Spanish Bare Interrogatives and Number*

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Abstract

Dayal (1996) makes two predictions on the interaction of number and *wh*-phrases: (i) that questions with singular *wh*-phrases yield a uniqueness inference, and (ii) that those with plural *wh*-phrases yield an antiuniqueness inference. Maldonado (2020) shows that Spanish bare *wh*-phrases do not conform to Dayal's predictions. From this, she argues against a unified treatment of number across *wh*-expressions. Elliott et al. (2022) argue that a unified treatment of number can be maintained if bare *wh*-phrases are capable of ranging over generalized quantifiers. We weigh in on this discussion by arguing for an intermediate position: though independent evidence suggests that *wh*-phrases can range over generalized quantifiers, an assumption that we adopt for bare *wh*-phrases, the unified treatment of number presented in Elliott et al. (2022) faces challenges that can be avoided under Maldonado's assumption about number marking on bare *wh*-phrases.

1 Introduction

English complex *wh*-phrases consist of a *wh*-word and an NP whose head inflects for number. This head noun's number affects a question's answerhood conditions: (1) shows that a question with a singular complex *wh*-phrase allows for only fragment answers that name atomic individuals. We refer to answers like (1a) as *singular answers*, and those like (1b) as *plural answers*. The examples in (2) show that questions with plural complex *wh*-phrases allow only for plural answers.

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(1) Which student is leaving?
   a. ✓ Ana.
   b. # Ana and Blas.

(2) Which students are leaving?
   a. # Ana.
   b. ✓ Ana and Blas.

Simplex *wh*-phrases consist only of a bare interrogative (word) with no complement NP. While bare interrogatives in English lead to singular agreement on the verb, questions like (3a) admit both singular and plural answers.[1]

(3) a. Who {is*are} leaving?
   b. ✓ Ana. \ ✓ Ana and Blas.

To capture the paradigm above, Dayal (1996) proposed what became a very influential analysis of how number in *wh*-phrases determines the answerhood conditions of questions.

A new paradigm emerges in languages where bare interrogatives inflect for number, like Spanish (Maldonado, 2020), Greek, Hungarian (Elliott et al., 2022) or Farsi. In those languages, questions with plural bare interrogatives demand plural answers, but their singular counterparts admit both singular and plural answers, as shown for Spanish in (4) and (5).

(4) a. ¿Quién**es** marcharon?
   who.PL left.PL
   b. # Ana. \ ✓ Ana y Blas.

(5) a. ¿Quién marchó?
   who.SG left.SG
   b. ✓ Ana. \ ✓ Ana y Blas.

Two recent contributions to the *Journal of Semantics* discuss the theoretical significance of the paradigm in (4)-(5). Maldonado (2020) shows that it poses challenges to Dayal's analysis, and argues against a uniform semantics for number across complex and simplex *wh*-phrases. In response, Elliott & Sauerland (2019) and Elliott et al. (2022) argue that number features can be interpreted uniformally across *wh*-phrases, provided bare interrogatives range over generalized quantifiers (GQs). We take stock of the debate. §2 lays out the challenges that Spanish bare interrogatives pose for Dayal's theory. §3 presents Maldonado's proposal, and shows that it inherits problems from Dayal's. §4 shows that these problems are solved if, like Elliott et al. propose, bare interrogatives range over GQs. In §5, we nevertheless argue against Elliott et al.'s attempt at a unified treatment of number. §6 concludes with a summary and two issues left unresolved.

2 The puzzle

Dayal (1996) derives from three assumptions the ban on plural answers for singular *which*-questions:

(i) Quantification over individuals. *Wh*-phrases range over entities, as in (6).

[1] Bare interrogatives can in some environments be accompanied by plural agreement on the verb. This is the case, for instance, when *who* appears in the context of a postcopular plural definite description, as in (i).

(i) Who {*is\are} the new students?

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

(ii) Strong singular. Singular *wh*-phrases range over atomic individuals.

(7) $[\![\text{student.SG}_{\text{strong}}]\!]^w = \lambda x\colon \mathsf{atom}(x).\ *\mathsf{student}_w(x)$

(iii) Maximal informativity. A question denotes the set of its possible answers, i.e. its *Hamblin set* (Hamblin, 1973). Hamblin sets must include a maximally informative true member.

We assume for (8a) the LF in (8b).[2] ANS is base generated as the sister of the complementizer ?, defined in (8c), and moves to the edge of the LF (Fox, 2012), binding t_1. ③ denotes the (characteristic function of the) Hamblin set in (8d). ANS is defined for a Hamblin set only if this set contains a maximally informative true member q, as in (8e). When defined, ANS outputs q.[3]

(8) a. Which student left?
b. ANS [③ λ_1 [which student.SG$_{\text{strong}}$] λ_2 [② ? $t_{1,st}$] [① $t_{2,e}$ left]]
c. $[\![?]\!] = \lambda p_{st}.\lambda q_{st}.\ p = q$
d. $\{\lambda v.\ *\mathsf{left}_v(x) \mid \mathsf{atom}(x) \wedge *\mathsf{student}_w(x)\}$
e. $[\![\text{ANS}]\!]^w = \lambda \mathcal{Q}_{(st)t}\colon \text{MAX}_{\subseteq}(\{p \mid w \in p \in \mathcal{Q}\}) \neq \emptyset$. the $q \in \text{MAX}_{\subseteq}(\{p \mid w \in p \in \mathcal{Q}\})$ where $p \in \text{MAX}_{\subseteq}(\mathcal{Q})$ iff $p \in \mathcal{Q} \wedge \forall q \in \mathcal{Q}[p \subseteq q]$

A set of propositions $\mathcal{Q}$ has a maximally informative member only in case it includes the conjunction of its members ($\bigwedge \mathcal{Q}$).[4] If (8d) has two or more true members, e.g. those in (9a), the condition fails: $\bigwedge\{*\mathsf{left(a)}, *\mathsf{left(b)}\} \notin \{*\mathsf{left(a)}, *\mathsf{left(b)}\}$.[5] If it has one, e.g. (9b)'s sole member, it doesn't: $\bigwedge\{*\mathsf{left(a)}\} \in \{*\mathsf{left(a)}\}$. (8a) thus carries the uniqueness presupposition in (10).[6]

(9) a. $\{*\mathsf{left(a)}, *\mathsf{left(b)}\}$ b. $\{*\mathsf{left(a)}\}$

(10) $[\![(8b)]\!]^w$ is defined only if $\exists! x[*\mathsf{student}_w(x) \wedge *\mathsf{left}_w(x)]$

The ban on singular answers to plural *which*-questions follows from two further assumptions:

(iv) Weak plural. The plural in a *wh*-phrase restricts it to atomic and non-atomic individuals.[7]

[2] We depart from Dayal in details of implementation, with a more modern Hamblin-Karttunen semantics (Hamblin, 1973; Karttunen, 1977). Nodes ② and ① combine via *Intensional Function Application* (Heim & Kratzer, 1998).

[3] Maximally informative propositions are unique: if $p \in \text{MAX}_{\subseteq}(\mathcal{Q})$ and $q \in \text{MAX}_{\subseteq}(\mathcal{Q})$, $p \subseteq q$ and $q \subseteq p$, so $p = q$.

[4] Proof: [←] if $\bigwedge \mathcal{Q} \in \mathcal{Q}$, then $\bigwedge \mathcal{Q} \in \text{MAX}_{\subseteq}(\mathcal{Q})$, since for any $q \in \mathcal{Q}$, $\bigwedge \mathcal{Q} \subseteq q$. [→] Suppose $p \in \text{MAX}_{\subseteq}(\mathcal{Q})$. Since $p \in \mathcal{Q}$, then $\bigwedge \mathcal{Q} \subseteq p$. Since for any $q \in \mathcal{Q}$, $p \subseteq q$, then $p \subseteq \bigwedge \mathcal{Q}$. Therefore, $p = \bigwedge \mathcal{Q}$.

[5] We assume a and b are the atomic students.'$*\mathsf{left(a)}$' is shorthand for '$\lambda v.\ *\mathsf{left}_v(\mathsf{a})$'.

[6] The *extension* of a question is an answer, its *intension* a function from a world w to the maximally informative true answer in w. This intension can split a context set $\mathcal{C}$ into a set of equivalence classes: $\{p \cap \mathcal{C} : \exists v \in \mathcal{C}\ [\lambda u.\ [\![\text{ANS}(\mathcal{Q})]\!]^u(v)] = p\}$. We assume that a question is only felicitous if this set partitions $\mathcal{C}$. That won't be the case if there is a $v \in \mathcal{C}$ where the question intension is undefined, since the generalized union of the set won't be $\mathcal{C}$.

[7] Evidence for a weak plural in non-interrogative environments comes from downward entailing contexts (see, e.g., Sauerland 2003, Sauerland et al. 2005, Spector 2007a and Zweig 2009). If the bare plural ranged over non-atomic individuals only, *The inspector didn't see mice* would be true if the inspector saw one mouse, contrary to intuitions.

(11) $[\![\text{students.PL}_{\text{weak}}]\!]^w = \lambda x.\ *\mathsf{student}_w(x)$

(v) Singular / plural competition. Plural questions are not defined if a singular alternative is.

Take the LF of (12a) in (12b): ④ denotes the Hamblin set in (12c). If both a and b left, the set of true members of (12c) is just that set. By the equivalence of $*\mathsf{left}(\mathsf{a}\oplus\mathsf{b})$ and $*\mathsf{left}(\mathsf{a})\wedge *\mathsf{left}(\mathsf{b})$, it follows that $\bigwedge\{*\mathsf{left}(\mathsf{a}), *\mathsf{left}(\mathsf{b}), *\mathsf{left}(\mathsf{a}\oplus\mathsf{b})\} \in \{*\mathsf{left}(\mathsf{a}), *\mathsf{left}(\mathsf{b}), *\mathsf{left}(\mathsf{a}\oplus\mathsf{b})\}$. ANS is therefore defined in this scenario. For reasons we have already seen, ANS is also defined if just one student left. (12a) thus has the existence presupposition in (13): that at least one student left.

(12) a. Which students left?
b. ANS [$_{④}$ λ_1 [which student.PL$_{\text{weak}}$] λ_2 [? t_1] t_2 left]
c. $\{*\mathsf{left}(\mathsf{a}), *\mathsf{left}(\mathsf{b}), *\mathsf{left}(\mathsf{a}\oplus\mathsf{b})\}$

(13) $[\![(12b)]\!]^w$ is defined only if $\exists x[*\mathsf{student}_w(x)\wedge *\mathsf{left}_w(x)]$

Whenever singular *which*-questions are defined, so are their plural counterparts. In such contexts, both questions are semantically equivalent: they denote the same one true proposition in their Hamblin sets. We assume that this equivalence results in a competition that favors the singular: plural questions can only be used when their singular counterparts are undefined (Heim, 1990; Sauerland, 2008; Maldonado, 2020; Elliott et al., 2022). This requirement can be implemented via the operator EXH$_{\text{p}}$, which strengthens presuppositions (Marty, 2017; Magri, 2009; Elliott & Sauerland, 2019).[8] If the only alternative to a plural question is its singular counterpart, it will presuppose antiuniqueness, as in (15).

(14) $[\![\text{EXH}_{\text{p}}\ \phi]\!]^w$ is defined only if for all $\psi \in \text{ALT}(\phi)$ s.t. $\text{dom}(\lambda v.[\![\psi]\!]^v) \subset \text{dom}(\lambda v.[\![\phi]\!]^v)$, $[\![\psi]\!]^w$ is not defined. When defined, $[\![\text{EXH}_{\text{p}}\ \phi]\!]^w = [\![\phi]\!]^w$

(15) $[\![\text{EXH}_{\text{p}}$ (12b)$]\!]^w$ is defined only if $\exists x,y[x\neq y\wedge *\mathsf{student}_w(x\oplus y)\wedge *\mathsf{left}_w(x\oplus y)]$

We saw that English *who*-questions allow for both singular and plural answers. Dayal assumes that despite the singular agreement on the main verb, *who* is in fact number neutral. Like a plural complex interrogative, *who* ranges over both atomic and non-atomic individuals. This means that *who*-questions convey an existence presupposition, like plural *which*-questions do. Because *who*-questions lack an alternative that presupposes uniqueness, they do not convey antiuniqueness, though.

Similar to *who*-questions, Spanish *quién*-questions admit both singular and plural answers, as seen in (16). *Quiénes*-questions, in contrast, admit only plural answers, as (17) shows.

(16) a. ¿Quién marchó?
who.SG left.SG
b. ✓ Ana. / ✓ Ana y Blas.

(17) a. ¿Quién**es** marcharon?
who.PL left.PL
b. # Ana. / ✓ Ana y Blas.

[8] This departs from Dayal. To derive antiuniqueness, Dayal 1996 invokes an implicature. In Dayal 2016 (46,48), plural questions directly presuppose that at least one *plural* proposition in its Hamblin set is true.

Maldonado (2020) shows how the pattern in (16)-(17) challenges the generality of Dayal's assumptions. Suppose that, in analogy with *which* phrases, *quién* ranged over atomic individuals and *quiénes* over atomic and non-atomic individuals, as in (18). While the competition between *quién* and *quiénes* questions would derive the antiuniqueness of the former, *quién*-questions would presuppose uniqueness, counter to fact.[9]

(18) a. $[\![\text{quién}_{\text{strong}}]\!]^w = \lambda Q_{et}.\ \exists x[\mathcal{A}(*\mathsf{human}_w)(x) \wedge Q(x)]$
b. $[\![\text{quiénes}_{\text{weak}}]\!]^w = \lambda Q_{et}.\ \exists x[*\mathsf{human}_w(x) \wedge Q(x)]$

This problem is easily solved if, like *who*, *quién* were number neutral and ranged over both atomic and non-atomic individuals. This assumption would correctly predict the availability of singular and plural answers to *quién*-questions, however, it would render *quién* and *quiénes* questions equivalent. It would thus fail to derive the antiuniqueness of the *quiénes*-questions.

We are left with two puzzles. (i) Why don't singular bare interrogatives convey uniqueness, and (ii) why do plural bare interrogatives convey antiuniqueness? In §3, we lay out the basics of the solution proposed in Maldonado 2020 to these two puzzles and point out some of its shortcomings.

3 A weak singular and strong plural analysis

Maldonado (2020) abandons two of Dayal's assumptions. First, she abandons the Strong Singular assumption, allowing *quién* to range over atomic and non-atomic individuals. She also abandons the Weak Plural assumption, restricting *quiénes* to non-atomic individuals.[10]

(19) a. $[\![\text{quién}_{\text{weak}}]\!]^w = \lambda Q_{et}.\ \exists x[*\mathsf{human}_w(x) \wedge Q(x)]$
b. $[\![\text{quiénes}_{\text{strong}}]\!]^w = \lambda Q_{et}.\ \exists x[\mathcal{N}(*\mathsf{human}_w)(x) \wedge Q(x)]$

Her proposal predicts the lack of uniqueness of *quién*-questions while still getting the antiuniqueness for *quiénes*-questions. The Hamblin set of a *quién*-question contains both singular and plural answers, as illustrated by (20). The question thus triggers a mere existence presupposition.

(20) $[\![\lambda_1\ \text{quién}_{\text{weak}}\ \lambda_2\ [\ ?\ t_{1,st}\ ]\ t_{2,e}\ \text{left}\ ]\!]^w = \{\lambda v.\ *\mathsf{left}_v(x) \mid *\mathsf{human}_w(x)\}$

The antiuniqueness of plural bare interrogatives is derived without competition, because the Hamblin sets of *quiénes*-questions contain only plural answers, as (21) illustrates.

(21) $[\![\lambda_1\ \text{quiénes}_{\text{strong}}\ \lambda_2\ [\ ?\ t_{1,st}\ ]\ t_{2,e}\ \text{left}\ ]\!]^w = \{\lambda v.\ *\mathsf{left}_v(x) \mid \mathcal{N}(*\mathsf{human}_w)(x)\}$

Note that, under this proposal, EXH_{p} cannot be obligatory with *quién*-questions, which would otherwise convey uniqueness. Maldonado must thus also abandon the obligatoriness of Dayal's singular/plural competition.[11]

[9] Notation: For any P_{et}, $\mathcal{A}(P) = [\lambda x\colon \mathsf{atom}(x).\ P(x)]$

[10] Notation: For any P_{et}, $\mathcal{N}(P) = [\lambda x\colon \neg\mathsf{atom}(x).\ P(x)]$

[11] Maldonado (2020) shows that *quién* questions are compatible with scenarios where antiuniqueness is not common

As elegant as Maldonado's proposal is, it inherits from Dayal a challenge of overgeneration and one of undergeneration, which we discuss next.

3.1 An overgeneration challenge

Maldonado inherits from Dayal the overgeneration of uniqueness inferences first noted in Xiang (2016). As shown in (22), plural bare interrogatives can combine with collective predicates.

(22) a. ¿Quién**es** forman un comité?
who.PL form.PL a committee
b. ¿Quién**es** rodearon el edificio?
who.PL surrounded.PL the building
c. ¿Quién**es** se reúnen en la cafetería?
who.PL RFXV meet.PL in the cafeteria

These questions can receive answers that assert that more than one group satisfies the question nucleus. For instance, the question in (22a) can receive answers like (23a) or (23b). Both answers can be interpreted as saying that two groups form a different committee.

(23) a. Ana y Blas, y Carlos y Dana.
Ana and Blas, and Carlos and Dana
b. Los estudiante de primer año y los estudiantes de segundo año.
the students of first year and the students of second year
'The first year students and the second year students.'

Maldonado's proposal does not predict this interpretation for the answers in (23). Assuming that *form a committee* denotes (24), the sister of ANS in (25a) will denote the set in (25b).

(24) $[\![\text{form a committee}]\!]^w = \lambda x\colon \neg\mathsf{atom}(x).\ *\mathsf{form\text{-}a\text{-}committee}_w(x)$

(25) a. ANS λ_1 quiénes$_{\text{strong}}$ λ_2 [? $t_{1,st}$] $t_{2,e}$ form a committee
b. $\{\lambda v.*\mathsf{form\text{-}a\text{-}committee}_v(x) \mid \mathcal{N}(*\mathsf{human}_w)(x)\}$

If only one group of people form a committee, a single member of (25b) would be true and ANS's presupposition would be satisfied. But suppose two groups form different committees: Ana and Blas form a committee, and Carlos and Dana form another. The true members of (25b) would be in (26a). $*\mathsf{f}(\mathsf{a}\oplus\mathsf{b}\oplus\mathsf{c}\oplus\mathsf{d})$ is not equivalent to $*\mathsf{f}(\mathsf{a}\oplus\mathsf{b})\wedge *\mathsf{f}(\mathsf{c}\oplus\mathsf{d})$, since the former proposition is true, for instance, in a world where a and c form a committee and b and c too, where the latter proposition can be false. The set in (26a) does not include the conjunction of all its members, and so is not in the domain of ANS. The uniqueness presupposition in (26b) is predicted for (25a).

(26) a. $\{*\mathsf{f}(\mathsf{a}\oplus\mathsf{b}), *\mathsf{f}(\mathsf{c}\oplus\mathsf{d}), *\mathsf{f}(\mathsf{a}\oplus\mathsf{b}\oplus\mathsf{c}\oplus\mathsf{d})\}$

ground, but it is simply a live possibility, and with scenarios where uniqueness is common ground. As she discusses, this is expected if *quién*- and *quiénes*-questions compete pragmatically.

b. $[\![(25a)]\!]^w$ is defined only if $\exists!x[*\mathsf{human}_w(x) \wedge *\mathsf{form\text{-}a\text{-}committee}_w(x)]$

3.2 An undergeneration challenge

Spector (2007b) and Spector (2008) show that *which*-questions with universal modals admit complete disjunctive answers that convey free choice. The observation extends to bare interrogatives:

(27) a. ¿Con quién tienes que hablar?
with whom.SG have-to.2SG que speak?
'With whom do you have to speak?'

b. Con Ana o con Blas y Carlos.
with Ana or with Blas and Carlos
⇝ you can talk to just Ana.
⇝ you can talk to just Blas and Carlos.

(28) a. ¿Con quién**es** tienes que hablar?
with whom.PL have-to.2SG que speak?
'With whom do you have to speak?'

b. Con Ana y Blas o con Carlos y David.
with Ana and Blas or with Carlos and David
⇝ you can talk to just Ana and Blas.
⇝ you can talk to just Carlos and David.

The Hamblin sets that Maldonado's proposal derives for (27a) and (28b) are (29a) and (29b).[12] The first only has a maximally informative member if there is at least one specific person the addresse must talk to. The second only does if there is a specific group they must talk to. These presuppositions are incompatible with the free choice inferences of (27b) and (28b).

(29) a. $\{\lambda_v.\Box^u_v * \mathsf{you\text{-}talk\text{-}to}_u(x) \mid *\mathsf{human}(x)\}$
b. $\{\lambda_v.\Box^u_v * \mathsf{you\text{-}talk\text{-}to}_u(\mathsf{addr}, x) \mid \mathcal{N}(*\mathsf{human})(x)\}$

4 Meeting the challenges: Higher-order quantification

The observation that *quiénes*-questions should presuppose uniqueness with collective predicates parallels Xiang's (2016) observation that so should *which*-questions. In both cases, the problem stems from the fact that the members of a set like (25b) are logically independent of each other. Suppose that this set were instead closed under conjunction, as in (30).

(30) $\{\bigwedge \mathcal{Q}' : \mathcal{Q}' \subseteq (25b) \wedge \mathcal{Q}' \neq \emptyset\}$

If a and b form a committee and c and d form another, the true members of (30) are in (31). This set contains the conjunction of its members and is therefore in the domain of ANS.

[12] '$\Box^u_v\phi$' is shorthand for $\forall u[\text{accessible-from}(u, v) \rightarrow \phi(u)]$.

(31) $\{*\mathsf{f}(\mathsf{a}\oplus\mathsf{b}), *\mathsf{f}(\mathsf{c}\oplus\mathsf{d}), *\mathsf{f}(\mathsf{a}\oplus\mathsf{b})\wedge *\mathsf{f}(\mathsf{c}\oplus\mathsf{d})\}$

We follow Xiang's lead and abandon Dayal's Quantification over individuals. Like Xiang does for *which*-questions, we assume that Spanish bare interrogatives range over GQs, in particular over conjunctions (universal quantifiers ranging over sets of individuals). With Maldonado, we assume that the singular form is weak, in that it ranges over conjunctions formed out of atomic and non-atomic individuals, and the plural form is strong, ranging only over conjunctions of non-atomic individuals.

(32) For any P_{et}, $\mathcal{G}^{\wedge}(P) = \{\lambda Q_{et}.\ \forall x \in X[Q(x)] \mid X \neq \emptyset \wedge X \subseteq P\}$

(33) a. $[\![\text{quién}^{\wedge}_{\text{weak}}]\!]^w = \lambda\mathcal{P}_{((et)t)t}.\ \exists\mathcal{Q}\in\mathcal{G}^{\wedge}(*\mathsf{human}_w)[\mathcal{P}(\mathcal{Q})]$
b. $[\![\text{quiénes}^{\wedge}_{\text{strong}}]\!]^w = \lambda\mathcal{P}_{((et)t)t}.\ \exists\mathcal{Q}\in\mathcal{G}^{\wedge}(\mathcal{N}(*\mathsf{human}_w))[\mathcal{P}(\mathcal{Q})]$

We assume that the LF in (34) is available for (22a). In line with assumptions made by Elliott et al. (2022), we take *quiénes* to move, leaving behind a trace of type $(et)t$ that also moves, leaving behind a trace of type e on its turn. This analysis unlocks new readings for questions containing collective predicates, but makes the same predictions for questions with distributive predicates, since the Hamblin sets of those questions were already closed under conjunction.

(34) ANS λ_1 quiénes$^{\wedge}_{\text{strong}}$ λ_2 [? $t_{1,st}$] $t_{2,(et)t}$ λ_3 $t_{3,e}$ form a committee

Independently of Xiang's proposal, Spector (2007b, 2008) noted that the undergeneration problem that disjunctive answers pose for *which*-phrases can be solved by assuming that *which*-phrases range over disjunctions of individuals.

(35) For any P_{et}, $\mathcal{G}^{\wedge\vee}(P) = \mathcal{G}^{\wedge}(P) \cup \{\lambda Q_{et}.\ \exists x \in X[Q(x)] \mid X \neq \emptyset \wedge X \subseteq P\}$

(36) a. $[\![\text{quién}^{\wedge\vee}_{\text{weak}}]\!]^w = \lambda\mathcal{P}_{((et)t)t}.\ \exists\mathcal{Q}\in\mathcal{G}^{\wedge\vee}(*\mathsf{human}_w)[\mathcal{P}(\mathcal{Q})]$
b. $[\![\text{quiénes}^{\wedge\vee}_{\text{strong}}]\!]^w = \lambda\mathcal{P}_{((et)t)t}.\ \exists\mathcal{Q}\in\mathcal{G}^{\wedge\vee}(\mathcal{N}(*\mathsf{human}_w))[\mathcal{P}(\mathcal{Q})]$

If the domains of *quién* and *quiénes* contain generalized disjunctions, it will be possible for questions with modals to have maximally informative disjunctive answers. For concreteness, we can assume that the LF in (37) is available for (27a).

(37) λ_1 quién$^{\wedge\vee}_{\text{weak}}$ λ_2 [? $t_{1,st}$] have-to $t_{2,(et)t}$ λ_3 you talk to $t_{3,e}$

This LF allows the disjunctions in the range of the bare interrogative to take scope below the modal. The LF denotes the function in (38a), which characterizes the Hamblin set in (38b).[13] A disjunctive answer in this set can be maximally informative. Moreover, when a disjunctive answer is maximally informative, it will lead to a free choice inference, which is what is empirically attested. For example, if $\Box[*\mathsf{t}(\mathsf{a})\vee *\mathsf{t}(\mathsf{b}\oplus\mathsf{c})]$ is maximally informative, then it must be the case

[13] We abbreviate the set in (38b): propositions of the form $\Box *\mathsf{t}(\mathsf{a}\oplus\mathsf{b})$ are equivalent to $\Box[*\mathsf{t}(\mathsf{a})\wedge *\mathsf{t}(\mathsf{b})]$, $\Box[*\mathsf{t}(\mathsf{a})\wedge *\mathsf{t}(\mathsf{a}\oplus\mathsf{b})]$ to $\Box[*\mathsf{t}(\mathsf{a}\oplus\mathsf{b})]$, and $\Box[*\mathsf{t}(\mathsf{a})\vee *\mathsf{t}(\mathsf{a}\oplus\mathsf{b})]$ to $\Box *\mathsf{t}(\mathsf{a})$.

that both $\Box * \mathsf{t}(\mathsf{a})$ and $\Box * \mathsf{t}(\mathsf{b} \oplus \mathsf{c})$ are false. This implies $\Diamond * \mathsf{t}(\mathsf{a})$ and $\Diamond * \mathsf{t}(\mathsf{b} \oplus \mathsf{c})$.[14]

(38) a. $\lambda p.\, \exists \mathcal{Q} \in \mathcal{G}^{\wedge\vee}(*\mathsf{human}_w)[p = \lambda v.\, \Box^u_v \mathcal{Q}(\lambda x.\ * \text{you-talk-to}_u(x))]$

b. $\left\{ \begin{array}{c} \Box * \mathsf{t}(\mathsf{a}),\ \ \Box * \mathsf{t}(\mathsf{b}),\ \ \Box * \mathsf{t}(\mathsf{c}),\ \ \ldots \\ \Box * \mathsf{t}(\mathsf{a} \oplus \mathsf{b}),\ \ \Box * \mathsf{t}(\mathsf{a} \oplus \mathsf{c}),\ \ \Box * \mathsf{t}(\mathsf{b} \oplus \mathsf{c}),\ \ \ldots \\ \Box[* \mathsf{t}(\mathsf{a}) \vee\ * \mathsf{t}(\mathsf{b})],\ \ \Box[* \mathsf{t}(\mathsf{a}) \vee\ * \mathsf{t}(\mathsf{c})],\ \ \ldots,\ \ \Box[* \mathsf{t}(\mathsf{a}) \vee\ * \mathsf{t}(\mathsf{b} \oplus \mathsf{c})],\ \ \ldots \end{array} \right\}$

In sum, the challenges to Maldonado's proposal laid out in the previous section dissolve once we assume that bare interrogatives range over conjunctions and disjunctions.

To account for the properties of number-inflected bare interrogatives, Maldonado's proposal moves away from Dayal's in significant ways: the proposal abandons the Strong Singular, Weak Plural, and the (obligatory) Singular / Plural Competition assumptions. In this section we have seen that the Quantification over Individuals assumption needs to be abandoned, too.

Elliott et al. (2022) argue that this radical departure from Dayal's proposal is unmotivated: once we give up the Quantification Over Individuals assumption, the answerhood conditions of *quién*- and *quiénes*-questions can be derived without giving up the Strong Singular and Weak plural assumptions, thus allowing for a uniform treatment of number across question types.

In the next section, we lay out Elliott et al.'s proposal and show that the advantage of providing a uniform treatment of number across question types is counterbalanced by overgeneration and undergeneration challenges that can be avoided by giving up the Strong Singular and Weak Plural assumptions for bare plurals, like Maldonado did.

5 A strong singular and weak plural analysis with higher-order quantification

5.1 *Quién*: a lexical ambiguity

The analysis presented in Elliott et al. 2022 proposes that *quién* is ambiguous between two forms: the first, $\textit{quién}_e$ quantifies over individuals, the second, $\textit{quién}_{(et)t}$, over generalized quantifiers.

Like singular *which*-questions for Dayal, $\textit{quién}_e$-questions presuppose uniqueness. In their implementation, Elliott et al. (2022) follow the proposal in Sauerland 2003 and assume that number features are identity functions, the one contributed by singular being restricted to atoms.

(39) a. $[\![\text{SG}_{\text{strong}}]\!] = \lambda x\colon \mathsf{atom}(x).\ x$ b. $[\![\text{PL}_{\text{weak}}]\!] = \lambda x.\ x$

In the LF in (40a), the interrogative is base generated as a sister of the number feature. The presupposition introduced by the number feature imposes a definedness condition on the propositions that end up in the Hamblin set of (40a): the node ⑤ establishes an equivalence between two

[14] Proof: Suppose $\Box[* \mathsf{t}(\mathsf{a}) \vee\ * \mathsf{t}(\mathsf{b} \oplus \mathsf{c})]$ is true and both $\Box * \mathsf{t}(\mathsf{a})$ and $\Box * \mathsf{t}(\mathsf{b} \oplus \mathsf{c})$ are false. If $\Diamond * \mathsf{t}(\mathsf{a})$ were false, $\Box * \mathsf{t}(\mathsf{b} \oplus \mathsf{c})$ would be true. If $\Diamond * \mathsf{t}(\mathsf{b} \oplus \mathsf{c})$ were false then $\Box * \mathsf{t}(\mathsf{a})$ would be true.

propositions, the rightmost of which is a partial function. Since the atomicity restriction is introduced by $\text{SG}_{\text{strong}}$, *quién*$_e$ is treated as an existential quantifier ranging over atomic and non-atomic humans, as in (40d). The node in ⑥ has the meaning in (40d).

(40) a. ANS $[_{⑥}\ \lambda_1$ quién$_e$ $\lambda_2\ [_{⑤}\ [\ ?\ t_{1,st}\ ]\ [\ \text{SG}_{\text{strong}}\ t_{2,e}\ ]$ left $]\ ]$
b. $[\![⑤]\!]^g = 1$ iff $g(1) = \lambda v\colon \mathsf{atom}(g(2)).\ *\mathsf{left}_v(g(2))$
c. $[\![\text{quién}_e]\!]^w = \lambda P_{et}.\ \exists x[*\mathsf{human}_w(x) \wedge P(x)]$
d. $[\![⑥]\!]^w = \lambda p.\ \exists x[*\mathsf{human}_w(x) \wedge p = \lambda v\colon \mathsf{atom}(x).\ *\mathsf{left}_v(x)]$

Because the domain of *quién*$_e$ contains atoms and non-atoms, the set characterized by (40d) will contain propositions defined in all worlds (e.g. $\lambda v\colon \mathsf{atom}(\mathsf{a}).\ *\mathsf{left}_v(\mathsf{a})$) and others that aren't defined in any (e.g. $\lambda v\colon \mathsf{atom}(\mathsf{a}\oplus\mathsf{b}).\ *\mathsf{left}_v(\mathsf{a}\oplus\mathsf{b})$). This gives the set in (41).[15]

(41) $\{*\mathsf{left}(\mathsf{a}), *\mathsf{left}(\mathsf{b}), *\mathsf{left}(\mathsf{c}),\ \#\}$

can never be true, and is therefore never the set's maximally informative true member. Since all the other members of (41) are logically independent, (40a) presupposes uniqueness.

(42) $[\![(40a)]\!]^w$ is defined only if $\exists!x[*\mathsf{human}_w(x) \wedge *\mathsf{left}_w(x)]$

The antiuniqueness of *quiénes*-questions is derived via competition with *quién*$_e$-questions. Since PL_{weak} is semantically vacuous in (43a), ⑦'s truth depends on the equivalence of two propositions, the rightmost of which is always defined.

(43) a. ANS $[_{⑧}\ \lambda_1$ quiénes$_e$ $\lambda_2\ [_{⑦}\ [\ ?\ t_{1,st}\ ]\ [\ \text{PL}_{\text{weak}}\ t_{2,e}\ ]$ left $]\ ]$
b. $[\![⑦]\!]^g = 1$ iff $g(1) = \lambda v.\ *\mathsf{left}_v(g(2))$

Quiénes$_e$ is equivalent to *quién*$_e$. The node in ⑧ denotes the Hamblin set in (44b), which contains both singular and plural answers. Like plural *which*-questions, (43a) only presupposes existence.

(44) a. $[\![\text{quiénes}_e]\!]^w = [\![\text{quién}_e]\!]^w$
b. $[\![⑧]\!]^w = \{\lambda v.\ *\mathsf{left}_v(x) \mid *\mathsf{human}_w(x)\}$

(45) $[\![(43a)]\!]^w$ is defined only if $\exists x[*\mathsf{human}_w(x) \wedge *\mathsf{left}_w(x)]$

If we assume *quién*$_e$ to be an alternative to *quiénes*$_e$ and that *quiénes*$_e$-questions are always exhaustified, we derive for them antiuniqueness:

(46) $[\![\text{EXH}_{\text{p}}\ (43a)]\!]^w$ is defined only if $\exists x, y[x \neq y \wedge *\mathsf{human}(x\oplus y) \wedge *\mathsf{left}(x\oplus y)]$

An anticipated above, Elliott et al. assume a second form, *quién*$_{(et)t}$, which ranges over generalized quantifiers, which we restrict here, for the purpose of illustration, to conjunctions and

[15] Assuming that $\mathsf{a}, \mathsf{b}, \mathsf{c}$ are the people in the world of evaluation. Presuppositions that are always satisfied are not indicated in this set. '#' represents the obligatorily undefined propositions, which are all equivalent to each other. Thanks to Patrick Elliott for discussing with us the role of the atomicity presupposition.

disjunctions:

(47) For any $P_{et}, \mathcal{G}^{\wedge\vee}_{+}(P) = \{\lambda Q_{et}.\ \forall x \in X[Q(x)] \mid X \subseteq P\} \cup \{\lambda Q_{et}.\ \exists x \in X[Q(x)] \mid X \subseteq P\}$

(48) $[\![\text{quién}_{(et)t}]\!]^w = \lambda \mathcal{P}_{((et)t)t}.\ \exists \mathcal{Q} \in \mathcal{G}^{\wedge\vee}_{+}(*\mathsf{human}_w)[\mathcal{P}(\mathcal{Q})]$

Since they range over conjunctions of individuals, *quién*$_{(et)t}$-questions will admit plural answers and will not presuppose uniqueness. At the same time, *quién*$_{(et)t}$-questions differ from *quiénes*$_e$-questions in that empirically, they don't convey antiuniqueness. Questions like (49a) can receive a partial answer like (49b). The person answering the question states that either just Ana and Blas left, or just Carlos, though they aren't sure which. Since both answers are taken to be possible, the question implies neither uniqueness nor antiuniqueness.

(49) a. ¿Quién marchó?
who.SG left.SG

b. Ana y Blas, o Carlos.
Ana and Blas, or Carlos.

To explain why *quiénes*$_e$-questions carry antiuniqueness while *quién*$_{(et)t}$-questions don't, Elliott et al. (2022) assume a presuppositional asymmetry between the two. While the former presuppose existence, the latter presuppose nothing at all. This is so because *quién*$_{(et)t}$ ranges over conjunctions and disjunctions of individuals where the quantifier's restrictor is the empty set. If the restrictor of a universal quantifier is empty, it maps any predicate to true ($\lambda P_{et}.\ 1$). This quantifier introduces a tautology ($\top$) into the Hamblin set. If the restrictor of an existential quantifier is empty, it maps any predicate to false ($\lambda P_{et}.\ 0$). This introduces a contradiction ($\bot$) into the Hamblin set. In (50a), node ⑨ denotes (50b), which characterizes the set in (50c). Any of the propositions in (50c) that are not disjunctions or $\bot$ can be maximally informative and true. $\top$ will be true if nobody left. Thus (50a) is always going to be defined: it will be defined both when someone left and when nobody did.

(50) a. ANS [$_{⑨}$ λ_1 quién$_{(et)t}$ λ_2 [? $t_{1,st}$] $t_{2,(et)t}$ λ_3 [SG$_{\text{strong}}$ $t_{3,e}$] left]

b. $[\![⑨]\!]^w = \lambda p.\ \exists \mathcal{Q} \in \mathcal{G}^{\wedge\vee}_{+}(*\mathsf{human}_w)[p = \lambda v.\ \mathcal{Q}(\lambda x\colon \mathsf{atom}(x).\ *\mathsf{left}(x))]$

c. $\{*\mathsf{left}(\mathsf{a}),\ *\mathsf{left}(\mathsf{b}), \ldots, *\mathsf{left}(\mathsf{a}) \wedge *\mathsf{left}(\mathsf{b}), \ldots, *\mathsf{left}(\mathsf{a}) \vee *\mathsf{left}(\mathsf{b}), \ldots, \top, \bot\}$

We have then three competing types of questions that differ in the strength of their presuppositions, as summarized in the table below:[16]

(51)

	ANS(quién$_e$)		ANS(quiénes)		ANS(quién$_{(et)t}$)
presupposition	$\exists!x$	$\Rightarrow$	$\exists x$	$\Rightarrow$	$\varnothing$

Elliott & Sauerland (2019) and Elliott et al. (2022) exploit the lack of presupposition of *quien*$_{(et)t}$-questions to account for why they don't convey antiuniqueness, but *quiénes*$_e$-questions do. To this end, they propose the principle of *Avoid Ineffability!* (AI).

[16] We take a proposition ϕ to be presuppositionally stronger than ψ if $\text{dom}(\phi) \subset \text{dom}(\psi)$.

(52) *Avoid Ineffability!* (Elliott & Sauerland, 2019; Elliott et al., 2022)
EXH_p can be dropped in $[\text{EXH}_\text{p}\ \phi]$ in context C iff no alternative to ϕ is defined in C.

Whenever a *quiénes*$_e$-question is defined, so must be a *quién*$_{(et)t}$-question. This means that AI predicts that EXH_p obligatorily applies to the former. On the other hand, in a context where it isn't assumed that anybody left, only a *quién*$_{(et)t}$-question is defined. In such contexts, EXH_p is predicted to be optional for a *quién*$_{(et)t}$-question. This predicts that *quién*$_{(et)t}$-questions need not convey antiuniqueness.

In §3.2, we presented evidence (first discussed in Alonso-Ovalle & Rouillard 2019) that *quiénes* has a higher-order reading. In line with these observations, Elliott et al. (2022) assume that *quiénes*, like *quién*, is ambiguous between a form which quantifies over entities (*quiénes*$_e$), and form which ranges over GQs (*quiénes*$_{(et)t}$). This latter shares its meaning with *quién*$_{(et)t}$. We postpone discussion of *quiénes*$_{(et)t}$ until §5.3.

5.2 Undergeneration challenges for the Strong Singular assumption

Elliott et al.'s proposal faces two undergeneration challenges. The first comes from *quién*-questions with 'mixed' predicates like *lift that piano*, i.e. predicates that are true of atoms and non-atoms. The question/answer pair in (53) is felicitous in situations where there is no prior expectations as to whether the piano was lifted by a group of people together or by a single person, or whether there was one or more liftings. The answer in (53b) is both true and appropriate if there was one collective lifting of the piano by Ana and Blas.[17]

(53) a. ¿Quién levantó ese piano?
who.SG lifted that piano
'Who lifted that piano?'

b. Ana y Blas.
Ana and Blas

This observation poses a challenge. Under a *quién*$_e$ parse, no plural answer is expected, because (53a) will presuppose that at most one person lifted the piano. Its Hamblin set will be (54), which contains logically independent propositions and no plural answer for ANS to output. [18]

(54) $\{*\mathsf{lift}(\mathsf{a})_{\mathsf{atom}(\mathsf{a})}, *\mathsf{lift}(\mathsf{b})_{\mathsf{atom}(\mathsf{b})}, \ldots \#\}$

Under a *quién*$_{(et)t}$ parse, plural answers are possible, but they correspond to conjunctions of propo-

[17]Number inflected bare interrogatives with mixed predicates allow for plural answers conveying group action in Farsi, Greek, and Hungarian, too. For judgements, thanks to Beata Gyuris, Tamás Halm, Sabine Iatridou, Esmail Moghiseh and his informants, Despina Oikonomou, Lilla Pintér, and Anna Szabolcsi.

[18]Notation: we write '$*\mathsf{lift}(\mathsf{a})_{\mathsf{atom}(\mathsf{a})}$' for '$\lambda v : \mathsf{atom}(\mathsf{a}). *\mathsf{lift}_v(\mathsf{a})$.' # names the obligatorily undefined propositions generated by the non-atomic individuals in the range of *quién* (like $*\mathsf{lift}(\mathsf{a} \oplus \mathsf{b})_{\mathsf{atom}(\mathsf{a} \oplus \mathsf{b})}$), all of which are equivalent.

sitions generated from atoms, like (55), and are therefore incompatible with collective liftings.[19,20]

(55) $*\mathsf{lift}(\mathsf{a}) \wedge *\mathsf{lift}(\mathsf{b})_{\mathsf{atom}(\mathsf{a})\wedge\mathsf{atom}(\mathsf{b})}$

A possible line of defense to this challenge could be to assume that plural answers like (53b) name a group, under the assumption that groups are a type of atomic individual (Link, 1983). But *quién* questions do not seem to quantify over individuals that are conceived of as groups. To see that, consider the predicate *es grande* ('is tall/is big'), which applies to either regular individuals or groups. In (56), the predicate applies to a regular individual, and conveys information about its height. In (57), it applies to a group, stating that it has many members.[21]

(56) Ana es grande.
Ana is tall.
'Ana is tall.'

(57) La clase es grande.
the class is big
'The class is big.'

If *quién* ranged over groups, we would expect the answer in (58b) to be ambiguous between stating that each person is tall and that the group is large. Only the former interpretation is available, though, suggesting that the individuals over which *quién* ranges exclude groups.[22]

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[19] Elliott et al. (2022) acknowledge the undergeneration problem, but point out that in cases like (i) we only seem to get a distributive interpretation. In an out-of-the blue context, (i) might seem to be ranging over atomic individuals, but once the context provides ways of grouping individuals in sets whose members could collective weigh 300 kilos, the situation changes. Suppose that, while visiting a farm, the teachers and the students took turns standing on a large livestock scale. The groups left, and I see now that the scale marks 300 kilograms. In that situation, I can ask (ii).

(i) ¿Quién pesa 300 kilos?
who.SG weighs 300 kilos?

(ii) ¿Quién pesa 300 kilos, los profesores o los estudiantes?
who.SG weighs 300 kilos, the professors or the students?

[20] The Hamblin set of a $quién_{(et)t}$ parse of (53a) includes $\top$, which will be true if a collective lifting of the piano took place, and could then be the output of ANS in that situation in case all other members in the Hamblin set are false. In a set consisting of the generalized conjunctions and disjunctions of a, b, and c, $\top$ will be the output of ANS in case (i) is true. Obviously, (53b) cannot correspond to $\top$, since $\top$ being the output of ANS is compatible with no lifting of the piano, unlike what (53b) conveys.

(i) $\neg\exists x \in \{\mathsf{a},\mathsf{b},\mathsf{c}\}[*\mathsf{lift}(x)]$

[21] The noun *clase* is ambiguous: it can mean either 'classroom' or 'class'.

[22] A second line of defence might be to assume that *lift that piano* is true of the *participants* in a piano lifting event. (53b) could then be taken to be equivalent to (i), which would convey that Ana participated in lifting that piano and Blas did too. These truth conditions would be satisfied if a single lifting took place.

(i) Ana levantó ese piano y Blas levantó ese piano.
Anna lifted.3SG that piano and Blas lifted.3SG that piano

This hypothesis faces a challenge with distributive quantifiers. The question in (53a) can be answered with (ii). If a single lifting took place, (ii) can be false. If *lift that piano* meant 'participated in a lifting of that piano', (ii) would be unambiguously true. Thanks to Orin Percus (p.c) for raising this concern.

(ii) Cada uno de esos cinco estudiantes.
each one of those five students

(58) a. ¿Quién es grande?
who.SG is tall/big
'Who is tall/big?'

b. Ana, Blas, Carlos, y Daniel.
Ana, Blas, Carlos, and Daniel

The second undergeneration challenge that Elliott et al. face is that *quién* questions with plural definite descriptions allow for cumulative answers, like other *wh*-questions containing plural definite descriptions do (Dayal, 1992, 1996; Krifka, 1992). For instance, (59b) has a cumulative interpretation where Ana, Blas and Carlos each spoke to at least one of the ten professors, and where each of the ten professors was spoken to by at least one of Ana, Blas and Carlos.[23]

(59) a. ¿Quién habló con esos diez profesores?
who:SG talked to these ten professors
'Who talked to those ten professors?'

b. Ana, Blas, y Carlos.
Ana, Blas, and Carlos

Elliott et al. predict for (59a) the $\textit{quién}_e$ parse in (60a). In its Hamblin set, only singular answers are ever defined, making (59b) unavailable.

(60) a. ANS λ_1 quién$_e$ λ_2 [? $t_{1,st}$] [$\text{SG}_{\text{strong}}$ $t_{2,e}$] talked to those ten professors

b. $\{\lambda v\colon \mathsf{atom}(x).\ **\mathsf{talk}_v(x, \mathsf{those\text{-}ten\text{-}professors}) \mid *\mathsf{human}_w(x)\}$

They also predict the $\textit{quién}_{(et)t}$ parse in (61a). The Hamblin set in (61b) contains plural answers, but, again, those are formed from conjunctions of atoms: (59b) could only correspond to the proposition that Ana, Blas, and Carlos each spoke to the ten professors. While this is a possible reading for the answer, it is stronger than its cumulative interpretation.[24] Under neither of the possible parses that Elliott et al. offer for (59a) do we expect cumulative answers, then.

(61) a. ANS λ_1 quién$_{(et)t}$ λ_2 [? $t_{1,st}$] $t_{2,(et)t}$ λ_3 [$\text{SG}_{\text{strong}}$ $t_{3,e}$] talked to those ten professors

b. $\{\lambda v.\ \mathcal{Q}(\lambda x\colon \mathsf{atom}(x).\ **\mathsf{talk}_v(x, \mathsf{those\text{-}ten\text{-}professors})) \mid \mathcal{Q} \in \mathcal{G}_+^{\wedge\vee}(*\mathsf{human}_w)\}$

Elliott et al. could assume that scopal interactions are available between the source of a predicate's cumulativity and the source of its atomicity presupposition. If cumulative interpretations are derived in the syntax via an operator (e.g. Beck & Sauerland 2000), we could end up with a structure like (62a) for (59a). By scoping the $\star\star$ over $\text{SG}_{\text{strong}}$, its atomicity presupposition can be filtered out. (62b) can be fed two pluralities and gives a cumulativily interpreted statement.

(62) a. ANS λ_1 quién$_e$ λ_2 [? $t_{1,st}$] $t_{2,e}$ [those ten professors] $\star\star$ λ_3 λ_4 [$\text{SG}_{\text{strong}}$ $t_{4,e}$] talked to $t_{3,e}$

b. $[\![\star\star\ \lambda_3\ \lambda_4\ [\ \text{SG}_{\text{strong}}\ t_{4,e}\ ]\ \text{talked to}\ t_{3,e}]\!]^w = **\lambda x \lambda y\colon \mathsf{atom}(y)\ .\ \mathsf{talk}_w(y,x)$

[23] We also find cumulative answers for singular bare interrogatives in Farsi, Greek, and Hungarian.

[24] Much like with mixed predicates, one could think that (59b) corresponds to the tautological answer in the Hamblin set, but the tautological answer can only be maximally informative in a Hamblin set if all other members are false, i.e. if nobody spoke to the ten professors, which is inconsistent with the cumulative interpretation of (59b).

While this move allows for a strong treatment of singular number to produce cumulative answers, relying on scopal interactions between number features and cumulativity operators creates problems where it solves them. On this view, singular *which*-questions should have readings that don't presuppose uniqueness. For instance, since the restrictor of the *wh*-phrase in (63a) includes non-atomic students, its Hamblin set includes plural answers.

(63) a. ANS λ_1 which student λ_2 [? $t_{1,st}$] $t_{2,e}$ [those ten profs] $\star\star$ λ_3 λ_4 [$\text{SG}_{\text{strong}}$ $t_{4,e}$] talked to $t_{3,e}$

b. $\{\lambda v.\ **\mathsf{talked}(x), \mathsf{those\text{-}ten\text{-}professors}) \mid *\mathsf{student}_w(x)\}$

5.3 An overgeneration challenge for the Weak Plural assumption

Elliott et al. overgenerate answers available for *quiénes*-questions. We have discussed three bare interrogatives: $\textit{quién}_e$, $\textit{quiénes}_e$, and $\textit{quién}_{(et)t}$. Elliott et al. also discuss the possibility of having $\textit{quiénes}_{(et)t}$-questions. For them, (64) can have the parse in (65a), with the Hamblin set in (65b).

(64) ¿Quiénes marcharon?
who.PL left.PL

(65) a. ANS λ_1 $\text{quiénes}_{(et)t}$ λ_2 [? $t_{1,st}$] $t_{2,(et)t}$ λ_3 [$\text{PL}_{\text{weak}} t_{3,e}$] left

b. $\{\lambda v.\ \mathcal{Q}(\lambda x.\ *\mathsf{left}_v(x)) \mid \mathcal{Q} \in \mathcal{G}_+^{\vee\wedge}(*\mathsf{human}_w)\}$

Only the set's conjunctive answers (including the tautology) can be maximally informative and true. By virtue of $*\mathsf{left}$'s distributivity, these conjunctions are equivalent to those denoted by the $\textit{quién}_{(et)t}$-question counterpart to (65a). Both questions are therefore semantically equivalent. Since $\textit{quién}_{(et)t}$-questions don't have to convey antiuniqueness, we should expect the same for $\textit{quiénes}_{(et)t}$-questions. However, this is empirically unattested.

Elliott et al.'s solution to this problem appeals to the fact that *quiénes* is morphosyntactically more complex than its singular counterpart. They suggest that a principle of Brevity prevents speakers from using the plural when it is equivalent to its singular counterpart. However, as first discussed in Alonso-Ovalle & Rouillard 2019, we do find *quiénes*-questions that admit higher-order readings, such as those in (66).

(66) a. ¿Con quiénes tiene que hablar Juan?
with who.PL must that speak-to Juan
'With whom does John have to talk?'

b. con Ana y Blas o con Carlos y David.
with Ana and Blas or with Carlos and David

Since for Elliott et al. the plural is weak, the Hamblin set of (66a)'s $\textit{quiénes}_{(et)t}$ parse includes answers formed with the disjunctions of atoms and non-atoms.

(67) $\{\lambda v.\ \Box_v^w \mathcal{Q}(\lambda x.\ *\mathsf{juan\text{-}speaks\text{-}to}_w(x)) \mid \mathcal{Q} \in \mathcal{G}_+^{\wedge\vee}(*\mathsf{human}_w)\}$

However, the only complete disjunctive answers that a $\textit{quiénes}_{(et)t}$-question tolerates involve the

disjunction of non-atoms. Disjunctions of atoms, as in (68a), or disjunctions of an atom and a non-atom, as in (68b), are infelicitous answers to (66a).

(68) a. #con Ana o con Blas.
with Ana or with Blas.
b. #con Ana o con Blas y Carlos.
with Ana or with Blas and Carlos.

Since these answers are in (67), their infelicity must be the result of competition. The problem is that it's unclear what alternatives would block these answers. From the competition with *quién*$_e$, we only get the inference that there is no single individual that Juan must talk to. This is compatible with a free choice interpretation of both (68a) and (68b). Similarly, the competition with *quiénes*$_e$ would result in the inference that there is no particular individual or group of people that Juan must talk to. This again rules out neither (68a) nor (68b). The *quién*$_{(et)t}$-question counterpart to (66a) is presuppositionally vacuous, so no inference can be drawn from competition with it. It seems then that competition cannot explain why (68a) and (68b) are infelicitous answers to (66a), then.

Even if *quién*$_{(et)t}$-questions were presuppositionally stronger than *quiénes*$_{(et)t}$-questions, and we could derive from the competition between the two the infelicity of (68a) and (68b), the logic of AI would predict the exhaustification of the *quiénes*$_{(et)t}$ parse, because it is the weakest alternative, to (66a) to be optional. Answers (68a) or (68b) should be felicitous in contexts where the *quién*$_{(et)t}$ alternative is undefined.

5.4 Weak singulars and strong plurals to the rescue

Both the undergeneration and overgeneration challenges faced by Elliott et al. are circumvented if we follow Maldonado in abandoning the Strong Singular and Weak Plural assumptions. Consider the fact that (69b) can be interpreted as saying that Ana and Blas lifted the piano together.

(69) a. ¿Quién levantó ese piano?
Who.SG lifted this piano
'Who lifted this piano?'
b. Ana y Blas.
Ana and Blas

This answer is expected if the singular in *quién* is weak, whether the interrogative ranges over entities as in (70a), or generalized quantifiers as in (70b). In both Hamblin sets, we have answers where a non-atom lifted the piano together. We therefore expect that an answer like (69b) can mean that there was a single lifting event.

(70) a. $\{\lambda v.\ *\mathsf{lift}_v(x) \mid *\mathsf{human}_w(x)\}$
b. $\{\lambda v.\ \mathcal{Q}(\lambda x.\ *\mathsf{lift}_v(x)) \mid \mathcal{Q} \in \mathcal{G}^{\wedge\vee}(*\mathsf{human}_w)\}$

Similarly, once we abandon the Strong Singular assumption for *quién*, it becomes clear how (71b) can be interpreted cumulatively.

(71) a. ¿Quién habló con esos diez profesores?
who.SG talked with these ten professors
'Who talked to these ten professors?'
b. Ana, Blas, y Carlos.
Ana, Blas, and Carlos

Assuming a weak singular *quién* does quick work of this no matter whether it quantifies over entities or GQs. Once again, we have in both (72a) and (72b) answers where the atomic parts of a non-atom cumulatively spoke to the ten professors.[25]

(72) a. $\{\lambda v.\ **\mathsf{talk}_v(x, \mathsf{those\text{-}ten\text{-}professors}) \mid *\mathsf{human}_w(x)\}$
b. $\{\lambda v.\ \mathcal{Q}(\lambda x.\ **\mathsf{talk}_v(x, \mathsf{those\text{-}ten\text{-}professors})) \mid \mathcal{Q} \in \mathcal{G}^{\wedge\vee}(*\mathsf{human}_w)\}$

Finally, let's look back at the question in (73). While it admits as answers disjunctions of non-atoms, both disjunctions of atoms like (74a) and a disjunction of an atom and a non-atom like (74b) are infelicitous.

(73) ¿Con quiénes tiene que hablar Juan?
with who.PL must that talk Juan
'With who does Juan have to talk?'

(74) a. #Con Ana o con Blas.
with Ana or with Blas
b. #Con Ana o con Blas y Carlos.
with Ana or with Blas and Carlos

These facts follow if we assume that *quiénes* is a strong plural that can range over disjunctions of individuals. While complete disjunctive answers aren't found in (75a), where *quiénes* ranges over entities, they are found in (75b). Moreover, because the plural in *quiénes* is assumed to be strong, we only find in this set disjunctions of pluralities. Both (74a) and (74b) are expected to be unavailable answers.

(75) a. $\{\lambda v.\ \Box_v^w *\mathsf{juan\text{-}talks\text{-}to}_v(x) \mid \mathcal{N}(*\mathsf{human}_w(x))\}$
b. $\{\lambda v.\ \Box_v^w \mathcal{Q}(\lambda x.\ *\mathsf{juan\text{-}talks\text{-}to}_v(x)) \mid \mathcal{Q} \in \mathcal{G}^{\wedge\vee}(\mathcal{N}(*\mathsf{human}_w))\}$

[25] Cumulative answers may pose a challenge to Dayal's Maximal Informativity Principle. Suppose that Ana spoke with just Carl, while Blas spoke to both Carl and Dani. Here, (ib) seems like a complete and true answer to (ia). In this scenario, the set of true answers to the question is (ii). This set does not have a maximally informative member.

(i) a. Which students did Ana and Blas talk to?
b. Carl and Dani.

(ii) $\{ **\mathsf{talk}(\mathsf{a} \oplus \mathsf{b}, \mathsf{c}), **\mathsf{talk}(\mathsf{a} \oplus \mathsf{b}, \mathsf{c} \oplus \mathsf{d})\}$

It doesn't help to assume *which students* ranges over conjunctions of individuals. The answer in (ib) doesn't correspond to (iii), since unlike (iii) it is silent as to who Ana spoke to and who Blas spoke to.

(iii) $**\mathsf{talk}(\mathsf{a} \oplus \mathsf{b}, \mathsf{c}) \wedge **\mathsf{talk}(\mathsf{a} \oplus \mathsf{b}, \mathsf{c} \oplus \mathsf{d})$

In conclusion, Elliott et al.'s efforts to maintain a unified semantics for number lead to challenges that are avoidable under a higher-order expansion of Maldonado's proposal. While the prospect of a unified treatment of number is appealing, assuming a weak singular and a strong plural in Spanish bare interrogatives seems to have the empirical edge over it.

6 Conclusions and open issues

As we have seen, Dayal analyzes how number affects the answerhood conditions of *wh*-questions in terms of five assumptions: (i) wh-phrases range over individuals, (ii) singular forms are strong, (iii) Hamblin sets contain a maximally informative true member, (iv) plural forms are weak, and (v) plural and singular alternatives obligatorily compete. Maldonado (2020) shows that these assumptions overgenerate uniqueness inferences for *quién*-questions and undergenerate antiuniqueness inferences for *quiénes*-questions. In response, she proposes to abandon the Strong Singular and Weak Plural assumptions. We showed that Maldonado's analysis overgenerates uniqueness inferences for *quiénes*-questions with collective predicates. Following Xiang's (2016) lead in dealing with this problem in the domain of *which*-questions, we argued that bare interrogatives should range over generalized quantifiers. This move finds further support in the availability of complete disjunctive answers to *quién*- and *quiénes*-questions containing modals, which also conforms to similar observations made about *which*-questions (Spector, 2007b, 2008). After laying out the empirical shortcomings of Elliott et al.'s (2022) analysis, where quantification over generalized quantitiers is exploited to preserve a unified treatment of number, we side with Maldonado in assuming that the interpretation of number must vary across interrogatives.

Our discussion leaves open two issues. The first is the extent to which number interpretation is uniform across DPs in general. A proposal where the singular in *quién*-questions is weak and the plural in *quiénes*-questions strong is at odds with widely held assumptions about the semantics of number (see, a.o., Sauerland 2003, Sauerland et al. 2005, Zweig 2009). The obvious question is why the interpretation of number should vary across DPs. Maldonado (2020, 164) tentatively concludes that the number in quantificational DPs might differ from number in non-quantificational DPs. In support of her point, we note that there are quantificational DPs that pattern with bare interrogatives. A case in point example is the Spanish existential determiner *algún* and its plural counterpart *algunos*: the former ranges over atoms and non-atoms (Alonso-Ovalle & Menéndez-Benito, 2010), but the latter only ranges over non-atoms (Alonso-Ovalle & Menéndez-Benito, 2011).

The parallel between *algún*/*algunos* and bare interrogatives is not perfect, however. While seemingly able to quantify over non-atoms, *algún*-DPs are not compatible with collective predicates. This brings us to our second issue. We have seen that singular bare interrogatives are felicitous with mixed predicates like *lift the piano*, but the situation with purely collective predicates is less clear. Both Maldonado (2020) and Alonso-Ovalle & Rouillard (2019) claim that *quién* is felicitous with collective predicates. This is also supported by naturally occurring examples.

(76) a. ¿Quién se juntó ayer a la noche?
who.sg reflx gathered yesterday at the night?
'Who gathered last night?' (Maldonado, 2020, 157)

b. ¿Quién se conoce entre sí en la fiesta?
who.sg reflx know between them at the party?
'Who knows each other at the party?' (Maldonado, 2020, 157)

c. ¿Quién se reúne en Bruselas y para qué? Los ventiocho jefes de Estado
who RFXV meets in Brussels and for what? The twenty-eight chiefs of state
o de Gobierno de la Unión Europea.
or of government of the Union European
'Who meets in Brussels and what for? The twenty eight chiefs of state or premiers of the European Union.'
https://www.expansion.com/economia/2015/03/19/550ae6ff22601d9b658b456e.html

However, not all speakers accept *quién* with collective predicates. Two anonymous reviewers report that while they do not rule out *quién* completely in those cases, they prefer *quiénes*. Other speakers simply don't seem to tolerate *quién* with collective predicates.[26] This immediately raises the question of the source of speaker variation. In lieu of a full-fledged answer, we suggest that treating the singular in *quién* as weak and the plural in *quiénes* as strong offers an avenue towards one. Assuming that *quién* ranges both over atoms and non-atoms, the Hamblin set associated with (76a) will include propositions that can never be defined (e.g. $\lambda v : \mathsf{atom}(\mathsf{a} \oplus \mathsf{b}). * \mathsf{gather}_v(\mathsf{a} \oplus \mathsf{b})$). The same undefined propositions would be in the question's Hamblin set if *quién* ranged over the conjunctions and disjunctions of entities.

(77) $\{\#, *\mathsf{gather}(\mathsf{a} \oplus \mathsf{b}), *\mathsf{gather}(\mathsf{b} \oplus \mathsf{c}), *\mathsf{gather}(\mathsf{a} \oplus \mathsf{c}) \ldots\}$

Assuming *quiénes* ranges over only non-atoms, the Hamblin set associated with (78), in (79a), lacks any undefined members. The same is true if we assumed *quiénes* ranged over conjunctions and disjunctions of non-atoms, as in (79b).

(78) ¿Quiénes se juntaron ayer a la noche?
who.PL REFLX gathered yesterday at the night?
'Who gathered last night?'

(79) a. $\{*\mathsf{gather}(\mathsf{a} \oplus \mathsf{b}), *\mathsf{gather}(\mathsf{a} \oplus \mathsf{c}), *\mathsf{gather}(\mathsf{b} \oplus \mathsf{c}) \ldots\}$
b. $\{*\mathsf{g}(\mathsf{a} \oplus \mathsf{b}), \ldots, *\mathsf{g}(\mathsf{a} \oplus \mathsf{b}) \wedge *\mathsf{g}(\mathsf{a} \oplus \mathsf{c}), \ldots, *\mathsf{g}(\mathsf{a} \oplus \mathsf{b}) \vee *\mathsf{g}(\mathsf{a} \oplus \mathsf{c}), \ldots\}$

In short, if *quién* is a weak singular and *quiénes* a strong plural, then *quién*-questions with collective predicates differ from *quiénes*-questions insofar as they contain undefined propositions in their Hamblin sets. This fact alone is insufficient to explain why some speakers find *quién* degraded with collective predicates, since the answers that could be maximally informative and true are the same for both (76a) and (78), as these exclude any undefined proposition. Given Dayal's

[26] According to our informants, the situation seems to be parallel in Farsi, Greek, and Hungarian.

definition for ANS, we expect both questions to carry the same presupposition. An alternative to Dayal's definition of ANS, proposed in Fox 2018 and Fox 2020, does in fact tease apart both types of questions. Fox suggests that a question is defined only if the pointwise application of an exhaustification operator on its Hamblin set partitions the context set.

(80) For any $\mathcal{Q}_{(st)t}$ and context $\mathcal{C}$, $[\![\text{ANS } \mathcal{Q}]\!]^{\mathcal{C}}$ is defined only if $\{\mathsf{exh}(p,\mathcal{Q}) \cap \mathcal{C} \mid p \in \mathcal{Q}\}$ is a partition of $\mathcal{C}$.

(81) For any p_{st} and $\mathcal{Q}_{(st)t}$, $\mathsf{exh}(p,\mathcal{Q}) = p \cap \{v \mid \forall q \in \mathsf{IE}(p,\mathcal{Q})[\neg q(v)]\}$, where $\mathsf{IE}(p,\mathcal{Q}) = \bigcap\{\mathcal{Q}' \mid \mathcal{Q}'$ is a maximal subset of $\mathcal{Q}$ s.t. $\{p\} \cup \{\neg q \mid q \in \mathcal{Q}'\}$ is consistent$\}$

On this definition of ANS, Hamblin sets that contain undefined propositions are pathological, since exhaustifying these propositions will not pick out a cell in any contextual partition. We might assume that speakers that always reject *quiénes*-questions with collective predicates do so on the basis of the pathology of their Hamblin sets. Speakers who tolerate them may do so because they tolerate, at least to a certain extent, restricting the domain of the interrogative so as to exclude undefined propositions from the Hamblin set. The difference between speakers could be cashed out in terms of how costly they view domain restriction for the purposes of making a question acceptable. We conclude with this tentative solution, which we leave as an invitation for future exploration.

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