Who and what do *who* and *what* range over cross-linguistically?

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Abstract Dayal's (1996) account of the presuppositions of *wh*-questions makes faulty predictions for languages which draw number distinctions in the domain of simplex *wh*-expressions: Dayal predicts that a singular *wh*-expression should always give rise to a *Uniqueness Presupposition*; the *Anti-Singleton Inference* associated with its plural counterpart is expected to be parasitic on the uniqueness presupposition. We provide new data from Spanish and Hungarian, where simplex *wh*-expressions inflect for number. We claim that singular simplex *wh*-expressions do not give rise to a Uniqueness Presupposition, but plural simplex *wh*-expressions nonetheless give rise to an Anti-Singleton Inference. We provide an analysis of these facts that is consistent with Dayal's account of constituent questions, by assigning simplex *wh*-expressions a type-flexible denotation.

Keywords: plurality, questions, quantification, *Maximize Presupposition!*, polymorphism

1 Overview

Simple *wh*-phrases like *who* trigger singular agreement on the verb in English, but nevertheless allow plural answers: E.g. the question-answer pair in (1) is fully grammatical and coherent.

(1) a. Q: who wrote that paper?
    b. A: Jeroen, Martin and Frank.

The best current analysis of the effect of number on simple and complex *wh*-phrase is due to Dayal (1996). In this paper, we observe that Dayal's (1996) classical account of the presuppositions of *wh*-questions makes faulty predictions for languages which draw number distinctions in the domain of simplex *wh*-expressions. The problem, in short, is as follows: Dayal predicts that a singular *wh*-expression should always give rise to a *Uniqueness Presupposition* (UP); the *Anti-Singleton*

Inference (ASI) associated with its plural counterpart is parasitic on the UP. Dayal's analysis is tailored to account for the properties of *which*-questions. Once we look beyond languages such as English, to languages where simplex *wh*-expressions such as *who* inflect for number, we observe that singular simplex *wh*-expressions do not give rise to a UP, but plural simplex *wh*-expressions nevertheless give rise to an ASI. This is unexpected, according to Dayal's theory.

We consider and dismiss two possible approaches to solving this problem:

i. Dispensing with Dayal's answerhood operator.

ii. Dispensing with the so-called "weak" theory of plurality (Sauerland, Anderssen & Yatsushiro 2005 and others) in the domain of simplex *wh*-expressions

We argue that both would amount to ad-hoc solutions to the problem. Rather we provide an analysis that maintains both Dayal's theory of constituent questions and the weak theory of plurality, by positing higher-order meanings for simplex *wh*-expressions.

In §2, we introduce the basic facts concerning the interpretation of constituent questions in English, and Dayal's analysis. In §3, we introduce data from Spanish and Hungarian – languages in which simplex *wh*-expressions are inflected for number. The prediction, based on Dayal's analysis, is that singular simplex *wh*-expressions should give rise to a UP. This turns out to be false. In §4, we show how to reconcile Dayal's theory with the cross-linguistic data, by allowing simplex *wh*-expressions to range over higher-order semantic objects. In §6, we conclude with some consequences and open questions arising from our analysis.

2 Background

A constituent question formed with a singular *which*-phrase carries a *Uniqueness Presupposition* (UP), as illustrated by the infelicity of the answer in (2b) to the question in (2).

(2) Which employee left early?

a. Moss left early.

b. #Roy and Moss left early.

A constituent question formed with a plural *which*-phrase (a plural *which*-question), on the other hand, carries an *Anti-Singleton Inference* (ASI), as illustrated by the infelicity of the answer to (3a) to the question in (3).[1]

1 At this stage, we adopt UP and ASI as descriptive terms, without commitment to the precise status of the meaning component under consideration.

(3) Which employees left early?

a. #Roy left early.

b. Roy and Moss left early.

The standard account of the UP of singular *which*-questions is due to Dayal (1996). Dayal's analysis rests on the following two premises: (i) singular *which*-phrases range over atomic individuals *only*, and (ii) the *Maximal Informativity Principle* (MIP), stated informally in (4).

(4) *Maximal Informativity Principle (*MIP*)*
A question Q presupposes the existence of a unique, maximally-informative true answer to Q.

For concreteness, we capture the principle in (4) via a covert, presuppositional *answerhood operator* ANS at LF, with the semantics in (5). It is intuitive to think of ANS as the correlate of the definite determiner *the* in the propositional domain. It takes a set of propositions Q, and an evaluation world w, presupposes that there is a unique $p \in Q$ s.t. p is true in w, and p entails every other true member of Q, and returns that p.

(5) $\text{ANS}_w(Q) = \iota p \in Q[p(w) \wedge \forall p' \in Q[p'(w) \rightarrow p \subseteq p']]$

Following Hamblin (1973) and Karttunen (1977), Dayal assumes that questions denote answer-sets. Suppose that, in the world of evaluation @, the extension of $\mathsf{employee}_@$ is as in (6). This means that the denotation of the question (2) will be the set of propositions $\{①, ②, ③\}$ in (7).

(6) $[\![\mathsf{employee}_@]\!] = \{\mathsf{Roy}, \mathsf{Moss}, \mathsf{Jen}\}$

(7) $$[\![\text{which employee left early?}]\!] = \left\{\begin{array}{l} ①\,\mathsf{that\ Roy\ left\ early,} \\ ②\,\mathsf{that\ Moss\ left\ early,} \\ ③\,\mathsf{that\ Jen\ left\ early} \end{array}\right\}$$

Suppose that in @, only Moss in fact left early. In this instance, only ② is true. It follows that the question in (7) has a unique true answer, and therefore the MIP is satisfied. The maximal-informativity requirement in particular is vacuously satisfied.

Suppose now that in @, both Roy and Moss, and nobody else in fact left early. In this instance, both ① and ② are true, but ③ is false. Furthermore, ① and ② are equally informative, i.e., ① does not entail ②, and ② does not entail ①. The MIP is therefore not satisfied in such an instance, and this is reflected by the infelicity of the answer in (2b).

According to Dayal's account then, the UP of singular *which*-questions is not lexically triggered, e.g., by *which*, but rather is an epiphenomenon that arises due to the interaction between semantic singularity and the MIP.

What about the ASI in (3)? The ASI can straightforwardly be accounted for as a reflex of the pragmatic principle *Maximize Presupposition!* (MP!) (Heim 1991, Sauerland 2008), building on Dayal's account of the UP. An informal statement of MP! is given in (8).

(8) *Maximize Presupposition! (informal)* (Heim 1991)
Do not use ϕ if there is a presuppositionally stronger $\psi \in \mathsf{alt}(\phi)$.

Concretely, we follow Sauerland, Anderssen & Yatsushiro (2005) in assuming that morphosyntactically plural expressions range over both atomic individuals and groups (although this is not crucial here). The denotation of $\mathsf{employees}_@$ is therefore the set given in (9), i.e. the closure of the set of atomic employees under the sum-formation operator $\oplus$. The denotation of the question in (3) is the set of propositions in (10). Suppose that, in @, both Roy and Moss in fact left early. In such a scenario, the propositions ①, ②, and ③ are all true. There is a unique, maximally-informative proposition, namely ③. ③ entails both ① and ②[2], but is neither entailed by ① nor ②. This correctly predicts that (3b) is a felicitous answer to the question in this scenario.

(9) $$[\![\mathsf{employees}_@]\!] = \left\{ \begin{array}{c} \mathsf{Roy}, \mathsf{Moss}, \mathsf{Jen}, \\ \mathsf{Roy} \oplus \mathsf{Moss}, \mathsf{Roy} \oplus \mathsf{Jen}, \mathsf{Moss} \oplus \mathsf{Jen}, \\ \mathsf{Roy} \oplus \mathsf{Moss} \oplus \mathsf{Jen} \end{array} \right\}$$

(10) $$[\![\text{which employees left early}]\!] = \left\{ \begin{array}{l} \text{①}\,\mathsf{that\ Roy\ left\ early} \\ \text{②}\,\mathsf{that\ Moss\ left\ early} \\ \quad\mathsf{that\ Jen\ left\ early} \\ \text{③}\,\mathsf{that\ Roy} \oplus \mathsf{Moss\ left\ early,} \\ \quad\mathsf{that\ Roy} \oplus \mathsf{Jen\ left\ early,} \\ \quad\mathsf{that\ Moss} \oplus \mathsf{Jen\ left\ early,} \\ \quad\mathsf{that\ Roy} \oplus \mathsf{Moss} \oplus \mathsf{Jen\ left\ early} \end{array} \right\}$$

Now suppose that, in @, in fact only Moss left early. In this instance, the set in (10) only has a single true member: ③. Recall the principle *Maximize Presupposition!* in (8). We assume that *which employee left?* is an alternative to *which employees left?*. As we have seen, *which employee left?* presupposes that a unique

2 In this particular instance, the entailment goes through in this direction due to the fact that *leave early* is a distributive predicate. In other words, if the group consisting of *Roy* and *Moss* left early, we may infer that Roy left early, and we may infer that Moss left early.

employee left, due to the MIP. By the logic of *Maximize Presupposition!* then, since the speaker chose not to use the singular alternative, the speaker must not be certain that its presupposition is defined, i.e. they must not be certain that a unique employee left. In this way, we derive the ASI.

Questions formed with simplex *wh*-expressions (simplex *wh*-questions) carry neither a UP nor an ASI, patterning with neither singular nor plural *which*-questions. Note furthermore that simplex *wh*-expressions are morphosyntactically singular, as diagnosed by the fact that they trigger singular agreement, as illustrated in (11).[3]

(11) Who {is | *are} leaving early?

  a. Roy is leaving early.
  b. Roy and Moss are leaving early.

If *who* were *semantically* singular, then the MIP would predict that *who*-questions should carry a UP, but this is evidently not the case. To avoid this faulty prediction, Dayal conjectures that simplex *wh*-expressions are in fact number neutral – that is to say, that they range over both atomic individuals and pluralities. Note that according to the weak theory of plurality, this essentially amounts to saying that simplex *wh*-expressions are semantically plural. We can account for the lack of the ASI due to the absence of a semantically singular competitor.[4]

Dayal's account of the apparently exceptional behaviour of simplex *wh*-expressions therefore rests on an idiosyncratic lexical property – simplex *wh*-expressions in languages like English, despite being morphosyntactically singular, are semantically number-neutral (plural). Mismatches between morphosyntactic and semantic numerosity are not unheard of.[5]

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3 There seem to be certain environments in which some speakers accept plural agreement with a simplex *wh*-expression.

(i) Who are a happy couple?
Roy and Moss are a happy couple.

Our impression is that speakers are likely to accept plural agreement with a simplex *wh*-expression, when the predicate is a collective atom predicate, according to Winter's (2001) classification schema. It is a matter for further research to determine exactly the conditions under which simplex *wh*-expressions in English may trigger plural agreement.

4 Note that this reasoning relies on the assumption that, e.g., *which person* does not count as a competitor to *who* for the purposes of *Maximise Presupposition*. This seems reasonable in light of recent work on the nature of alternatives, arguing that alternatives to an expression α should be structurally simpler, or at most as complex as α (Katzir 2008, Fox & Katzir 2011).

5 Consider, e.g., the case of group DPs, such as *the committee*, or *my family*, which despite being morphosyntactically singular (at least in certain varieties of English), show many of the hallmarks of semantic plurality, such as compatibility with collective predicates, as illustrated in (1).

3 Cross-linguistic data

Both Spanish and Hungarian, much like English, have both *which*-phrases (i.e., complex *wh*-phrases with a nominal restrictor) and simplex *wh*-expressions. Singular *which*-phrases give rise a UP, much like in English – this is illustrated for Spanish in (12) and for Hungarian in (14). Plural *which*-phrases give rise to an ASI, again, much like in English – this is illustrated for Spanish in (13) and for Hungarian in (15).

(12) Qué chico se fue pronto? — Spanish singular *which*-Q: ✓UP
Which boy.SG REFL left early?
a. John left early.
b. #John and Bill left early.

(13) Qué chicos se fueron pronto? — Spanish plural *which*-Q: ✓ASI
Which boy.PL REFL left early?
a. #John left early.
b. John and Bill left early.

(14) Melyik fiú ment el? — Hungarian singular *which*-Q: ✓UP
which boy.SG goes away?
a. John went away.
b. #John and Bill went away.

(15) Melyik fiú-k men-t-ek el? — Hungarian plural *which*-Q: ✓ASI
which boy.PL went away?
a. #John went away.
b. John and Bill went away.

When we turn to simplex *wh*-expressions however, the facts are more surprising. In both Spanish and Hungarian, unlike in English, simplex *wh*-expressions inflect for number – there is a morphological distinction between *who*.SG and *who*.PL. As illustrated in (16), a simplex *wh*-expression formed with *who*.SG carries neither a UP nor an ASI, as reflected by the acceptability of the answers in (16a) and (16b). The same facts obtain in Hungarian, as illustrated in (17).

(16) Quién se fue pronto? — Spanish singular simplex *wh*-Q: ✗UP
Who.SG REFL left early?

(i) The committee gathered.

Authors such as Bennett (1974), Pearson (2011), Magri (2012) have argued that group DPs should be analysed as semantically plural yet morphosyntactically singular.

a. John left early.

b. John and Bill left early.

(17) Ki énekel? — Hungarian singular simplex *wh*-Q: ✗UP
who.SG sings?

a. John sings.

b. John and Mary sing.

Recall that, according to the analysis of the ASI with plural *which*-questions outlined in the previous section, the derivation of the ASI relies on a competitor with a UP, via the logic of *Maximize Presupposition!*. Given that a question formed with *who.*SG in Spanish/Hungarian does not carry a UP, setting aside that this is itself mysterious, the prediction is that a question formed with *who.*PL should not carry an ASI. Surprisingly, however, questions formed with *who.*PL in Spanish/Hungarian *do* carry an ASI, as illustrated by the examples in (18) and (19) for Spanish and Hungarian respectively.

(18) Quiénes se fueron pronto? — Spanish plural simplex *wh*-Q: ✓ASI
Who.PL REFL left early?

a. #John left early.

b. John and Bill left early.

(19) Ki-k énekel-nek? — Hungarian plural simplex *wh*-Q: ✓ASI
who.PL sing?

a. #John sings.

b. John and Mary sing.

To briefly summarise, simplex *wh*-questions in languages with *who.*SG and *who.*PL raise two problems for Dayal's classical analysis of constituent questions, and our extension to the ASI based on *Maximize Presupposition!*: (i) questions formed with *who.*SG fail to give rise to a UP, despite the fact that singular *which*-questions carry a UP, and (ii) questions formed with *who.*PL give rise to an ASI, despite the fact that their singular competitor does not give rise to a UP. Our results are schematized in table 1.

3.1 Possible responses

Here we briefly consider and dismiss two possible responses for the issues raised by the cross-linguistic data for Dayal's theory. The first and most obvious option would be to claim that number morphology on simplex *wh*-expressions is semantically inert – both *who.*SG and *who.*PL are semantically plural. This would account for

	English	Spanish/Hungarian
who.SG *Q*	✗UP	✗UP
who.PL *Q*	–	✓ASI
which NP.SG *Q*	✓UP	✓UP
which NP.PL *Q*	✗ASI	✗ASI

Table 1 Presuppositions of *wh*-questions

the lack of a UP with *who*.SG, but it would fail to account for the ASI with *who*.PL. Furthermore, this would lead to a lack of congruity between the morphology and the semantics, leading to concomitant learnability issues. We believe therefore that this option should be dispreferred on both empirical and conceptual grounds.

Another possibility would be to claim that *who*.SG is *number neutral* (Dayal's suggestion), whereas *who*.PL is interpreted as an *exclusive plural*. That is to say that *who*.SG quantifies over atomic individuals and pluralities, whereas *who*.PL quantifies over pluralities only. Adopting an exclusive interpretation for *who*.PL would account for the ASI, but this would beg the question of why *who*.SG does not acquire a UP via competition with *who*.PL, since the two competitors are in a superset-subset relation. There are also good reasons to believe that in the general case, plural expressions range over both atomic individuals and pluralities,[6] so this would amount to a construction-specific stipulation, tailored to account for the contribution of number in this particular environment.

4 Analysis

4.1 Plurality

To begin with, we lay out our assumptions concerning the semantic contribution of number morphology. Following Sauerland (2003) and Sauerland, Anderssen & Yatsushiro (2005) for concreteness, we assume that NPs are inherently plural – that is to say that they range over both atomic individuals and groups. Furthermore,

6 For example, Sauerland, Anderssen & Yatsushiro observe that plural indefinites in downward entailing contexts range over both pluralities *and* atoms.

(i) a. Kai hasn't found any eggs.

b. Kai has found no eggs.
$\rightsquigarrow$ *It's not the case that Kai has found one or more eggs*
$\not\rightsquigarrow$ *It's not the case that Kai has found more than one egg*
Sauerland, Anderssen & Yatsushiro (2005: p. 419)

the singular feature SG is taken to be presuppositional – specifically, it denotes a partialized identity function of type $\langle \mathsf{e}, \mathsf{e} \rangle$, as in (20a). The plural feature PL, on the other hand, is simply semantically vacuous – it denotes the identity function of type $\langle \mathsf{e}, \mathsf{e} \rangle$, as in (20b). This is the so-called "weak" theory of plurality (see Sauerland, Anderssen & Yatsushiro 2005 for extensive arguments).

(20) a. $[\![\text{SG}]\!] = \lambda x_{\mathsf{e}} : \mathsf{atom}_{@}(x) = 1\,.\,x$
b. $[\![\text{PL}]\!] = \lambda x_{\mathsf{e}}\,.\,x$

Due to the way that the number features are typed, they do not compose with NPs, but rather with DPs of type e. When the DP with which they compose is of a quantificational type (as is the case with *wh*-expressions), the DP moves and the number feature composes with its trace. We illustrate this idea in more detail in the next section.

4.2 Question composition

For concreteness, we assume that *wh*-phrases are existential quantifiers. The denotation assumed for *which employee* is given in (21). The denotation assumed for the interrogative complementizer, which we take to be responsible for the shift from a propositional type to a question type, is given in (22). Following, e.g., Sauerland (1998: p. 243), we assume that C_Q composes first with a propositional variable, which later in the derivation gets bound by a lambda operator, in order to derive a Hamblin-Karttunen question denotation.[7]

(21) $[\![\text{which employee}]\!] = \lambda P_{\langle \mathsf{e},\mathsf{t} \rangle}\,.\,\exists x[\mathsf{employee}_{@}(x) \wedge P(x)]$

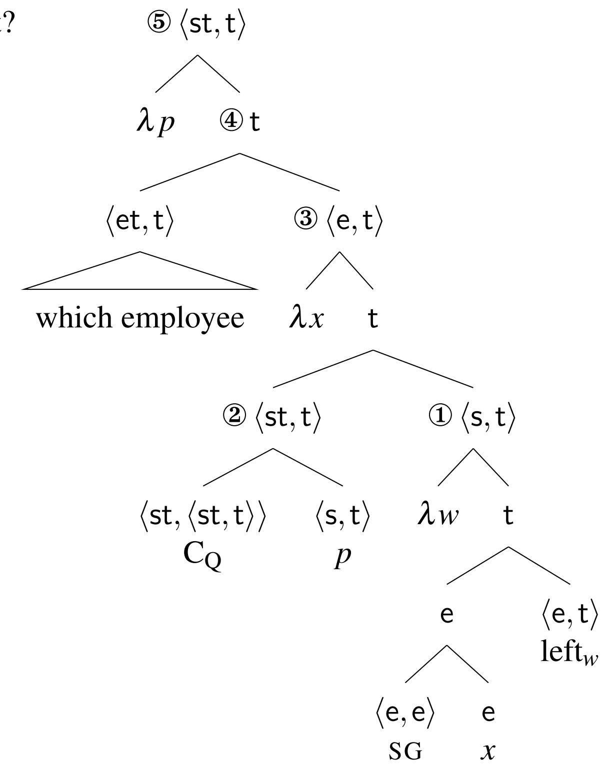
7 Sauerland (1998) notes that the introduction of the λp operator at the CP level is construction-specific, and therefore non-compositional. We adopt this assumption here for purely expository purposes.

There are a number of ways in which the LF in (23) can be re-analyzed compositionally, while achieving the same results. Fox (2012), inspired by Shimada's (2007) view of head movement, assumes that C_Q composes first with an answerhood operator, which moves, leaving behind a propositional variable. Heim (1994) and Cresti (1995) achieve the same result compositionally by assigning *wh*-expressions a higher type ($\langle\langle \mathsf{e}, \langle \mathsf{st}, \mathsf{t} \rangle\rangle, \langle \mathsf{st}, \mathsf{t} \rangle\rangle$), although this obscures the parallel between *wh*- and existential quantifiers. Both approaches, as far as we can tell, are compatible with our analysis.

(22) $[\![\mathrm{C_Q}]\!] = \lambda q_{\langle \mathsf{s,t} \rangle} \,.\, \lambda p_{\langle \mathsf{s,t} \rangle} \,.\, p = q$

Given the assumptions outlined above, the LF assumed for a simple constituent question is given in (23). Note that, due to the semantics we assume for number morphology, outlined in the previous section, the number feature SG applies to the type e trace left behind by *wh*-movement.[8] The details of the derivation are given in (24).[9]

(23) Which employee left?



(24) a. $[\![①]\!] = \lambda w : \mathsf{atom}_{@}(x) = 1 \,.\, \mathsf{left}_w(x)$

b. $[\![②]\!] = \lambda q \,.\, p = q$

c. $[\![③]\!] = \lambda x : \mathsf{atom}_{@}(x) = 1 \,.\, p = \lambda w \,.\, \mathsf{left}_w(x)$

d. $[\![④]\!] = 1 \text{ iff } \exists x : \mathsf{atom}_{@}(x) \begin{bmatrix} \mathsf{employee}_{@}(x) \\ \wedge\, p = \lambda w \,.\, \mathsf{left}_w(x) \end{bmatrix}$

8 More generally, Sauerland (2003) argues explicitly that number features apply to DPs (i.e. expressions of type e), rather than NPs (i.e. expressions of type $\langle \mathsf{e,t} \rangle$).

9 Note that for expository simplicitly, all nouns and nominal features are assumed to be interpreted rigidly or *de re*.

e. $[\![⑤]\!] = \lambda p \,.\, \exists x : \mathsf{atom}_{@}(x) \begin{bmatrix} \mathsf{employee}_w(x) \\ \wedge\, p = \lambda w \,.\, \mathsf{left}_w(x) \end{bmatrix}$

4.3 Simplex *wh*-expressions

Unlike complex *which*-phrases, which we assume denote rigidly-typed existential quantifiers over individuals (type $\langle \mathsf{et}, \mathsf{t} \rangle$), we claim that simplex *wh*-expressions can additionally quantify over higher-order semantic objects, such as quantifiers.[10] Ignoring phi features, the denotation we assume for *who* is given in (25). Simplex *wh*-expressions are taken to quantify over members, of D_σ, where σ is a variable over types in Σ. We give a recursive characterisation of Σ in (26), and an extensional characterisation in (27).

(25) $[\![\text{who}]\!] = \lambda P_{\langle \sigma, \mathsf{t} \rangle} \,.\, \exists x_\sigma [P(x)]$ $\qquad \sigma \in \Sigma$

(26) $\sigma \in \Sigma \text{ iff } \begin{cases} \sigma = \mathsf{e} \\ \sigma = \langle \sigma_1, \mathsf{t} \rangle \quad \text{where } \sigma_1 \in \Sigma \end{cases}$

(27) $\Sigma = \{\mathsf{e}, \langle \mathsf{e}, \mathsf{t} \rangle, \langle \langle \mathsf{e}, \mathsf{t} \rangle, \mathsf{t} \rangle, \langle \langle \langle \langle \mathsf{e}, \mathsf{t} \rangle, \mathsf{t} \rangle, \mathsf{t} \rangle, \mathsf{t} \rangle, \ldots \}$

A consequence of our claim that simplex *wh*-expressions are type-flexible is that questions involving simplex *wh*-expressions are in principle ambiguous. If $\sigma = \mathsf{e}$, then the result is essentially the same as the LF in the previous section for a simple *which*-question. If $\sigma = \langle \mathsf{et}, \mathsf{t} \rangle$ however, things get more interesting. The resulting interpretation that obtains for *who* is given in (28).

(28) $[\![who_{\sigma = \langle \mathsf{et}, \mathsf{t} \rangle}]\!] = \lambda P_{\langle \langle \mathsf{et}, \mathsf{t} \rangle, \mathsf{t} \rangle} \,.\, \exists Q_{\langle \mathsf{et}, \mathsf{t} \rangle} [P(Q)]$

Due to the way that $who_{\sigma = \langle \mathsf{et}, \mathsf{t} \rangle}$ is typed, it should leave behind a trace of type $\langle \mathsf{et}, \mathsf{t} \rangle$. However, recall that number features may only compose with expressions of type e. For composition to proceed, we must additionally QR the trace

10 We are not the first to suggest that *wh*-expressions may quantify over higher-order semantic objects; Spector (2007) claims that the question in (1) has two distinct interpretations: (1a) and (1b).

(i) Which books does Jack have to read? (Spector 2007: p. 289)

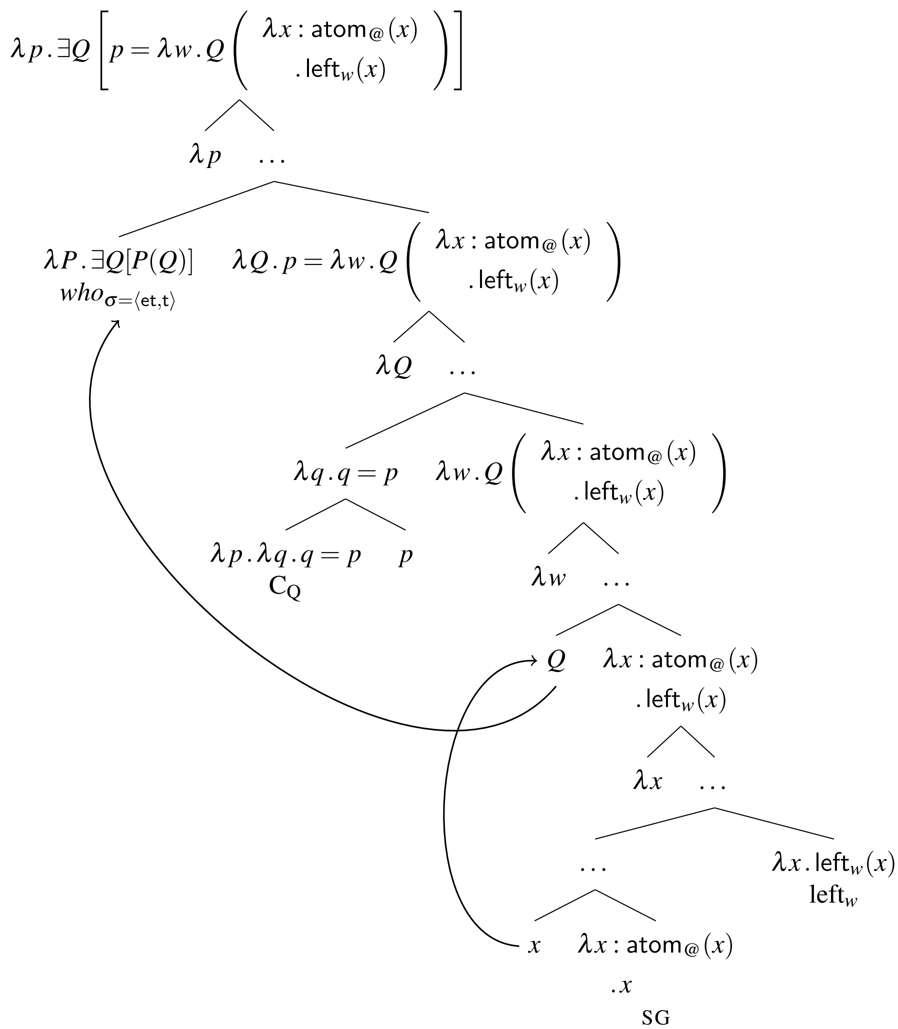
a. $\rightsquigarrow$ *For which books x, is it the case that Jack must read x?*

b. $\rightsquigarrow$ *For which generalised quantifier G over books, must Jack read G?*

Without going into the details of the proposal, Spector suggests that *which books* is ambiguous in roughly the same way we have suggested that simplex *wh*-phrases are ambiguous. It will be important for our proposal however that only *simplex wh*-expressions are ambiguous in this way. We leave a detailed reconsideration of data brought to light by Spector to future work.

of $who_{\sigma=\langle \mathsf{et,t} \rangle}$, leaving behind a variable of type e. The composition of a simplex *wh*-questions involving $who_{\sigma=\langle \mathsf{et,t} \rangle}$.SG is given in (29).

(29) Who left?



In order to see how the LF in (29) accounts for the lack of a UP in questions involving *who*.SG, consider the extension of (29), where $D_\mathsf{e} = \{ \mathsf{Roy}, \mathsf{Moss}, \mathsf{Jen} \}$ in @. Let's assume that Roy and Moss left in @, and Jen didn't leave in @.

The question extension in (30) is the set of propositions $\lambda w \,.\, Q(\lambda x : \mathsf{atom}(x) \,.\, \mathsf{left}_w(x))$, where Q is a quantifier, i.e., a set of sets, which includes the set of atomic individuals that left. In this case, the set of atomic individuals that left is $\{ \mathsf{R}, \mathsf{M} \}$, so the true members of the question extension are those where Q is a set of sets including $\{ \mathsf{R}, \mathsf{M} \}$, and possibly others. Concretely, ① and ② are both true members of the answer set.

(30) $$\lambda p \,.\, \exists Q \left[p = \lambda w \,.\, Q \left(\begin{array}{c} \lambda x : \mathsf{atom}_{@}(x) \\ .\, \mathsf{left}_w(x) \end{array} \right) \right]$$

$$= \left\{ \begin{array}{l} \lambda w \,.\, \{\{\mathsf{R}\}\}(\lambda x : \mathsf{atom}_{@}(x) \,.\, \mathsf{left}_w(x)), \\ \lambda w \,.\, \{\{\mathsf{M}\}\}(\lambda x : \mathsf{atom}_{@}(x) \,.\, \mathsf{left}_w(x)), \\ \lambda w \,.\, \{\{\mathsf{J}\}\}(\lambda x : \mathsf{atom}_{@}(x) \,.\, \mathsf{left}_w(x)), \\ ①\lambda w \,.\, \{\{\mathsf{R},\mathsf{M}\}\}(\lambda x : \mathsf{atom}_{@}(x) \,.\, \mathsf{left}_w(x)), \\ ②\lambda w \,.\, \{\{\mathsf{R}\},\{\mathsf{R},\mathsf{M}\}\}(\lambda x : \mathsf{atom}_{@}(x) \,.\, \mathsf{left}_w(x)), \\ \lambda w \,.\, \{\{\mathsf{R},\mathsf{J}\}\}(\lambda x : \mathsf{atom}_{@}(x) \,.\, \mathsf{left}_w(x)), \\ \lambda w \,.\, \{\{\mathsf{R},\mathsf{M},\mathsf{J}\}\}(\lambda x : \mathsf{atom}_{@}(x) \,.\, \mathsf{left}_w(x)), \\ \ldots \end{array} \right\}$$

Recall the MIP in (31) (repeated from (4)):

(31) *Maximal Informativity Principle* (MIP)
A question Q presupposes the existence of a unique, maximally-informative true answer to Q.

The answer-set in (30) has a maximally-informative true answer – namely, the proposition where Q contains the set consisting of Roy and Moss, and no other sets, ①. This asymmetrically entails all other true members of the answer-set, such as ②. Note that SG is still semantically active – if Q is the set $\{\{\mathsf{R} \oplus \mathsf{M}\}\}$, then the resulting proposition is undefined.

Just so long as σ is resolved to type $\langle \mathsf{et}, \mathsf{t} \rangle$ then, singular simplex *wh*-questions are correctly predicted to not necessarily give rise to a UP. As we have seen, however, plural simplex *wh*-questions still give rise to an ASI, despite the fact that their singular counterpart does not give rise to a UP. This is relatively straightforward to account for according to our analysis; we must simply assume that $\phi[who_{\sigma=\mathsf{e}}.\text{SG}]$ is always an alternative to $\phi[who_{\sigma}.\text{PL}]$ for the purposes of *Maximize Presupposition!*. $who_{\sigma=\mathsf{e}}$ *left?* globally presupposes that a unique individual left, much like a singular *which*-question, and therefore, by the logic of *Maximize Presupposition!*, $who_{\sigma}.\text{PL}$ *left?* gives rise to the implicated presupposition that the speaker does not believe that a unique individual left.

4.4 Distinguishing between *who* and *which*

Why is it that simplex *wh*-expressions may range over higher-order semantic objects, whereas *which*-phrases may not? We suggest here that this is due to their respective semantic decomposition. Both simplex *wh*-expressions and *which*-phrases can be decomposed into an abstract morpheme WH, responsible for the quantificational force of the *wh*-expression, and a restrictor. WH has a type-flexible denotation, as given in (32). The restrictor of a *which*-phrase is a (rigidly-typed) NP, which denotes a property of type $\langle \mathsf{e}, \mathsf{t} \rangle$. The restrictor of a simplex *wh*-expression, on the other hand, is a type-flexible domain variable of type $\sigma \in \Sigma$. The decomposition of a simplex *wh*-expression is given in (33).

(32) $[\![\text{WH}]\!] = \lambda P_{\langle \sigma, \mathsf{t} \rangle} \,.\, \lambda Q_{\langle \sigma, \mathsf{t} \rangle} \,.\, \exists x_\sigma [P(x) \wedge Q(x)]$ $\qquad \sigma \in \Sigma$

(33)

$$\ldots$$

$$\underset{\text{WH}}{\langle \sigma\mathsf{t}, \langle \sigma\mathsf{t}, \mathsf{t} \rangle \rangle} \qquad D_\sigma$$

This concludes our basic analysis of the absence of a uniqueness presupposition with singular simplex *wh*-expressions. In the next section, we address the character of the anti-singleton inference in more detail, which will require an elaboration of the principle of *Maximize Presupposition!*.

5 *Maximize Presupposition!* and Ignorance Contexts

Maldonado (2017) presents interesting facts from Spanish concerning the choice between singular *quien* ('who') and plural *quienes* ('who') in contexts where the speaker is ignorant concerning the numerosity of the entity questioned. Maldonado reports correctly that these facts are outside the scope of an earlier version of our analysis. In this section we address her criticism, and show that her data follow naturally from the current analysis once we refine our view of *Maximize Presupposition!*, based on independently motivated work building on Heim's (1991) original proposal.

5.1 Local *Maximize Presupposition!*

Heim's original formulation of *Maximize Presupposition!*, repeated in (34), is based on a Gricean view of pragmatics, according to which maxims apply globally to speech acts.

(34) *Maximize Presupposition! (informal)* (Heim 1991)
Do not use ϕ if there is a presuppositionally stronger $\psi \in \mathsf{alt}(\phi)$.

Percus's (2006) example (35) illustrates a serious problem for Heim's global formulation of *Maximize Presupposition!*.

(35) a. Everyone with exactly two students assigned the same exercise to both his students.

Presupposition: *Everyone with exactly two students has exactly two students.*

b. #Everyone with exactly two students assigned the same exercise to all his students.

According to independently known facts about presupposition projection, universally quantified sentences display a universal projection pattern (Karttunen & Peters 1979, Heim 1982, etc.). (35a) is therefore predicted to presuppose a tautology, due to the presence of the presupposition trigger *both* in the scope of the universal. To presuppose a tautology is to be defined in every world, and thus essentially to not place any requirements on the context. (35b) does not contain any presupposition trigger,[11] and is therefore not predicted to carry any presuppositions. *Maximize Presupposition!*, as stated, should not apply here, since neither sentence is presuppositional. Nonetheless, as Percus (2006) points out, the infelicitly of (35b) seems reminiscent of effects associated with *Maximize Presupposition!*.

Singh (2011) observes that (35b) contains embedded within it the sentence *x assigned the same exercise to all his students*, which via *Maximize Presupposition!* would give rise to an implicated presupposition: *that the speaker is not certain that x has exactly two students*. Pursuing this intuition, Singh proposes that *Maximize Presupposition!* should apply not just globally but also at embedded positions. Informally, this means that *Maximize Presupposition!* is checked for *x assigned the same exercise to all his students*, giving rise to the implicated presupposition that *the speaker is not certain that x has exactly two students*. This projects through the universally quantified sentence in the usual way, giving rise to the presupposition: *everyone with exactly two students is such that the speaker is not certain that they have exactly two students*, thus explaining the oddness of the sentence.

For concreteness, we can cash this idea out by treating *Maximize Presupposition!* as the reflex of a covert operator EXH, following existing proposals by Magri (2012) and Marty (2017).[12,13] For concreteness, we adopt a slightly modified version of Magri's formulation, after Marty's (2017: p. 243) exposition. Magri assumes a bi-dimensional theory of presupposition in the style of Karttunen & Peters (1979), according to which a sentence ϕ denotes a pair consisting of two propositions – its

11 Arguably, universal quantifiers carry an existential presupposition, which we ignore here.

12 See also Spector & Sudo (2017) and Anvari (2018) for different analyses of the way in which presuppositions and implicature interact.

13 It is not crucial for our analysis that *Maximize Presupposition!* is the reflex of a covert syntactic operator. Singh's (2011) local formulation of *Maximize Presupposition!* relies on the notion of *local context* from the dynamic semantics literature (see, e.g., Heim 1982). We do not adopt Singh's formulation here since, to our knowledge, the *local context* of a clause embedded under an attitude verb has not been made formally precise.

assertion, and its presupposition, i.e., $[\![\phi]\!] = \langle \phi_{prs}, \phi_{asr} \rangle$.[14] EXH, as defined in (36), applies to a constituent ϕ, and returns a pair consisting of its strengthened presupposition and its strengthened assertion. The assertive component, which is used to derive scalar implicatures, is largely orthogonal to our concerns here, and so we will focus on the strengthened presupposition, which is defined in (37).[15] For a given constituent ϕ, the excludable presuppositional alternatives, EXCL_{prs}, are those alternatives ψ, the presuppositions of which are non-logically-weaker than the presuppositions of ϕ. The strengthened presupposition of ϕ consists of the presupposition of ϕ conjoined with negations of the presuppositions of every alternative ψ in EXCL_{prs}.

(36) $[\![[\text{EXH } \phi]]\!] = \langle \text{EXH}_{prs}(\phi_{prs}), \text{EXH}_{asr}(\phi_{asr}) \rangle$

(37) **Strengthened Presupposition**

a. $\text{EXCL}_{prs}(\phi) = \left\{ \psi \in \text{ALT}(\phi) : \phi_{prs} \nrightarrow \psi_{prs} \right\}$

b. $\text{EXH}_{prs}(\phi) = \phi_{prs} \wedge \forall \psi[\psi \in \text{EXCL}_{prs}(\phi) \rightarrow \neg \psi_{prs}]$

Let's illustrate how Magri's theory works by showing how it derives the oddness of Percus's problematic example. The LF we assume for (35b) is given below in (38).

(38) [② [Everyone with exactly two students] λx ① EXH [x assigned the same exercise to all his students]]

We furthermore assume that *x assigned the same exercise to both his students* $\in$ ALT(*x assigned the same exercise to all his students*). The denotation of the prejacent of EXH and the prejacent's alternative are given in (39a) and (39b) respectively. Recall that EXH applied to ϕ presupposes the negation of the presuppositions of ϕ's logically non-weaker alternatives, and therefore returns the strengthened meaning in (40). The negated presupposition projects universally through the universally quantified sentence, resulting in the final meaning in (41). Assuming that the domain of

14 Marty (2017) gives an alternative formulation of EXH couched in a partial semantics for presupposition, and gives explicit arguments in favour of this formulation over Magri's. We adopt Magri's formulation here purely for ease of exposition, as the precise formulation of EXH is orthogonal to our concerns here.

15 For completeness, the definition of the strengthened assertion is as follows:

(i) **Strengthened Assertion**

a. $\text{EXCL}_{asr}(\phi) = \{ \psi \in \text{ALT}(\phi_{asr}) \nrightarrow \psi_{asr} \}$

b. $\text{EXH}_{asr}(\phi) = \phi_{asr} \wedge \forall \psi[\psi \in \text{EXCL}_{asr}(\phi \rightarrow \neg \psi_{asr})]$

the universal is non-empty, the presupposition is a contradiction, thus explaining the oddness of the sentence.

(39) a. $[\![x$ assigned the same exercise to all his students$]\!]$

$$= \left\langle \begin{array}{l} \emptyset, \\ x \text{ assigned the same exercise to all his students} \end{array} \right\rangle$$

b. $[\![x$ assigned the same exercise to both his students$]\!]$

$$= \left\langle \begin{array}{l} x \text{ has exactly two students,} \\ x \text{ assigned the same exercise to all his students} \end{array} \right\rangle$$

(40) $$[\![①]\!] = \left\langle \begin{array}{l} x \text{ does not have exactly two students} \\ x \text{ assigned the same exercise to all his students} \end{array} \right\rangle$$

(41) $[\![②]\!]$

$$= \left\langle \begin{array}{l} \text{everyone with ex. 2 students does not have ex. 2 students} \\ \text{everyone with ex. 2 students assigned the same exercise to all...} \end{array} \right\rangle$$

At this point, note that the presuppositional implicature derived via EXH is simply the negation of the presuppositions of the alternatives. In the literature on *Maximize Presupposition!* however it is commonly assumed that presuppositional implicatures derived via *Maximize Presupposition!* are *epistemically weak*. That is to say, if the presupposition of ϕ's alternative is ψ_{prs}, the presuppositional implicature is that: *the speaker is not certain that* ψ_{prs}, rather than simply $\neg\psi_{prs}$. We turn to this issue now.

5.2 The epistemic status of implicated presuppositions

Heim (1991) and Sauerland (2008) claim that inferences derived from *Maximize Presupposition!* generally have a weaker epistemic status than inferences from lexical content. Consider Heim's example in (42) and its definite counterpart (43). Heim points out that the definite (43) allows us to infer that every possible world in the common ground contains a unique 20 ft. catfish. But (42) is different: we can only infer that the common ground contains at least one possible world that contains a unique 20 ft. catfish. This contrast follows from Heim's proposal that (42) is available whenever (43) is blocked.

(42) Robert caught a 20 ft. catfish.

(43) Robert caught the 20 ft. catfish.

In sum, Heim's account predicts that speakers should use the marked form, namely the definite (43), whenever they are certain that its presupposition is satisfied, but speakers should use the unmarked form, the indefinite (42), if either when they believe the presupposition of the marked form might be satisfied, but also might not be satisfied or when they are certain that the presupposition of the marked form is not satisfied. Magri's grammatical account of presuppositional implicatures however derives something stronger: the speaker should only use the unmarked form if they are certain that the presupposition of the marked form is not satisfied. The question arises, how can we account for the epistemic status of (global) presuppositional implicatures?

We assume that the epistemic status of presuppositional implicatures is parallel to the epistemic status of (assertive) implicatures which, as is well known, can be epistemically weak. Since we have adopted a grammatical theory of presuppositional implicatures, we outline one concrete way to derive the epistemic status of presuppositional implicatures within a grammatical framework, by adopting Meyer's (2013, 2014) *Matrix K axiom*.

(44) **Matrix K Axiom** (Meyer 2014: p. 583)
Assertion of ϕ is parsed as $K_s\phi$ at LF.

The Matrix K Axiom states that all assertively uttered sentences are covertly modalized by an operator K_s anchored to the beliefs of the speaker s. K is taken to universally quantify over the speaker's doxastic alternatives, much like the attitude verb *believe*. The LF we assume for Heim's (1991) example, used to motivate the epistemic status of implicated presuppositions, is given below:

(45) EXH K_s [Robert caught a 20 ft. catfish]

Due to independently known facts concerning how presuppositions project through attitudes (Heim 1992),[16] the alternative to the sentence above, namely K_s *[Robert caught the 20 ft. catfish]* is predicted to presuppose that the speaker believes that there is a unique 20 ft. catfish. Applying Magri's exhaustivity operator therefore predicts that the strengthened presupposition of the sentence should be the negation of the aforementioned presupposition. Therefore, the sentence as a whole is correctly predicted to presuppose that it's not the case that the speaker believes that there is a unique 20 ft. catfish. A stronger presuppositional implicature – namely,

16 We assume here that presuppositions project through K_s in the same way as they project through attitude verbs such as *believe* – that is to say, the sentence x *believes* ϕ presupposes that x believes the presuppositions of ϕ.

that the speaker believes there is not a unique 20 ft. catfish, is derived if EXH is inserted below K_s.

5.3 Ignorance contexts in Spanish

Having now made precise our assumptions concerning the status of *Maximize Presupposition!*, we return now to Maldonado's (2017) data. The predictions of *Maximize Presupposition!* are complicated by the fact that, according to our analysis of simplex *wh*-expressions, three representations are involved in Spanish: *quien*$_{\sigma=\langle \mathsf{et,t}\rangle}$.SG, *quien*$_{\sigma=\mathsf{e}}$.SG, and *quienes*$_{\sigma=\mathsf{e}}$.PL. The lexical presuppositions the three representations carry stand in an linear entailment order, where *quien*$_{\sigma=\langle \mathsf{et,t}\rangle}$.SG has the weakest presupposition and *quien*$_{\sigma=\mathsf{e}}$.SG has the strongest one. We spell out the three lexical presuppositions as follows, from weakest to strongest:

- *quien*$_{\sigma=\langle \mathsf{et,t}\rangle}$.SG: does not presuppose existence of any individual (hence any answer)
- *quienes*$_{\sigma=\mathsf{e}}$.PL: presupposes existence of an individual (hence an answer)
- *quien*$_{\sigma=\mathsf{e}}$.SG: presupposes the unique existence of an individual (hence the existence of a unique answer involving an individual)

The presupposition of *quien*$_{\sigma=\langle \mathsf{et,t}\rangle}$.SG doesn't presuppose existence because the quantifier *noone* is a possible quantificational answer. For the individual type *quienes*$_{\sigma=\mathsf{e}}$.PL and *quien*$_{\sigma=\mathsf{e}}$.SG, on the other hand, all possible answers must be predicated of an individual *e*. Therefore they carry a lexical existence presupposition. Given the logical strength ordering between the presuppositions, application of EXH above K_s predicts the following usage conditions for matrix questions.

- *quien*$_{\sigma=\langle \mathsf{et,t}\rangle}$.SG: used if the speaker isn't sure whether an individual true answer exists
- *quienes*$_{\sigma=\mathsf{e}}$.PL: used if the speaker is sure that an individual true answer exists, but the speaker thinks it might be possible that more than one individual answer exists
- *quien*$_{\sigma=\mathsf{e}}$.SG: only used if the speaker is certain a unique individual answer exists

Maldonado's extremely precise empirical discussion shows that exactly these predictions are born out for Spanish. When we relate our predictions to Spanish data, we need to keep in mind that *quien*$_{\sigma=\langle \mathsf{et,t}\rangle}$.SG and *quien*$_{\sigma=\mathsf{e}}$.SG are realized by the same form in Spanish, but they are distinct representations at the level relevant for our predictions. Hence, *quien* is unmarked when existence isn't presupposed, but once existence is presupposed *quienes* is the unmarked form. Consider first the difference between *quien*$_{\sigma=\langle \mathrm{et,t}\rangle}$.SG and *quienes*$_{\sigma=\mathrm{e}}$.PL concerning the existential presupposition. Maldonado (2017: footnote 9) writes that *'Quién' and 'quiénes' also differ in their ability to appear in interrogatives without existential import*. One of her examples (46) supports her claim by showing that only *quien* can occur in the *there*-insertion context.

(46) Quién (# quiénes) hay en la fiesta?
Who.SG (# who.PL) was at the party

Who was there at the party?

Now consider scenarios where existence is presupposed. Maldonado shows using example (47) that when unique existence is assumed, only the singular form *quien* is acceptable.

(47) Una de mis amigas llamó pero no me acuerdo quién (# quines)
one of my friends called but not REFL remember who.SG (# who.PL)

One of my friends called but I dont remember who.

Furthermore once existence and cardinality greater than one is presupposed as in (48), only the plural form *quines* is fully acceptable.

(48) Varias amigas llamaron pero no me acuerdo quiénes (?? quién).
several friends called but not REFL remember who.PL (?? who.SG)

Several friends called but I dont remember who.

Maldonado furthermore notes that the singular is unacceptable in (48), but perceives the unacceptability to be weaker than that of *quienes* in (47). We hypothesize that this difference may be due to the fact that with *quienes* the alternative *quien* is structurally less complex, and therefore the alternative is predicted to be available by approaches to scalar alternatives such as that of Katzir (2008) and Fox & Katzir (2011). In contrast, the alternative *quienes* for *quien*$_{\sigma=\langle \mathrm{et,t}\rangle}$.SG in (48) is more complex and therefore Katzir (2008) and Fox & Katzir (2011) predict it to not be available unless it is available in context. In (48), the previous plural noun phrase *varias amigas* does make the plural morpheme available, and therefore the unacceptability of *quien* is expected. But we suggest that the difference in status Maldonado notes can related to that between structual availability of the alternative vs. contextual availability.

The final critical case is the one where only existence is presupposed. Here our account predicts that *quienes* should be slightly preferred because the presupposition of *quien*$_{\sigma=\mathsf{e}}$.SG is not satisfied, while the presupposition of *quien*$_{\sigma=\langle \mathsf{et,t} \rangle}$.SG is weaker than that of *quienes*. Maldonado discusses the two relevant examples (49) (from Maldonado 2017: p. 5) and (50) (from Maldonado 2017: p. 7).

(49) Una o más de una persona llamó pero no me acuerdo quién
One or more than one person called but not REFL remember who.SG
(# quiénes).
(# who.PL)

'One or more than one person called but I don't remember who.'

(50) #Juan no sabe quiénes van a venir a la fiesta.
#Juan not know who.PL will come to the party

'Juan doesn't know who will come to the party'

Our account correctly predicts the oddness of (50) in both true ignorance contexts, where Juan considers it possible that noone will come to the party *and* in contexts where only existence is presupposed, where Juan considers it possible that one or more than one person will come to the party. This is because obligatory local application of EXH derives a strong anti-singleton inference. Following Magri (2012), we assume that EXH applies obligatorily at every sentential node. The LF we assume for (50) is therefore as follows:[17]

(51) ③ Juan not know ② EXH [① ANS who.PL will come to the party]

(52) $$[\![\text{①}]\!] = \left\langle \begin{array}{l} \text{one or more people will come to the party,} \\ \textsc{ans}(\text{who.}\textsc{pl} \text{ will come to the party}) \end{array} \right\rangle$$

(53) ①′ ANS who$_{\sigma=\mathsf{e}}$.SG will come to the party $\in$ ALT(①)

(54) $$[\![\text{①}']\!] = \left\langle \begin{array}{l} \text{exactly one person will come to the party,} \\ \textsc{ans}(\text{who}_{\sigma=\mathsf{e}}.\textsc{sg} \text{ will come to the party}) \end{array} \right\rangle$$

(55) $$[\![\text{②}]\!] = \left\langle \begin{array}{l} \text{more than one person will come to the party,} \\ \textsc{ans}(\text{who.}\textsc{pl} \text{ will come to the party}) \end{array} \right\rangle$$

17 We abstract away from application of EXH to the matrix node here for ease of exposition.

(56) $[\![③]\!] = \left\langle \begin{array}{l} \text{Juan believes that more than one person will come to the party,} \\ \text{Juan doesn't know who will come to the party} \end{array} \right\rangle$

6 Conclusion

In this paper, we have addressed a puzzle that arises for the standard account of the presuppositions of *wh*-questions. In our view, the exceptional behaviour of simplex *wh*-expressions suggests that some quantificational expressions in natural language are (constrained) *polymorphic*, in line with work by Spector (2007). This gives rise to a degree of type-flexibility which complicates the predictions of theories of the semantics-pragmatics interface.

To briefly summarise our analysis, singular simplex *wh*-expressions fail to give rise to a uniqueness presupposition, because they can range over *quantifiers* of type $\langle et, t\rangle$. An anti-singleton inference still arises for plural simplex *wh*-expressions, since they compete with the type-rigid denotation of the singular simplex *wh*-expression which ranges over individuals. We address apparently problematic data discovered by Maldonado (2017) by building on existing work, such as Singh (2011), arguing that Maximize Presupposition! must be computed for embedded constituents. Once we adopt this refined view of presuppositional implicatures, Maldonado's observations fall out straightforwardly.

We turn now to an apparently problematic prediction made by our analysis, and offer some speculation. The standard assumption for *collective* predicates in the semantics literature, is that they presuppose that their complement is non-atomic. This is illustrated in (57) for *gather*.

(57) $[\![\text{gather}]\!] = \lambda w \,.\, \lambda x : \neg \mathsf{atom}_{@}(x) \,.\, \mathsf{gather}_w(x)$

We therefore expect a presupposition failure when *quién* composes with a collective predicate, since, even under the higher-type meaning, it leaves behind an atomic trace. The examples in (58) and (59) show that this is not the case.

(58) Quién se reunió en el patio?
who.SG REFL gathered in the playground.

(59) Quién se odia el una al otro?
who.SG REFL hates the one to-the-other

We suggest that the account of collective predicates in (57) is simply not on the right track, rather, it seems desirable to impose the non-atomicity presupposition at the level of the event. Evidence for this comes from the fact that the simplex universal quantifier *everyone* is also compatible with collective predicates, as shown by

(60). Furthermore, if collective predicates impose a non-atomicity presupposition on their argument, then (61) poses a serious compositionality puzzle, since there is a stage in the derivation at which *gather* composes with an atomic individual-denoting argument (unless the syntax is rendered more baroque than surface appearances suggest).

(60) Everyone gathered in the hallway.

(61) Jeroen gathered with Martin and Frank.

Our hope is that the behaviour of simplex quantificational expressions in such environments will ultimately shed light on the correct semantic analysis of *collectivity*.

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