Number Inflection, Spanish Bare Interrogatives, and Higher-Order Quantification.*

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1. Introduction.

In languages like Hungarian or Spanish (Elliott et al. 2018, Maldonado 2017a,b), simplex *wh*-interrogatives inflect for number. This is illustrated in (1) for Spanish:

(1) a. ¿Quién marchó?
who.SG left.SG
'Who left?'

b. ¿Quién**es** marcharon ?
who.PL left.PL
'Who left?'

Maldonado (2017a,b) shows that these simplex *wh*-words challenge assumptions on the semantics of number made in Dayal 1996, where plural *wh*-phrases range over both atomic and non-atomic individuals (are 'weak'), while their singular counterparts range over atomic individuals only (are 'strong.') She proposes that singular bare *wh*-interrogatives are weak (they range over atomic and non-atomic individuals) while their plural counterparts are strong (they range over non-atomic individuals only.)

We show, following on Xiang 2016, that Maldonado's proposal overgenerates, as it predicts unatestted uniqueness inferences with collective predicates. To answer Xiang's challenge, we propose, in line with Elliott et al. (2018), that number inflected simplex interrogatives range over generalized quantifiers (generalized conjunctions and disjunctions). Unlike Elliott et al., but in line with Maldonado, we defend that the plural version of these forms is strong (it ranges over generalized conjunctions and disjunctions 'formed out' of non-atomic individuals only) while the singular is weak (it ranges over conjunctions and disjunctions 'formed out' of atomic and non-atomic individuals).

The paper is organized as follows. Section 2 reviews Dayal's account of the uniqueness inference conveyed by singular *which*-questions, as well as an extension to this account,

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discussed in Elliott et al. 2018, that derives the antiuniqueness of plural *which*-questions via a pragmatic competition with their singular counterparts. Under this view, singular *wh*-phrases are strong (they range over atomic individuals only) and plural *wh*-phrases weak (they range over atomic and non-atomic individuals.) Section 3 shows, following Maldonado 2017a,b, that number inflected simplex interrogatives pose a challenge to the account presented in Section 2 and reviews Maldonado's proposal that it is singular bare *wh*-expressions that range over atomic and non-atomic individuals, whereas their plural counterparts are restricted to non-atomic individuals. Section 4 points out, based on Xiang 2016, that Maldonado's semantics derives unattested uniqueness inferences with collective predicates. Section 5 solves this problem by assuming that simplex interrogatives range over generalized quantifiers, like Elliott et al. 2018 proposed for singular *quién*, a proposal motivated by the interpretation of these forms in disjunctive answers. Finally, Section 6 evaluates Elliott et al.'s proposal that describing bare interrogatives in terms of higher-order quantification allows us to maintain Dayal's assumptions about the interpretation of number in *wh*-interrogatives. We argue that the intepretation of simplex interrogatives with collective predicates and their interpretation in disjunctive answers challenge this proposal.

2. *Which* Questions: Uniqueness and Antiuniqueness.

Singular *which*-questions allow for answers naming a unique atomic individual ('singular answers') but exclude answers mentioning multiple individuals ('plural answers'), as (2-a) and (2-b) show. Conversely, plural *which*-questions only allow for plural answers, as (3-a) and (3-b) illustrate. Dayal (1996) shows that the pattern in (2) can be derived from two assumptions: i) that singular interrogatives are strong, and ii) that questions have a maximally informative true answer.

(2) Which student left?
   a. ✓ Al [left].
   b. ✗ Al and Bob [left].

(3) Which students left?
   a. ✗ Al [left].
   b. ✓ Al and Bob [left].

For Dayal, plural *which*-phrases range over atomic and non-atomic individuals, whereas singular *which*-phrases range over atomic individuals only. To illustrate this, we take *which*-phrases to be existential quantifiers, assume that the extension of all predicates is closed under sum-formation, and assume that singular marking on the NP introduces an atomicity presupposition (Sauerland 2003, Sauerland et al. 2005 a.o.), as in (4-a):[1]

(4) a. $[\![\text{which student.SG}]\!]^w = \lambda g_{\langle e,t\rangle}.\exists x : \text{ATOM}(x)[^*\text{STUDENT}_w(x) \wedge g(x)]$
   b. $[\![\text{which student.PL}]\!]^w = \lambda g_{\langle e,t\rangle}.\exists x \quad [^*\text{STUDENT}_w(x) \wedge g(x)]$

Under a Hamblin-Karttunen semantics (Hamblin 1973, Karttunen 1977), questions denote sets of propositions. Hamblin (whom we follow here) assumes that these propositions correspond to the possible answers of the question. For concreteness, we will assume for

[1] For any individual d, $^*\text{LEFT}_w$ is true of d if LEFT_w is true of d or LEFT_w is true of both d_1 and d_2 and $d = d_1 \oplus d_2$. If $^*\text{LEFT}_w(a \oplus b)$ is true, then both a and b left in w.

(2) and (3) the LF schema in (5). Assuming that there are only two atomic students at the world of evaluation w (a and b), (2) will denote in w the Hamblin set in (6), and (3) the one in (7).[2]

(5) $[_{\text{CP}}\ \text{OP}\ \lambda p$ which student(s) $\lambda_1\ [_{\text{C}'}\ [_{\text{C}_0}?\ p]\ t_1$ left$]]$

(6) $\left\{ \begin{array}{l} \lambda w.\ {}^*\text{LEFT}_w(a), \\ \lambda w.\ {}^*\text{LEFT}_w(b) \end{array} \right\}$

(7) $\left\{ \begin{array}{c} \lambda w.\ {}^*\text{LEFT}_w(a), \lambda w.\ {}^*\text{LEFT}_w(b), \\ \lambda w.\ {}^*\text{LEFT}_w(a \oplus b) \end{array} \right\}$

In order to derive the pattern in (2), Dayal (1996) assumes that the Hamblin set of a question must contain a strongest true proposition, which constitutes the complete answer of the question. We will assume that this requirement is a presupposition triggered by a covert answerhood operator, in (8), which, when defined, picks up the strongest true proposition in the Hamblin set that it operates over.[3]

(8) $[\![\text{ANS}]\!]^w = \lambda Q:\ \exists p \in Q[p(w) = 1 \wedge \forall p' \in Q[p'(w) = 1 \rightarrow p \subseteq p']].$
$\iota p \in Q[p(w) = 1 \wedge \forall p' \in Q[p(w) = 1 \rightarrow p \subseteq p']]$

Since the propositions in (6) are not related by entailment, the presupposition of ANS, when applied to (2), will require that at most one of them be true. For (2) to be felicitous, this presupposition will have to be common ground—true in all worlds in the *context set*, the set of worlds compatible with what the conversation participants assume (Stalnaker 1978). The answer pattern in (2) is thus predicted: for (2) to be felicitous, the context set must entail that exactly one student left.

The answer pattern in (3) is, however, not predicted. Applied to (7), ANS triggers the presupposition that at least one of the propositions in (7) is true. This presupposition will be entailed by any context set that entails that both students left, but also by any context set that entails that exactly one student left. This does not align with intuitions that plural *which*-interrogatives imply antiuniqueness.

However, antiuniqueness can be derived from a pragmatic competition between the singular and plural questions. Following Elliott et al. (2018), it can be assumed that the pragmatic principle *Maximize Presupposition!* (Heim 1991, Percus 2006, Sauerland 2008), outlined in (9), operates whenever a plural *which*-interrogative is uttered.

(9) *Maximize Presupposition!*: Do not use ϕ if there is a presuppositionally stronger alternative to ϕ whose presuppositions are entailed by the context.

[2] In (5), a covert proto-question operator ? (Karttunen 1977) combines with a covert, semantically inert, operator OP that moves from its base position, leaving a trace of type $\langle s,t \rangle$ that gets abstracted over (Heim 2018). The proto-question operator expresses the relation that holds between two propositions p, q in case $p = q$. C_0 combines with its sister constituent via Intensional Functional Application (Heim and Kratzer 1998).

[3] See Heim 2018, Sect. 3.4 for the proposal that ANS is present in unembedded questions, some discussion of its effect on the speech act that unembedded questions are associated with, and the suggestion (due to Danny Fox, p.c.) that ANS might in fact replace the covert operator in (5).

The predicted presupposition of (2) is stronger than that of (3): if exactly one student left, at least one did, and, so, any context set that entails the presupposition of (2), will entail the presupposition of (3). It follows from *Maximize Presupposition!* that one should not utter a plural *which*-interrogative if the context set entails that exactly one student left. Uttering (3) should lead to the inference that the presupposition of (2) is not entailed by the context set. Assuming that this inference is obligatorily strengthened to convey that the context set entails that the presupposition of (2) is false will convey that it is taken for granted that more than one student left, deriving the attested answer pattern.

3. Simplex Interrogatives: Maldonado's Challenge.

Maldonado (2017a,b) shows that simplex interrogatives pose a challenge to the account presented in the previous section. The challenge does not arise in English, though. Consider (10). In English, the simplex interrogative *who* triggers singular agreement on the verb, but allows for both singular and plural answers. This would be unexpected if *who* were semantically singular, because, in that case, ANS would yield a uniqueness presupposition. But *who* can be taken to be semantically plural, and, under that assumption, since plural forms are taken to be weak, and *who* does not compete with a semantically singular form, the answer pattern in (10) is expected.

(10) Who left?

a. ✓ Al [left].
b. ✓ Al and Bob [left].

In languages where simplex interrogatives inflect for number, the situation is different. Consider the answer pattern for Spanish *quién*(*es*) ('who') in (11) and (12):

(11) ¿Quién marchó?
who.SG left.SG

a. ✓ Al [marchó].
Al left.SG
b. ✓ Al y Bob [marcharon].
Al and Bob left.PL

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

a. ✗ Al [marchó].
Al left.3SG
b. ✓ Al y Bob [marcharon].
Al and Bob left.3PL

In Spanish or Hungarian, the singular simplex form allows for both singular and plural answers, but its plural counterpart only allows for plural answers. This raises two questions for the account presented in Section 2: i) why does the singular form lack uniqueness, and ii) what is the source of the plural form's antiuniqueness. If to answer question i) we amend the semantics of *quién* so that it ranges over both atomic and non-atomic individuals, we reach an impasse when considering question ii). Indeed, if plural features are semantically vacuous, the antiuniqueness of the plural form must be derived through competition with

the presuppositionally stronger singular form. However, assuming *quién* to be number neutral, there is no presuppositionally stronger alternative to strengthen the plural.[4]

In light of this problem, Maldonado (2017a,b) proposes a revision of the interpretation of number features on Spanish simplex *wh*-phrases: she takes *quién* to range over both atomic and non-atomic individuals, and *quiénes* over non-atomic individuals only, as in (13), where, for illustration, we adopt an antiatomicity presupposition.

(13) a. $[\![\text{quién}]\!]^w = \lambda g_{\langle e,t\rangle}.\exists x \quad [{}^*\text{HUMAN}_w(x) \wedge g(x)]$
b. $[\![\text{quién}\underline{\textbf{es}}]\!]^w = \lambda g_{\langle e,t\rangle}.\exists x : \text{NON-ATOM}(x).[{}^*\text{HUMAN}_w(x) \wedge g(x)]$

These assumptions derive the answer pattern in (11) and (12). Assuming the set of humans at the world of evaluation to be (14), the semantics in (13) results in the Hamblin sets in (15-b) and (16-b). The propositions in the Hamblin set in (15-b) are related by entailment, and, so, the presupposition of ANS will not convey uniqueness for the singular question. The propositions in the Hamblin set in (16-b) all convey that more than one student left, thus the antiuniqueness of the plural question is derived.

(14) $\{x : {}^*\text{HUMAN}_w(x)\} = \{a, b, c, a \oplus b, b \oplus c, a \oplus c, a \oplus b \oplus c\}$

(15) a. ¿Quién marchó?
who.SG left.SG?
b. $\left\{ \begin{array}{l} \lambda w.\ {}^*\text{LEFT}_w(a), \\ \lambda w.\ {}^*\text{LEFT}_w(b), \\ \lambda w.\ {}^*\text{LEFT}_w(c), \\ \lambda w.\ {}^*\text{LEFT}_w(a \oplus b), \\ \lambda w.\ {}^*\text{LEFT}_w(a \oplus c), \\ \lambda w.\ {}^*\text{LEFT}_w(b \oplus c), \\ \lambda w.\ {}^*\text{LEFT}_w(a \oplus b \oplus c) \end{array} \right\}$

(16) a. ¿Quiénes marcharon?
who.PL left.PL?
b. $\left\{ \begin{array}{l} \lambda w.\ {}^*\text{LEFT}_w(a \oplus b), \\ \lambda w.\ {}^*\text{LEFT}_w(a \oplus c), \\ \lambda w.\ {}^*\text{LEFT}_w(b \oplus c), \\ \lambda w.\ {}^*\text{LEFT}_w(a \oplus b \oplus c) \end{array} \right\}$

As natural as it is, this solution, however, overgenerates: it predicts unattested interpretations, as we will see next.

[4]It does not help to assume *quién* is ambiguous between a strong singular form and a 'plural' form. Competition between the forms should lead the 'plural' one to imply antiuniqueness, and, so, partial answers where one disjunct is atomic and the other non-atomic should be deviant. Such answers are in fact possible, as illustrated below:

(i) a. ¿Quién marchó?
who.SG left.SG
b. ✓ Al o [Bob y Charles].
Al or [Bob and Charles].

4. Xiang's Challenge.

The examples in (17) and (18) show that *quién* and *quiénes* can combine with collective predicates:

(17) ¿Quién formó un grupo?
who.SG formed.SG a group
'Who formed a group?'

(18) ¿Quién**es** formaron un grupo?
who.PL formed.PL a group
'Who formed a group?'

With collective predicates, neither singular *quién* nor plural *quiénes* questions tolerate answers mentioning an atomic individual. This is expected: since collective predicates are only defined for non-atomic individuals, we expect the questions in (17) and (18) to only allow answers mentioning non-atomic individuals, as in (19).

(19) a. Al, Bob, y Charles [formaron un grupo.]
Al, Bob, and Charles formed.3PL a group
b. Los estudiantes [formaron un grupo.]
the students [formed.3PL a group.]

Answers mentioning multiple non-atomic individuals and conveying that more than one group was formed, as in (20), are also felicitous. This is, however, unexpected. To see why, consider the Hamblin set for (18), in (21). The propositions in (21) are logically independent and ANS should, therefore, presuppose that at most one of them is true. The question in (18) is then expected to presuppose that only group was formed, and to be inconsistent with the answers in (20).

(20) a. Al y Bob [formaron un grupo] y Al y Charles [formaron un grupo.]
Al and Bob [formed.3PL a group] and Al and Charles [formed.3PL a group]
b. Los estudiantes [formaron un grupo] y los profesores [formaron un grupo.]
the students [formed.3PL a group] and the professors [formed.3PL a group]

(21) $\{\lambda w.\ \mathrm{F}_w(a \oplus b), \lambda w.\ \mathrm{F}_w(b \oplus c), \lambda w.\ \mathrm{F}_w(a \oplus c), \lambda w.\ \mathrm{F}_w(a \oplus b \oplus c)\}$

Xiang (2016) applies the same logic to show that ANS wrongly predicts uniqueness for *which* questions with collective predicates. For that reason, we will refer to this argument as 'Xiang's challenge.'

To meet Xiang's challenge while retaining Dayal's ANS operator, we need to find a way to close Hamblin sets under entailment both for distributive and collective predicates.

5. Higher-Order Quantification.

We can close Hamblin sets under entailment both for distributive and collective predicates by moving away from the assumption that *quién* and *quiénes* quantify over regular individuals and assuming (like Xiang does for *wh*- questions in general) that these items range

over generalized quantifiers (GQs) instead. Elliott et al. 2018, in fact, endorse this move for *quién*. We will assume, for illustration, that the GQs over which *quién* and *quiénes* range are conjunctions. *Quién* ranges over those generalized conjunctions that correspond to universal quantification over sets containing atomic or non-atomic individuals, as in (22), and *quiénes* over those generalized conjunctions that correspond to universal quantification over sets containing non-atomic individuals only, as in (23).[5]

(22) a. $[\![\text{quién}]\!]^w = \lambda P_{\langle\langle et,t\rangle,t\rangle}.\ \exists Q \in$ (22-b) $[P(Q)]$
b. $\{\lambda f_{\langle e,t\rangle}.\forall x \in X[f(x)] : X \subseteq D_e\}$

(23) a. $[\![\text{quiénes}]\!]^w = \lambda P_{\langle\langle et,t\rangle,t\rangle}.\ \exists Q \in$ (23-b) $[P(Q)]$
b. $\{\lambda f_{\langle e,t\rangle}.\forall x \in X[f(x)] : X \subseteq D_e^{\oplus}\}$

With distributive predicates, this setup replicates Maldonado's results: the Hamblin set for *quién* contains the 'singular' propositions predicted under a strong semantics for the form, together with their conjunctions, as in (24-b), and the Hamblin set for *quiénes* contains only those conjunctions, as in (25-b).

(24) a. ¿Quién marchó?
who.SG left.SG
b. $\left\{\begin{array}{c}\lambda w.\ \mathrm{L}_w(a), \lambda w.\ \mathrm{L}_w(b), \lambda w.\ \mathrm{L}_w(c),\\ \lambda w.\ \mathrm{L}_w(a) \wedge \mathrm{L}_w(b),\\ \lambda w.\ \mathrm{L}_w(b) \wedge \mathrm{L}_w(c),\\ \lambda w.\ \mathrm{L}_w(a) \wedge \mathrm{L}_w(c),\\ \lambda w.\ \mathrm{L}_w(a) \wedge \mathrm{L}_w(b) \wedge \mathrm{L}_w(c)\end{array}\right\}$

(25) a. ¿Quiénes marcharon?
who.PL left.PL
b. $\left\{\begin{array}{c}\lambda w.\ \mathrm{L}_w(a) \wedge \mathrm{L}_w(b),\\ \lambda w.\ \mathrm{L}_w(b) \wedge \mathrm{L}_w(c),\\ \lambda w.\ \mathrm{L}_w(a) \wedge \mathrm{L}_w(c),\\ \lambda w.\ \mathrm{L}_w(a) \wedge \mathrm{L}_w(b) \wedge \mathrm{L}_w(c)\end{array}\right\}$

The advantage over Maldonado's proposal is that this setup avoids Xiang's challenge. This is so because the predicted Hamblin sets, in (26-b) and (27-b), are now closed under entailment, which means that ANS does not convey anymore that at most one group was formed.[6] Assume, for instance, that two groups were formed, one consisting of $a \oplus b$ (①) and the other of $b \oplus c$ (②). In that case, it follows that there is in (26-b) a maximally informative true proposition, *viz.* ③.

(26) a. ¿Quién formó un grupo?
who.SG formed.PL a group

[5] Where $D_e^{\oplus}$ is the (smallest) set containing all non-atomic individuals.

[6] We assume that the collective predicate *form a group* is only defined for non-atomic individuals. Some of the quantifiers that *quién* ranges over (those ranging over atomic individuals, like $\lambda f_{\langle e,t\rangle}.\forall x \in \{a\}[f(x)]$ yield a proposition defined in no world. We don't represent those propositions in (25-b) (and use '…' instead). The Hamblin sets for *quién* and *quiénes* are equivalent, modulo those propositions. This is in line with the predicted possible answers: both (17) and (18) allow for answers conveying that only one group was formed and for answers conveying that more than one group was formed.

b. $\left\{\begin{array}{l} \ldots, \\ \textcircled{1}\lambda w.\ \mathrm{F}_w(a \oplus b), \\ \textcircled{2}\lambda w.\ \mathrm{F}_w(b \oplus c), \\ \quad \lambda w.\ \mathrm{F}_w(a \oplus c), \\ \textcircled{3}\lambda w.\ \mathrm{F}_w(a \oplus b) \wedge \mathrm{F}_w(b \oplus c), \\ \quad \lambda w.\ \mathrm{F}_w(b \oplus c) \wedge \mathrm{F}_w(a \oplus c), \\ \quad \lambda w.\ \mathrm{F}_w(a \oplus b) \wedge \mathrm{F}_w(a \oplus c), \\ \quad \lambda w.\ \mathrm{F}_w(a \oplus b) \wedge \mathrm{F}_w(b \oplus c) \wedge \mathrm{F}_w(a \oplus c) \end{array}\right\}$

(27) a. ¿Quiénes formaron un grupo?
who.PL formed.PL a group

b. $\left\{\begin{array}{l} \textcircled{1}\lambda w.\ \mathrm{F}_w(a \oplus b), \\ \textcircled{2}\lambda w.\ \mathrm{F}_w(b \oplus c), \\ \quad \lambda w.\ \mathrm{F}_w(a \oplus c), \\ \textcircled{3}\lambda w.\ \mathrm{F}_w(a \oplus b) \wedge \mathrm{F}_w(b \oplus c), \\ \quad \lambda w.\ \mathrm{F}_w(b \oplus c) \wedge \mathrm{F}_w(a \oplus c), \\ \quad \lambda w.\ \mathrm{F}_w(a \oplus b) \wedge \mathrm{F}_w(a \oplus c), \\ \quad \lambda w.\ \mathrm{F}_w(a \oplus b) \wedge \mathrm{F}_w(b \oplus c) \wedge \mathrm{F}_w(a \oplus c) \end{array}\right\}$

Independent motivation for the use of higher-order quantification in *wh*-interrogatives comes from the observation, presented in Spector 2007 and Spector 2008, that such questions can be answered disjunctively and lead to free choice effects. For instance, the question in (28) allows for (complete) disjunctive answers like (29-a), which convey the free choice inference in (29-b).

(28) ¿Con quiénes tienes que hablar?
with whom.PL have.2SG to speak.INF
'With who do you have to speak?'

(29) a. Con Al y Bob o con Al y Charles.
with Al and Bob or with Al and Charles
b. $\rightsquigarrow \Diamond \mathrm{S}_{w_0}(a \wedge b) \wedge \Diamond \mathrm{S}_{w_0}(a \wedge c)$

To derive the free choice inference in (29-b), we need a disjunction scoping under the modal, as in (30).

(30) $\lambda w.\ \Box\ [\mathrm{S}_w(a \oplus b) \vee \mathrm{S}_w(b \oplus c)]$

If *quiénes* quantified over individuals, this proposition would not be in its predicted Hamblin set, in (31). The proposition in (30) can't be derived by disjoining any of the propositions in (31) either.

(31) $$\left\{\begin{array}{l}\lambda w.\ \Box\ \mathrm{S}_w(a \oplus b),\\ \lambda w.\ \Box\ \mathrm{S}_w(b \oplus c),\\ \lambda w.\ \Box\ \mathrm{S}_w(a \oplus c),\\ \lambda w.\ \Box\ \mathrm{S}_w(a \oplus b \oplus c)\end{array}\right\}$$

We can derive (30) by assuming a higher-order *quiénes* ranging over both generalized conjunctions and generalized disjunctions, as in (32), which can scope under the modal, as the LF in (33) illustrates.[7] The Hamblin set that the sister of ANS denotes in the LF in (33) contains the disjunction in (30) (③). When ③ is the maximally informative true answer, ① and ② (which asymmetrically entail ③), are false, predicting the attested free choice inference.[8]

(32) a. $[\![\text{quiénes}]\!]^w = \lambda P_{\langle\langle et,t\rangle,t\rangle}.\exists Q \in$ (32-b) $[P(Q)]$
b. $\{\lambda f_{\langle e,t\rangle}.\forall x \in X[f(x)] : X \subseteq D_e^{\oplus}\} \cup \{\lambda f_{\langle e,t\rangle}.\exists x \in X[f(x)] : X \subseteq D_e^{\oplus}\}$

(33) $[_{\mathrm{CP}}$ OP λp quiénes $\lambda 2\ [_{\mathrm{C}'}\ [_{\mathrm{C}_0}?\ p]\ [\Box\ [t_{2_{\langle et,t\rangle}}[\lambda 1$ you speak with $t_{1_e}]]]]]$

(34) $\{\ ①\lambda w.\ \Box\ \mathrm{S}_w(a \oplus b), ②\lambda w.\ \Box\ \mathrm{S}_w(b \oplus c), ③\lambda w.\ \Box\ [\mathrm{S}_w(a \oplus b) \vee \mathrm{S}_w(b \oplus c)], \ldots\ \}$

Let's sum up. Assuming that both *quién* and *quiénes* range over generalized conjunctions (and disjunctions) allows for a solution to Maldonado's challenge that does not run into Xiang's challenge. Like Maldonado, we have moved beyond Dayal's assumptions: we assume that singular *quién* is weak (in that it ranges over conjunctions and disjunctions formed out of both atomic and non-atomic individuals) and plural *quiénes* is strong (in that it ranges over conjunctions and disjunctions formed out of non-atomic individuals.) This raises a question: can we defend a more conservative account that resorts to higher-order quantification but assumes that singular *quién* is strong and *quiénes* is weak?

6. Higher-Order Quantification and Number.

The idea that the domain of quantification of bare interrogatives might be GQs has been argued for on independent grounds by Elliott et al. (2018). The motivation behind their proposal is to maintain a semantics for number features in accordance with that presented in Sauerland 2003 and Sauerland et al. 2005, where the singular is assumed to be strong

[7] We assume that *quiénes* moves twice, first generating a function of type $\langle e,t\rangle$ and then a function of type $\langle\langle et,t\rangle,t\rangle$.

[8] If ③ is true in w and ① and ② are both false in w, there must be permitted worlds in w where the addressee talks to both a and b and also permitted worlds in w where the addresee talks to both b and c. To see why, suppose that there are no permitted worlds in w where, for instance, the addressee does not talk to both b and c. Since ① is true in w, in all permitted worlds in w either the addressee talks to a and b or to b and c. If there are no permitted worlds in w where the addressee talks to both b and c, then it must be the case that in all permitted worlds in w the addressee talks to a and b, contradicting the assumption that this is not the case.

and the plural weak. This view proposes for *quién* the lexical entry in (35), where it ranges over the generalized conjunctions of atomic individuals.[9]

(35) a. $[\![\text{quién}]\!]^w = \lambda P_{\langle\langle et,t\rangle,t\rangle}.\ \exists Q \in \text{(35-b)}[P(Q)]$
b. $\{\lambda f_{\langle e,t\rangle}.\ \forall x \in X[f(x)] : X \subseteq D_e^\circ\}$

Under this view, the lack of a uniqueness presupposition for singular bare interrogatives is predicted by the fact that the Hamblin sets produced by such questions are closed under entailment. To appreciate this point, consider the Hamblin set for (36-a), in (36-b). The set in (36-b) is predicted to contain in addition to singular propositions the propositions formed from the generalized conjunctions of atomic individuals. This set is then closed under conjunction and, as we have seen before, no uniqueness is predicted.

(36) a. ¿Quién marchó?
who.SG left.SG
b. $\left\{ \begin{array}{c} \lambda w.\ \mathrm{L}_w(a), \\ \lambda w.\ \mathrm{L}_w(b), \\ \lambda w.\ \mathrm{L}_w(c), \\ \lambda w.\ \mathrm{L}_w(a) \wedge \mathrm{L}_w(b), \\ \ldots \end{array} \right\}$

There are challenges for this approach, though. First, recall that singular bare interrogatives can combine with collective predicates such as *form a group*. Under the proposal in (35), this is unexpected. To see why, consider the LF in (37-b). The propositions in the Hamblin set for (37-a) result from combining the conjunctions that *quién* ranges over with a property that is only defined for non-atomic individuals (the property that a non-atomic individual has in a world w if that individual formed a group in w.) By assumption, however, *quién* ranges over conjunctions that will only be defined for properties of atomic individuals, so no proposition in the predicted Hamblin set will be defined in any world.

(37) a. ¿Quién formó un grupo?
who.SG formed.SG a group
'Who formed a group?'
b. $[_{\text{CP}}\ \text{OP}\ \lambda p$ quién $\lambda 2\ [_{\text{C}'}\ [_{\text{C}_0}?\ p]\ [t_{2_{\langle et,t\rangle}}[\lambda 1\ t_{1_e}$formed a group]]]]

Elliott et al. (2018) acknowledge this problem, but, instead of moving beyond their semantics for number, they take the problem to show that the definedness conditions of collective predicates should be rethought. Here, we simply note that the felicity of *quién* with collective predicates follows straightforwardly if it is assumed that the generalized quantifiers over which it ranges quantify over both atomic and non-atomic individuals.

[9] D_e° is assumed to be the domain of atomic individuals. Elliott et al. (2018) assume that in addition to generalized conjunctions, *quién* also ranges over downward entailing quantifiers, such as *nobody*.

The behavior of collective predication with *quién* is not the only challenge for an analysis that assumes that this item ranges over generalized quantifiers defined only for properties of atomic individuals. That type of analysis also runs into problems with the behavior of *quién* and *quiénes* in modal environments. Let us see why.

The argument in favor of generalized disjunctions being available as answers to plural bare interrogatives applies equally to their singular counterparts. Consider, for instance, the sentence in (38):

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

The question in (38) allows for disjunctive answers which offer free choice interpretations, as in (39).

(39) a. Con Al o con Bob y Carl.
with Al or with Bob and Carl
b. $\rightsquigarrow \Diamond S_{w_0}(a) \wedge \Diamond S_{w_0}(b \wedge c)$

Following the same line of reasoning outlined in Section 5, it should be argued that *quién* ranges both over generalized conjunctions and disjunctions, as illustrated in (40).

(40) a. $[\![\text{quién}]\!]^w = \lambda P_{\langle\langle et,t\rangle,t\rangle}.\ \exists Q \in (40\text{-b})[P(Q)]$
b. $\{\lambda f_{et}.\ \forall x \in X[f(x)] : X \subseteq D_e^\circ\} \cup \{\lambda f_{et}.\ \exists x \in X[f(x)] : X \subseteq D_e^\circ\}$

Elliott et al. (2018)'s commitment to strong singulars predicts (39-a) to be unavailable as an answer to a singular bare interrogative. Indeed, this view predicts that only disjunctions of atomic individuals should be available for such questions. In contrast, the availability of answers such as (39-b) follows naturally from the assumption that *quién* is a weak singular (in that it ranges over generalized disjunctions and conjunctions ranging over atomic and non-atomic individuals.)

The theory of number features espoused by Elliott et al. (2018) also has problems with the plural answers produced by plural questions. Following Sauerland 2003 and Sauerland et al. 2005, Elliott et al. assume a weak plural. Let's then take *quiénes* to range over generalized quantifiers which themselves range over both atomic and non-atomic individuals, as in (41):[10]

(41) a. $[\![\text{quiénes}]\!]^w = \lambda P_{\langle\langle et,t\rangle,t\rangle}.\ \exists Q \in (41\text{-b})[P(Q)]$
b. $\{\lambda f_{et}.\ \forall x \in X[f(x)] : X \subseteq D_e\} \cup \{\lambda f_{et}.\ \exists x \in X[f(x)] : X \subseteq D_e\}$

[10]Elliott et al. (2018) assume that *quién*, but not *quiénes*, ranges over generalized quantifiers.

If this were indeed the entry for *quiénes*, the question in (42-a) would be predicted to allow for a disjunctive answer in which one disjunct is atomic and the other plural, as in (42-b). This is unattested. To our ear, (42-a) requires answers naming pluralities.

(42) a. ¿Con quiénes tienes que hablar?
with whom.SG have.2SG to speak.INF
'With who do you have to speak?'
b. Con Al o con Bob y Carl.
with Al or with Bob and Carl

Note that, crucially, the answer in (42-b) should not be blocked by any competition with the singular, as Elliott et al. (2018)'s account predicts that this answer should only be available for the plural. Here too, assuming as we have that *quién* is weak and *quiénes* strong captures these facts with no need for additional stipulations.

7. Conclusion

We have argued in this paper that the interaction of Spanish bare interrogatives with number features cannot simply be accounted for by assuming, as Maldonado (2017a,b) does, that *quién* quantifies over both atomic and non-atomic individuals, whereas the domain of *quiénes* is restricted to non-atomic individuals only.

In order to capture the behavior of bare interrogatives with collective predicates while assuming the presupposition of Dayal's ANS operator, we have proposed that both *quién* and *quiénes* take as arguments properties of generalized quantifiers. This shift in quantificational domain further captures the behavior of bare interrogatives under necessity modals, which allow for disjunctive answers exhibiting free choice inferences, as observed in Spector 2007 and Spector 2008 for complex interrogatives.

We furthermore provided challenges for treating *quién* as ranging over generalized conjunctions and disjunctions over atomic individuals only and *quiénes* as ranging over generalized conjunctions and disjunctions over both atomic and non-atomic individuals. Those challenges do not arise if one follows Maldonado 2017a,b in assuming a weak singular and a strong plural and let *quién* range over generalized conjunctions and disjunctions over both atomic individuals and non-atomic individuals.

The theoretical consequences of these observations on the semantics of number remain unclear. If the claim to be made is that the singular is semantically vacuous in general while the plural restricts itself to non-atomic individuals, one must address a variety of arguments against such a view. Chief among these arguments is the behavior of the plural in downward-entailing environments. As Sauerland et al. (2005) note, (43) cannot be true if John saw an atomic horse but no plurality of horses. However, if the plural of *horse* denotes horse pluralities only, such a context should render the statement true.

(43) John didn't see any horses.

If on the other hand one defends that the semantics of number features varies between bare interrogatives and nominal predicates, one is left with a stipulation which offers little in terms of helping us understand the interaction between number and where in a sentence it occurs.

In addition to these questions, one is left with an important puzzle. Notice that under the view that the disjointness of the domains of singular and plural *which*-questions is the result of competition, one must explain why this competition does not result in the disjointness of the domains of singular and plural bare interrogatives. In other words, why is it that singular *which*-questions carry a uniqueness presupposition absent from their bare counterparts? A possible line of answer, explored by Rullmann and Beck 1998 and Hirsch and Schwarz 2019, would be to argue that the obligatory uniqueness of singular *which*-phrases stems from the lexical properties of *which* itself.

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