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Lexically triggered uniqueness in *wh*-questions: An argument from Brazilian Portuguese*

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Abstract Recent discussion on the source of uniqueness in English singular *which*-questions has debated whether this is due to a general requirement for questions to have a maximally informative true answer (Dayal 1996), or whether uniqueness is lexically triggered by *which* (Hirsch & Schwarz 2020). We show that Brazilian Portuguese has two kinds of singular *which*-queestions, only one of which presupposes uniqueness. We argue that the distinction between these two kinds of questions is best accounted for under a lexical approach to uniqueness.

Keywords: *wh*-interrogatives, uniqueness, higher-order quantification, Brazilian Portuguese

1 Introduction

An English question of the form '[which NP_{SG}] φ' gives rise to a uniqueness presupposition: it is only felicitous if there is a unique individual that is in both the denotations of NP_{SG} and φ. For example, the question in (1) presupposes that a unique student arrived, which is why it doesn't admit *plural answers* like (1b), i.e. answers that name a plural individual.

(1) Which student arrived late? $\rightsquigarrow$ *a unique student arrived*

a. Alex.

b. # Alex and Barb.

The present paper is concerned with the source of this uniqueness presupposition. The standard account is due to Dayal (1996), who proposes that uniqueness arises through the interaction of the meaning of singular *which*-questions and a general requirement that questions have a true answer that entails all other true answers. Recently, however, this proposal has been challenged by Hirsch & Schwarz (2020), who argue instead that the trigger of uniqueness is located in the *wh*-phrase itself (see also Uegaki 2021).

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We compare these two approaches by examining the presuppositions of Brazilian Portuguese (BrP) questions with singular *wh*-phrases. The crucial data come from the distinction between two kinds of *wh*-questions: those with the *wh*-phrase [*que* NP_{SG}] and those with the *wh*-phrase [*qual* NP_{SG}]. These questions differ in an important way: only those with *qual* trigger a uniqueness inference. We argue that for this contrast to be captured, we need to adopt a proposal in the spirit of Hirsch & Schwarz (2020) where the source of uniqueness is the actual *wh*-item. The BrP data can then be easily accounted for: *qual* but not *que* triggers uniqueness.

This paper is structured as follows. In §2, we compare the proposals of Dayal (1996) and Hirsch & Schwarz (2020). In §3, we present the BrP contrast between *que*- and *qual*-questions and show how it can be naturally accounted for if uniqueness is lexically triggered, as proposed by Hirsch & Schwarz. §4 explores two moves that can be made in order to preserve Dayal's account of this presupposition, but argues that a lexical trigger is still required. §5 concludes with remarks on English *which*.

2 Two accounts of the uniqueness presupposition of singular *which*-questions

2.1 Dayal (1996): the Maximal Informativity Principle

Dayal's (1996) account of the uniqueness presupposition of singular *which*-questions relies on the interaction of three assumptions: (i) singular noun phrases denote predicates of singularities; (ii) *wh*-phrases denote existential quantifiers that range over individuals; and (iii) questions must have a maximally informative true answer. This third assumption is Dayal's key innovation. We review each of these assumptions in turn.

First, we present what Dayal takes to be the basic meaning of singular *which*-questions. As in Hamblin (1973), questions are taken to denote the set of their answers. These sets are often referred to as *Hamblin sets*. We take the LF of a question like (2a) to be the one in (2b) (we adopt the compositional analysis of Heim 2018, itself based upon Karttunen 1977).

(2) a. Which student arrived?

b. λ_p which student λ_x [$C_?$ p] [x arrived]

The interrogative complementizer $C_?$ has the meaning in (3): it is responsible for turning propositions into sets of propositions (the type of Hamblin sets).

(3) $[\![C_?]\!] = \lambda p_{st} \lambda q_{st}.\ p = q$

As per assumptions (i) and (ii), *student* denotes a predicate true of student singularities and *which* denotes an existential quantifier that ranges over individuals.

(4) a. $[\![\text{student}]\!] = \lambda x_e.\ \textbf{student}(x)$
b. $[\![\text{which}]\!] = \lambda P_{et} \lambda Q_{et}.\ \exists x[P(x) \wedge Q(x)]$

The LF in (2b) is thus interpreted as in (5). To ease readability, we suppress intensional details. For example, '$\textbf{arrived}(x)$' is shorthand for '$\lambda w.\ \textbf{arrived}_w(x)$'.

(5) $[\![(2b)]\!] = \lambda p.\ [\![\text{which student}]\!](\lambda x.\ [\![\text{C}_?]\!](p)([\![x \text{ arrived}]\!])))$
$= \lambda p.\ \exists x[\textbf{student}(x) \wedge p = \textbf{arrived}(x)]$
$= \{\ \textbf{arrived}(x) \mid \textbf{student}(x)\ \}$

Dayal proposes the existence of a general constraint on the interpretation of questions, which we call the *Maximal Informativity Principle*:

(6) *Maximal Informativity Principle* (MIP)
A questions Q is only felicitously uttered if in all worlds w in the context set it has a maximally informative true answer, i.e. a true answer in w that entails all other true answers in w.

Dayal encodes the MIP as a presupposition in the semantics of a silent answerhood operator ANS_D, under which questions are always assumed to scope. We define ANS_D in (7).[1] In this entry, the MIP is defined in a different but equivalent way: $\text{ANS}_D(\mathcal{Q})$ is defined only if the conjunction of all of its true answers is itself a member of $\mathcal{Q}$.

(7) $$[\![\text{ANS}_D]\!](\mathcal{Q}_{(st)t}) = \begin{cases} \bigwedge\{\ p \mid p \wedge p \in \mathcal{Q}\ \} & \text{if } \bigwedge\{\ p \mid p \wedge p \in \mathcal{Q}\ \} \in \mathcal{Q} \\ \# & \text{otherwise} \end{cases}$$

The MIP is general: it applies to *all* questions. Crucially, when it applies to the denotation of a singular *which*-question, it gives rise to a uniqueness presupposition. This is due to the fact that the answers to a singular *which*-question are all logically independent. To see this, consider the set of propositions in (8), which corresponds to the Hamblin set of the question '*Which student arrived?*' when the students are Ann (**a**) and Barb (**b**). Neither of these propositions entails the other, and, as a consequence, whenever more than one of these is true in some world w, the set of true answers in w will lack a maximally informative member.

(8) $\{\ \textbf{arrive}(\textbf{a}), \textbf{arrive}(\textbf{b})\}$

To see this, consider the case where Ann but not Barb arrived. In such a context, the presupposition of ANS_D would be satisfied: the conjunction of all true answers is just the proposition that Ann arrived, and this proposition is a member of (8).

1 In the definition of ANS_D (and also in subsequent definitions), we use the propositional variable p to also represent its extension. We hope this too eases readability.

(9) *Scenario*: Ann is the only student that arrived.
$\bigwedge\{\ p \mid p \wedge p \in (8)\ \} = \textbf{arrived}(\textbf{a})$

Now, suppose that both Ann and Barb arrived. In this case, the presupposition of ANS_D would not be satisfied: as shown in (10), the coordination of all true answers of (8) is the proposition 'that Ann and Barb arrived', which is not a member of (8). Equivalently, the presupposition of ANS_D is not satisfied because there is no true answer in (8) that entails all other true answers.

(10) *Scenario*: Both Ann and Barb arrived.
$\bigwedge\{\ p \mid p \wedge p \in (8)\ \} = \textbf{arrived}(\textbf{a}) \cap \textbf{arrived}(\textbf{b})$

We thus get uniqueness at the level of answers: a singular *which*-question is predicted to presuppose that it has a unique true answer.

(11) $[\![\text{ANS}_D]\!]([\![\text{which student arrived?}]\!]) \neq \#$
only if $\exists! p[p \wedge p \in [\![\text{which student arrived late?}]\!]]$

2.2 Hirsch & Schwarz (2020): Lexically triggered uniqueness

Contra Dayal, Hirsch & Schwarz (2020) propose that the source of uniqueness is *which* itself (see also Uegaki 2021). This idea is not too surprising given that similarities between *which* and definite descriptions have been previously pointed out (Rullmann & Beck 1998; Heim 1987). Within this proposal, a singular *which*-question like (12a) is assigned the denotation in (12b): a set of propositions of the form '$x = \textbf{the}(\textbf{student} \cap \textbf{arrived})$' where x is an individual. In order to make salient the connection between the presupposition of *which* and the definite article, we make use of the notation defined in (13).

(12) a. Which student arrived?
b. $[\![(12a)]\!] = \{\ (x = \textbf{the}(\textbf{student} \cap \textbf{arrived})) \mid x \in D\ \}$

(13) $\textbf{the}(P) =_{\text{def}} \iota x[P(x)]$

In this proposal, we do not need an answerhood operator to have Dayal's presupposition, since uniqueness is already present in the meaning of each answer.[2] It is straightforward to see why. In a scenario where only one student arrived, there will be a unique proposition in (12b) that is true. If, however, more than one student has arrived, the question will have no true answers, since all answers will be undefined.

2 Hirsch & Schwarz's analysis does have an answerhood operator – the one proposed in Fox (2013). They do so because they are interested in mention-some readings of questions. In this paper we are not concerned with such readings and will thus assume a different answerhood operator.

Our compositional implementation of Hirsch & Schwarz differs from theirs in that, rather than decomposing *which* syntactically, we make use of higher-order traces to reconstruct the uniqueness associated with *which* into the question nucleus (see Cresti 1995 and Rullmann 1995 for how higher-order traces can be used for reconstruction). We assume that the LF of (12a) is the one in (14), where a trace π of type of $(et)t$ is left in the question nucleus.

(14) λ_p which student λ_π [? p] [π λ_x x arrived]

The meaning of *which* is given in (15) and in (16) we show how the LF in (14) is assigned the desired denotation.

(15) $[\![\text{which}]\!] = \lambda P_{et} \lambda \mathscr{P}_{((et)t)t}.\ \exists x[\mathscr{P}(\lambda Q_{et}.\ x = \mathbf{the}(P \cap Q))]$

(16) $[\![(14)]\!] = \lambda p.\ [\![\text{which student}]\!](\lambda \pi_{(et)t}.\ [\![\text{C}_?]\!](p)(\pi(\lambda u.\ [\![\text{arrived}]\!](u))))$
$= \lambda p.\ \exists x[p = [\lambda Q_{et}.\ x = \mathbf{the}(\mathbf{student} \cap Q)](\lambda u.\ \mathbf{arrived}(u))]$
$= \lambda p.\ \exists x[p = (x = \mathbf{the}(\mathbf{student} \cap \mathbf{arrived}))]$
$= \{\ x = \mathbf{the}(\mathbf{student} \cap \mathbf{arrived}) \mid x \in D\ \}$

Differently from Dayal's proposal, Hirsch & Schwarz's is not general: the above is strictly an analysis of the presuppositions of singular *which*-questions. For example, Dayal's proposal can also straightforwardly account for the presuppositions of alternative questions; but within a lexically driven view of uniqueness, more would have to be said about the presuppositions of this type of questions.

3 Brazilian Portuguese *que* and *qual* and lexically triggered uniqueness

BrP has two types of singular complex *wh*-phrases: those headed by *que* and those headed by *qual*. As can be seen in the examples in (17) and (18), questions with *que* NP_{SG} and those with *qual* NP_{SG} differ in an important way: only the former questions admit plural answers.[3]

(17) <u>Que</u> aluno chegou atrasado?
QUE student arrived late
'Which student arrived late?'
a. Alex.
b. Alex and Barb.

(18) <u>Qual</u> aluno chegou atrasado?
QUAL student arrived late
'Which student arrived late?'
a. Alex.
b. # Alex and Barb.

3 There seem to be some speakers that do not have a contrast between *que* and *qual* questions. For them, both kinds of questions admit plural answers. This does not, however, weaken the argument we make in the text, as it relies on the fact that we can find across languages questions with singular complex *wh*-phrases that do not admit plural answers but also questions that do admit them.

These data are particularly interesting to the debate on the source of uniqueness in singular *wh*-interrogatives, since they seem to strongly suggest that the presence of this presupposition is correlated with the *wh*-item itself. We now show how Hirsch & Schwarz's (2020) proposal can be easily extended to account for this contrast.

Within this approach, *qual*-questions could receive the same kind of analysis as English *which*-questions. We can take *qual* to have the same denotation as *which*, as in (19), and *qual*-questions would be analyzed as in (20). Uniqueness is then expected to be derived from the lexical properties of *qual* itself.

(19) $[\![\text{qual}]\!] = [\![\text{which}]\!] = \lambda P_{et} \lambda \mathscr{P}_{((et)t)t} .\ \exists x[\mathscr{P}(\lambda Q_{et} .\ x = \textbf{the}(P \cap Q))]$

(20) a. *Qual* student arrived?

b. λ_p *qual* student λ_π [$C_?$ p] [π λ_x x arrived]

c. $\{\ (x = \textbf{the}(\textbf{arrived} \cap \textbf{student}))\ |\ x \in D\ \}$

Since *que*-questions do not presuppose uniqueness, we can simply analyze them as denoting regular existential quantifiers, as in (21). The analysis of *que*-questions, then, will look exactly like the analysis of *which*-questions in Dayal (1996). Since there is no MIP in this approach to uniqueness, we don't expect *que*-questions to trigger any uniqueness presupposition.

(21) $[\![\text{que}]\!] = \lambda P_{et} \lambda Q_{et} .\ \exists x[P(x) \wedge Q(x)]$

(22) a. *Que* aluno arrived?

b. λ_p *que* student λ_x [? p] [x arrived]

c. $\{\ \textbf{arrived}(x)\ |\ \textbf{student}(x)\ \}$

One puzzle remains, however. The question denotation in (22c) only contains singular answers – so why do these questions admit plural answers? This property of *que*-questions is not restricted to matrix questions. The sentences in (23), where a *que*-question is embedded under the verb *saber* 'know' show that, if both Ana and Bia are the students that arrived, knowing the answer to the question '*que* student arrived?' involves knowing its plural answer.

(23) *Context*: Ana and Bia arrived.

a. Eu sei [que aluno chegou]: a Ana e a Bia.
I know QUE student arrived the Ana and the Bia
'I know *que* students arrived: Ana and Bia.'

b. # Eu sei [que aluno chegou]: a Ana.
I know QUE student arrived the Ana
'I know *que* students arrived: Ana.'

We can capture the availability of plural answers to *que*-questions by assuming a variant of the answerhood operator proposed in Heim (1994) with an existence presupposition. We call this operator $\textsc{Ans}_H$ and it is defined in (24): $\textsc{Ans}_H$ takes a question as an argument and returns the conjunction of all its true answers.

(24) $$[\![\textsc{Ans}_H]\!](\mathscr{Q}_{(st)t}) = \begin{cases} \bigwedge\{\, p \mid p \wedge p \in \mathscr{Q} \,\} & \{\, p \mid p \wedge p \in \mathscr{Q} \,\} \neq \emptyset \\ \# & \text{otherwise} \end{cases}$$

Although *que*-questions themselves only contain singular answers, in circumstances in which more than one of those answers is true, $\textsc{Ans}_H$ will output the conjunction of all true answers.

(25) *Scenario*: Ann and Barb arrived.
$[\![\textsc{Ans}_H]\!]((22c)) = \textbf{arrived}(\textbf{a}) \wedge \textbf{arrived}(\textbf{b})$

Finally, we note that we still account for the uniqueness presuppositions of *qual*-questions. If there is a world in the context in which more than one student arrived, then none of the answers will be true in that world and $\textsc{Ans}_H(\mathscr{Q})$ will not be defined in that world. We assume that for a question to be satisfied in a context, $\textsc{Ans}_H$ must be defined in every world in that context.

4 Plural answers with the MIP

As previously mentioned, Dayal (1996) obtains uniqueness with singular *which*-questions through the interaction of three components - (i) singular nouns denote predicates of singularities, (ii) *wh*-phrases are existential quantifiers over individuals, and (iii) interrogatives must satisfy the MIP. We have shown that singular *que*- and *qual*-questions can be distinguished if we abandon (iii) and assume that the *qual*, but not *que*, triggers a uniqueness presupposition.

In this section, we will explore two ways *que*-questions could be distinguished from their *qual* counterparts while maintaining the MIP. The first, discussed in §4.1, involves abandoning (i) and allowing the restrictor of *que* to range over both singularities and pluralities in spite of its singular number. We argue against this position by showing that this incorrectly predicts that *que*-phrases can combine with collective predicates.

The second way of maintaining the MIP, which we discuss in §4.2, is to abandon (ii) and allow *que*-phrases, but not *qual*-phrases, to quantify over higher-typed variables. We show that if *que*-phrases have in their domain the generalized conjunctions of individuals, *que*-questions will admit plural answers (Elliott, Nicolae & Sauerland 2020; Xiang 2016, 2021). We argue that both types of *wh*-phrases are in fact able to quantify over higher-typed variables, and that distinguishing the two still requires assuming that *qual* but not *que* triggers a uniqueness presupposition.

4.1 Can the restrictor of *que* be number neutral?

One way of distinguishing *que*-interrogatives from their *qual* counterparts while maintaining the MIP is to abandon the idea that the restrictor of [que NP_{SG}] is a predicate of singularities. In other words, while morphosyntactically singular, the restrictor of a singular *que*-phrase - but not a *qual*-phrase - could be semantically number neutral. If we assume *que student* denotes the generalized quantifier in (26), we derive the Hamblin set in (27).

(26) $[\![\text{que student}]\!] = \lambda P_{et}.\ \exists x[{}^{*}\textbf{student}(x) \wedge P(x)]$

(27) $[\![\textit{que}\text{ student arrived?}]\!] = \{\ \textbf{arrived}(x) \mid {}^{*}\textbf{student}(x)\ \}$
$= \{\ \textbf{arrived}(\textbf{a}), \textbf{arrived}(\textbf{b}), \textbf{arrived}(\textbf{a} \sqcup \textbf{b})\}$

Because the predicate *arrive* is distributive, the set in (27) is closed under conjunction. Because of this, it is no longer the case that only one of its members can be true in order to satisfy the MIP. The closure of this set under conjunction ensures that the set will contain the conjunction of all true answers, provided there is at least one true answer.

(28) **Closure of a set under conjunction :** A set of propositions A is closed under conjunction iff for any $p, q \in A$, $p \wedge q \in A$

This proposal is appealing given that BrP does have singular nouns that are semantically number neutral: bare singulars seem to have pluralities in their denotation (Schmitt & Munn 1999). For example, the sentence in (29) is compatible with the speaker having bought multiple magazines even though the noun *revista* 'magazine' is morphologically singular. While *que*-phrases are not bare, it could be assumed that *que* but not *qual* can combine with such semantically number neutral singular nouns.

(29) Eu comprei revista.
I bought magazine.SG
'I bought one or more magazines.'

This analysis faces some immediate challenges, however. If the restrictor of *que* were number neutral, we would expect *que* NP_{SG} to combine with collective predicates. As shown in (30), this prediction is not borne out. We thus conclude that treating the restrictor of *que* as a number neutral noun is not tenable.

(30) * Que aluno se beijou?
QUE student.SG RECIPROCAL kissed
Intended: 'Which students kissed (each other)?'

We end this subsection by pointing out that the analysis proposed in the previous section is in fact able to account for the above data. Because plural answers are obtained via the conjunction of all true answers, it follows that such answers should always be distributive.

4.2 Letting *que*-phrases range over higher-order traces

4.2.1 Generalized conjunctions and plural answers

Another way of distinguishing *que*-phrases from *qual*-phrases is to assume that the former, but not latter, can quantify over higher-typed variables. As already stated, if *que* denotes an existential quantifier ranging over individuals, than the interrogative in (31a) denotes the Hamblin set in (31b). There is no way to assume this interrogative falls within the scope of $\textsc{Ans}_D$ without triggering a uniqueness presupposition. This is because the members of (31b) are logically independent from one another, which guarantees that at most one can be the maximally informative true member of the set.

(31) a. *Que* student arrived?
b. $\{\,\mathbf{arrived}(x) \mid \mathbf{student}(x)\}$

As discussed for the case of bare interrogatives such as *who* (Elliott et al. 2020), this uniqueness presupposition can be avoided if we assumed that *que student* has the ability to scope over generalized conjunctions (GCs) of students (Xiang 2021). Supposing we had the lexical entry for *que* in (32), the LF in (33a) would denote the Hamblin set in (33b).

(32) $[\![\text{que}_{\mathfrak{C}}]\!] = \lambda P_{et}\lambda \mathscr{P}_{((et)t)t}.\ \exists \pi \in \mathfrak{C}(P)[\mathscr{P}(\pi)]$,
where for any P_{et}, $\mathfrak{C}(P) = \{\lambda Q_{et}.\ \bigwedge_{x\in X}\ Q(x) \mid X \subseteq P\}$

(33) a. λ_p $\text{que}_{\mathfrak{C}}$ student [λ_π [$\text{C}_?$ p] [π [λ_x [x arrived]]]]
b. $\{\bigwedge_{x\in X}\ \mathbf{arrive}(x) \mid X \subseteq \mathbf{student}\}$

The set in (33b) is closed under conjunction, ensuring it contains a maximally informative true answer. This set is equivalent to (34), with the proposition "$\mathbf{arrive}(\mathbf{a}) \wedge \mathbf{arrive}(\mathbf{b})$" being maximally informative if both **a** and **b** arrived.

(34) $$\left\{\begin{array}{l}\mathbf{arrive}(\mathbf{a}),\\ \mathbf{arrive}(\mathbf{b}),\\ \mathbf{arrive}(\mathbf{a}) \wedge \mathbf{arrive}(\mathbf{b})\end{array}\right\}$$

We see that if *que*-phrases were to quantify over generalized conjunctions of individuals, interrogatives formed from them would not presuppose uniqueness, even assuming the MIP, because the maximally informative true answer in any such set will simply be the conjunction of all true answers. A natural explanation for the difference between *que*- and *qual*-phrases would then be that only the former is capable of this kind of higher-order quantification, whereas the latter is only capable of quantification over individuals.

4.2.2 *Qual* can range over higher-order variables

Independent evidence for the fact that *que*-phrases can range over higher-order variables comes from the availability of complete disjunctive answers to questions with possibility modals (Spector 2007, 2008; Xiang 2021; Hirsch & Schwarz 2020). The question in (35a) can be answered with (35b), which carries a free choice inference - we can use *Heim & Krazter* and we can use *Meaning and Grammar*.

(35) a. Que livro a gente pode usar (pra essa aula)?
QUE book we can use for this class
'Which book can we use for this class?'

b. *Heim & Krazter* or *Meaning and Grammar*.
$\rightsquigarrow$ *We can use "Heim & Kratzer"*
$\rightsquigarrow$ *We can use "Meaning and Grammar"*

This is surprising if *que*-phrases range only over individuals of type *e*. Assuming the MIP, the set in (36) would presuppose that there is only one book we can use. This is inconsistent with the free choice inference derived from (35b).

(36) $\{\Diamond\ \textbf{we-use}(x) \mid \textbf{book}(x)\}$

Two assumptions can account for this fact. The first is that *que*-phrases can range over generalized disjunctions (GDs) of individuals (Spector 2007, 2008), as in (37).

(37) $[\![\text{que}_{\mathfrak{D}}]\!] = \lambda P_{et} \lambda \mathscr{P}_{((et)t)t}.\ \exists \pi \in \mathfrak{D}(P)[\mathscr{P}(\pi)]$,
where for any P_{et}, $\mathfrak{D}(P) = \{\lambda Q_{et}.\ \bigvee_{x \in X} Q(x) \mid X \subseteq P\}$

The second assumption involves a means of strengthening disjunctive answers into conjunctions. This can be done by assuming the presence of an exhautification operator EXH in the scope of the interrogative (Fox 2007)[4]. Following Bar-Lev & Fox (2020), we assume that this operator takes a prejacent proposition *p* and a set of alternatives *C*, negating all the innocently excludable alternatives to *p* and asserting alternatives which aren't innocently excludable.[5]

4 Fox (2007) assumes a recursive application of EXH, which our definition of the operator does not require.

5 This is a simplification of Bar-Lev & Fox (2020), who assume that EXH asserts the propositions in the intersection of all maximal sets of propositions which can be consistently asserted with the negations of the innocently excludable alternatives.

(38) $[\![\text{EXH}_C]\!] = \lambda p_{st}.\ \forall q[q \leftrightarrow \neg\mathbf{IE}(q,p,C)]$,
where $\mathbf{IE}(q,p,C) = 1$ iff
$q \in \bigcap\{C' \mid C'$ is a maximal subset of C s.t. $\{\neg r \mid r \in C'\} \cup \{p\}$ is consistent$\}$

Assuming the set of books is restricted to **h** and **m**, the LF in (39a) - where the higher-order trace scopes below the modal - denotes the set in (39b).

(39) a. λ_p que$_{\mathfrak{D}}$ book λ_π [[$\text{C}_?$ p] EXH_C can π λ_x we use x]

b. $$\left\{\begin{array}{l} [\![\text{EXH}_C]\!](\Diamond\ \mathbf{we\text{-}use}(\mathbf{h})), \\ [\![\text{EXH}_C]\!](\Diamond\ \mathbf{we\text{-}use}(\mathbf{m})), \\ [\![\text{EXH}_C]\!](\Diamond\ (\mathbf{we\text{-}use}(\mathbf{h}) \vee \mathbf{we\text{-}use}(\mathbf{m}))) \end{array}\right\}$$

If we take the value of C to be the set in (40), (39b) becomes equivalent to (41), with the disjunctive answer in (39b) being equivalent to the conjunction "$\Diamond\ \mathbf{we\text{-}use}(\mathbf{h}) \wedge \Diamond\ \mathbf{we\text{-}use}(\mathbf{m}) \wedge \neg\Diamond\ (\mathbf{we\text{-}use}(\mathbf{h}) \wedge \mathbf{we\text{-}use}(\mathbf{m}))$". We therefore see that a disjunctive answer can be the maximally informative true answer to a modalized question, in which case a free choice inference is generated.

(40) $$C = \left\{\begin{array}{l} \Diamond\ \mathbf{we\text{-}use}(\mathbf{h}), \\ \Diamond\ \mathbf{we\text{-}use}(\mathbf{m}), \\ \Diamond\ (\mathbf{we\text{-}use}(\mathbf{h}) \wedge \mathbf{we\text{-}use}(\mathbf{m})), \\ \Diamond\ (\mathbf{we\text{-}use}(\mathbf{h}) \vee \mathbf{we\text{-}use}(\mathbf{m})) \end{array}\right\}$$

(41) $$\left\{\begin{array}{l} \Diamond\ \mathbf{we\text{-}use}(\mathbf{h}) \wedge \neg\Diamond\ \mathbf{we\text{-}use}(\mathbf{m}), \\ \Diamond\ \mathbf{we\text{-}use}(\mathbf{m}) \wedge \neg\Diamond\ \mathbf{we\text{-}use}(\mathbf{h}), \\ \Diamond\ \mathbf{we\text{-}use}(\mathbf{h}) \wedge \Diamond\ \mathbf{we\text{-}use}(\mathbf{m}) \wedge \neg\Diamond\ (\mathbf{we\text{-}use}(\mathbf{h}) \wedge \mathbf{we\text{-}use}(\mathbf{m})) \end{array}\right\}$$

This very line of reasoning in favor of allowing *que*-phrases to range over GDs applies wholesale to *qual*-phrases. The question in (42a) can be given the disjunctive answer in (42b), which like in the case of (35a) gives rise to a free choice inference. This argues against distinguishing *que*- and *qual*-phrases in terms of their ability to range over higher-order traces. If both are capable of ranging over GDs, why not GCs? In §4.2.3 we show that, once again, distinguishing both items in terms of a lexical trigger for uniqueness will correctly cover the empirical landscape.

(42) a. Qual livro a gente pode usar (pra essa aula)?
QUAL book we can use for this class
'Which book can we use for this class?'

b. *Heim & Krazter* or *Meaning and Grammar*.

4.2.3 Blocking plural answers with *qual*

How then do we prevent *qual*-phrases from ranging over GCs but not GDs? The distinguishing factor between *que* and *qual* can once again be presented in terms of lexically triggered uniqueness. For any P, let $\mathfrak{G}(P) = \mathfrak{C}(P) \cup \mathfrak{D}(P)$. We can define *que* and *qual* as (43) and (44), where only the latter triggers uniqueness.

(43) $[\![\text{que}_{\mathfrak{G}}]\!] = \lambda P_{et} \lambda \mathscr{P}_{((et)t)t}.\ \exists \pi \in \mathfrak{G}(P)[\mathscr{P}(\pi)]$

(44) $[\![\text{qual}_{\mathfrak{G}}]\!] = \lambda P_{et} \lambda \mathscr{P}_{((et)t)t}.\ \exists \pi \in \mathfrak{G}(P)[\mathscr{P}(\lambda Q_{et}.\ \pi(\lambda x_e.\ x = \mathbf{the}(P \cap Q)))]$

Let us first see how this can account for why *que*-interrogatives admit plural answers while *qual*-interrogatives do not. The interrogative in (45a) can be given the LF in (45b).

(45) a. Que student arrived?
b. λ_p $\text{que}_{\mathfrak{G}}$ student λ_π [[$C_?$ p] π λ_x x arrived]

The set of answers this LF denotes is in (46), which is closed under conjunction.[6] This means that the maximally informative true member in the set, provided there is one, is the conjunction of all true members. Plural answers are correctly predicted to be available while disjunctive answers are predicted to be unavailable because when true, they will always be properly entailed by some other true answer. They can therefore never satisfy the MIP.

(46) $$\left\{\begin{array}{l} \mathbf{arrive}(\mathbf{a}), \\ \mathbf{arrive}(\mathbf{b}), \\ \mathbf{arrive}(\mathbf{a}) \wedge \mathbf{arrive}(\mathbf{b}), \\ \mathbf{arrive}(\mathbf{a}) \vee \mathbf{arrive}(\mathbf{b} \end{array}\right\}$$

Things are different, however, for the *qual*-interrogative. Assuming the LF in (47b) for (47a), we obtain the set of answers in (48). While the set is closed under conjunction, the conjunction of any two propositions is contradictory, and thus can never satisfy the MIP (Xiang 2021). This correctly predicts the unavailability of plural answers with *qual*-interrogatives, as only singular answer can satisfy the MIP.

6 This would not be true if the domain of students were not restricted to just **a** and **b**. For instance, if this domain were $\{\mathbf{a}, \mathbf{b}, \mathbf{c}, \mathbf{d}\}$, the denotation of (45b) would contain the propositions of the form "$\mathbf{arrive}(\mathbf{a}) \vee \mathbf{arrive}(\mathbf{b})$" and "$\mathbf{arrive}(\mathbf{c}) \vee \mathbf{arrive}(\mathbf{d})$", but not their conjunction. However, such answers can never be the maximally informative true members of the Hamblin set because when true, they are always entailed by another true answer. What we can say is that the set of answers that could satisfy the MIP is closed under conjunction.

(47) a. Qual student arrived?

b. λ_p qual$_{\mathfrak{G}}$ student λ_π [[$C_?$ p] π λ_x x arrived]

(48) $$\left\{\begin{array}{l} \mathbf{a} = \mathbf{the}(\mathbf{student} \cap \mathbf{arrive}), \\ \mathbf{b} = \mathbf{the}(\mathbf{student} \cap \mathbf{arrive}), \\ \mathbf{a} = \mathbf{the}(\mathbf{student} \cap \mathbf{arrive}) \wedge \mathbf{b} = \mathbf{the}(\mathbf{student} \cap \mathbf{arrive}), \\ \mathbf{a} = \mathbf{the}(\mathbf{student} \cap \mathbf{arrive}) \vee \mathbf{b} = \mathbf{the}(\mathbf{student} \cap \mathbf{arrive}) \end{array}\right\}$$

On the other hand, both *que*- and *qual*-interrogatives will admit disjunctive answers. This is straightforward for *que*-interrogatives, as we've already seen in 4.2.2. Things are not much more complicated with *qual*. The question in (49a) can be given the LF in (49b), which itself denotes the set of answers in (50).[7]

(49) a. Qual book can we use?

b. λ_p qual$_{\mathfrak{G}}$ book λ_π [[$C_?$ p] EXH_C can π λ_x we use x]

(50) $$\left\{\begin{array}{l} [\![\text{EXH}_C]\!](\Diamond\ \mathbf{h} = \mathbf{the}(\mathbf{book} \cap \mathbf{we\text{-}use})), \\ [\![\text{EXH}_C]\!](\Diamond\ \mathbf{m} = \mathbf{the}(\mathbf{book} \cap \mathbf{we\text{-}use})), \\ [\![\text{EXH}_C]\!](\Diamond\ \mathbf{h} = \mathbf{the}(\mathbf{book} \cap \mathbf{we\text{-}use} \wedge \mathbf{h} = \mathbf{the}(\mathbf{book} \cap \mathbf{we\text{-}use})), \\ [\![\text{EXH}_C]\!](\Diamond\ \mathbf{h} = \mathbf{the}(\mathbf{book} \cap \mathbf{we\text{-}use} \vee \mathbf{h} = \mathbf{the}(\mathbf{book} \cap \mathbf{we\text{-}use})) \end{array}\right\}$$

While the conjunctive answer in this set is contradictory, the disjunctive answers is strengthened into the wide-scope conjunction in (51), which can be maximally informative. We thus do not expect plural answers, but correctly predict complete disjunctive answers with free choice inferences with modals.

(51) $\Diamond\mathbf{h} = \mathbf{the}(\mathbf{book} \cap \mathbf{we\text{-}use}) \wedge \Diamond\mathbf{m} = \mathbf{the}(\mathbf{book} \cap \mathbf{we\text{-}use})$

5 Conclusion

In this paper, we have argued that the distinction in the admittance of plural answers for *que*- and *qual*-interrogatives is best captured in terms of lexically triggered uniqueness. We have shown that even if we were to maintain the MIP and derive plural answers with *que*-phrases by allowing them to quantify over generalized conjunctions, explaining why this move is unavailable for *qual*-phrases requires

7 Here, we assume C to denote the set of alternatives in (i).

(i) $$C = \left\{\begin{array}{l} \Diamond\ \mathbf{h} = \mathbf{the}(\mathbf{book} \cap \mathbf{we\text{-}use}), \\ \Diamond\ \mathbf{m} = \mathbf{the}(\mathbf{book} \cap \mathbf{we\text{-}use}), \\ \Diamond\ \mathbf{h} = \mathbf{the}(\mathbf{book} \cap \mathbf{we\text{-}use} \wedge \mathbf{h} = \mathbf{the}(\mathbf{book} \cap \mathbf{we\text{-}use}), \\ \Diamond\ \mathbf{h} = \mathbf{the}(\mathbf{book} \cap \mathbf{we\text{-}use} \vee \mathbf{h} = \mathbf{the}(\mathbf{book} \cap \mathbf{we\text{-}use}) \end{array}\right\}$$

assuming lexical uniqueness in addition to the MIP. In fact, independent arguments have been made in favor of pairing lexical triggers for uniqueness with a general principle for ensuring question have a maximally informative true member (Kobayashi & Rouillard 2021).

While the focus of this paper has been capturing the distinction between *que*- and *qual*-interrogatives, it is interesting to see that some of the arguments we have presented apply to *which* in English. Much like *que* and *qual*, an interrogative formed with *which* does seem able to range over generalized disjunctions of individuals, as illustrated by the fact that (52b) can be a complete answer to (52a) carrying a free choice inference.

(52) a. Which book can we use (for this class)?
b. *Heim and Kratzer* or *Meaning and Grammar*.
c. #*Heim and Kratzer* and *Meaning and Grammar*.

The fact that the plural answer in (52c) is unavailable can be captured if we assume that in spite of ranging over higher-typed variables, *which* is itself a trigger for uniqueness. This lends strength to Hirsch & Schwarz's view that English *which*, much like BrP *qual*, triggers a uniqueness presupposition.

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