observation that (8) is judged infelicitous.

(7) a. Which two letters could be missing in *f _ _ m*?
b. It could be *i* and *l*, it could be *i* and *r*, it could be *o* and *a*, and it could be *o* and *r*.

(8) #Which two letters could be missing in *_ _ _ m*?

6. The dilemma resolved. Since ANS_D applies to the question as a whole, the content of the uniqueness presupposition it triggers must include the modal's contribution in cases like (4a). With the modal escaping the content of the uniqueness presupposition, low uniqueness is beyond the reach of ANS_D. Uniqueness must therefore be contributed by a scope-bearing element within the question, which can scope below the modal. The notion of answerhood is thus relieved from the burden of having to derive uniqueness presuppositions in *which*-questions, removing the obstacle to adopting ANS_F as the source of mention-some.

7. A new path to uniqueness. We hypothesize that *which* itself triggers the uniqueness presupposition, and, as a proof of concept, propose the following. *Which* is what [4] calls a *parametrized determiner*: applied to an individual, its denotation returns a function from two properties to a proposition; so the *which*-phrase denotes a generalized quantifier and hence can undergo quantifier raising; *which* underlyingly combines with the covert question-forming operator *Q*, which extracts from the *which*-phrase to take widest scope, leaving behind an individual-type trace that serves as *which*'s parameter argument. The question in (4a) will then allow for a logical form like the one sketched in (9), where the *which*-phrase scopes below *could*.

(9) **low uniqueness**
Q λ_1[could [[which t_1] letter] λ_2[t_2 missing]]
'what could be the letter that is missing?'

(10) **high uniqueness**
Q λ_1[[which t_1] letter] λ_2[could [t_2 missing]]
'what is the letter that could be missing?'

This logical form delivers the intended low uniqueness interpretation if *which* is assigned the particular parameterized determiner denotation in (11). According to (11), *which* triggers a uniqueness presupposition; in (9), that a unique letter is missing. Assuming that this presupposition projects past *could*, it will be carried by each answer, hence by the question as a whole, capturing the low uniqueness.

(11) $[\![\text{which}]\!] = \lambda x_e.\ \lambda f_{e(st)}.\ \lambda g_{e(st)}.\ \lambda w_s\text{: } \exists!y[f(y)(w) \wedge g(y)(w)].\ x = \iota y[f(y)(w) \wedge g(y)(w)]$

In addition to (9), (4a) is expected to allow for a logical form like (10), where the *which*-phrase outscopes *could*. This analysis predicts a "high uniqueness" reading that is similar to the interpretation derived with ANS_D. Cases like (4a) indeed seem to allow for such a reading as well, as is suggested by the coherence of texts like in (12), where speaker A states explicitly that the low presupposition is not satisfied.

(12) A: There may not be any letter missing in *tad*. But if one is missing, there is only one possibility.
B: Which letter could be missing?

8. Conclusion. Through novel observations about scope, we have argued that the source of uniqueness presuppositions with singular *which* must be separate from the answer operator. This in turn makes it possible to maintain Fox's operator ANS_F as an account of mention-some.

Appendix A: two answer operators

(i) a. $\text{ANS}_\text{D} = \lambda Q.\lambda w$: $\exists p[p(w) \wedge p \in Q \wedge \forall q[q(w) \wedge q \in Q \rightarrow p \subseteq q]\ ].$
$\iota p[p(w) \wedge p \in Q \wedge \forall q[q(w) \wedge q \in Q \rightarrow p \subseteq q]\ ]$ (Dayal 1996)

b. $\text{ANS}_\text{F} = \lambda Q.\lambda w$: $\exists p[p(w) \wedge p \in Q \wedge \neg\exists q[q(w) \wedge q \in Q \wedge q \subset p]\ ].$
$\{p \mid p(w) \wedge p \in Q \wedge \neg\exists q[q(w) \wedge q \in Q \wedge q \subset p]\}$ (Fox 2013)

Appendix B: attested (Googled) examples of low uniqueness

(ii) a. Which team could win the Stanley Cup next year? There are multiple answers and ...

b. Besides Ronaldo and Messi, which player could win the Ballon D'or? ... Neymar going by the records will be the first one to strike anyone's mind. In the current crop, two other names based on current form that deserves mentions are Harry Kane and Eden Hazard.

References

[1] Dayal, Veneeta. 1996. *Locality in Wh Quantification*. Dordrecht: Kluwer.

[2] Fox, Danny. 2013. Mention some readings. Lecture notes, Massachusetts Institute of Technology, February 2013.

[3] Fox, Danny. 2018. Partition by exhaustification: Comments on Dayal 1996. In *Proceedings of Sinn und Bedeutung 22*, ed. Uli Sauerland and Stephanie Solt, volume 2 of *ZASPiL 61*, 403–434. Berlin: Leibniz-Centre General Linguistics.

[4] Hackl, Martin. 2000. Comparative quantifiers. Doctoral Dissertation, Massachusetts Institute of Technology.

[5] Higginbotham, James. 1993. Interrogatives. In *The View from Building 20*, ed. Kenneth Hale and Jay Keyser. Cambride, MA: MIT Press.

[6] Higginbotham, James, and Robert May. 1981. Questions, quantifiers and crossing. *The Linguistic Review* 1:41–80.

[7] Xiang, Yimei. 2016. Interpreting questions with non-exhaustive answers. Doctoral Dissertation, Doctoral Dissertation, Harvard University.