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Referring and quantifying without nominals: headless relative clauses across languages

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Abstract Nominals can be used to refer to or quantify over individuals, while clauses convey propositional content, with the exception of set-denoting restrictive headed relative clauses. This well-attested crosslinguistic syntax/semantics mapping needs to be broadened. Recent crosslinguistic findings show that headless relative clauses—embedded argument or adjunct clauses with a missing constituent—are widely attested and are used to refer to or quantify over individuals, similar to nominals. The present work contributes to the investigation of the syntax/semantics interface of different varieties of headless relative clauses and begins to develop a much-needed close comparison with the syntax/semantics interface of nominals in order to establish which principles are at play in both families of constructions.

Keywords: headless relative clause, free relative clauses, light-headed relative clauses, *wh*-words, nominals, type-shifting, definiteness, maximality, bare nouns

1 Introducing Headless Relative Clauses and a generalization

It is a well-established crosslinguistic fact that nominals (NPs and/or DPs) can be used to refer to or quantify over individuals. Montague (1973) provides a powerful tool—generalized quantifiers—to unify this dual semantic behavior and solve the apparently "illogical" contrast with the unitary morphosyntactic behavior of nominals. Clauses, instead, have been taken as the privileged syntactic device for languages to convey varieties of propositional content. Restrictive headed relative clauses are the exception: they behave as nominal modifiers and, as such, denote sets of individuals (or properties), as suggested by Quine (1960) and then developed by Montague (1970) into the now familiar lambda-abstraction-based analysis.

This view of the mapping between morphosyntax and semantics needs to be broadened in order to handle a large, but mainly neglected family of constructions that are attested crosslinguistically: *headless relative clauses* (henceforth, *[−H]RCs*). These are embedded full clauses that lack at least one constituent and occur as arguments or adjuncts of their matrix clause. Semantically, they refer to or quantify over individuals. Examples of [−H]RCs are shown in (1) and (2).

(1) Anna hired [$_{[-H]RC}$ **those** (who) Lia recommended __ strongly].

(2) Luca now works [$_{[-H]RC}$ **where** Andrea used to live __ a few years ago].

The [−H]RCs in (1) and (2) share the four characterizing properties listed in (3):

(3) *Properties characterizing [−H]RCs (Caponigro 2021, 2022):*
   I. they are embedded clauses;
   II. they are missing (at least) one argument or adjunct;
   III. they lack an "external nominal head"—a nominal head that precedes or follows them and is linked to the missing constituent;
   IV. they exhibit the same distribution and interpretation as NPs/DPs or PPs.

The [−H]RCs in (1) and (2) satisfy Property I in (3), since they are both embedded clauses. They also satisfy Property II: the [−H]RC in (1) is missing the object of its transitive predicate *recommended*, while the one in (2) is missing the locative adjunct of its intransitive predicate *live*. Neither [−H]RC is introduced by a nominal head, which satisfies Property III: the [−H]RC in (1) is introduced by the bolded demonstrative D(eterminer) *those*, which crucially occurs without a nominal complement; the [−H]RC in (2) is introduced by the bolded *wh*-word *where*, which sits in the left periphery of the [−H]RC. Last, the [−H]RCs in (1) and (2) have the same distribution and interpretation as the bracketed DP in (4) and the bracketed PP in (5), respectively, and therefore satisfy Property IV as well.

(4) Anna hired [$_{DP}$ the people Lea recommended strongly].

(5) Luca now works [$_{PP}$ in the place Andrea used to live in a few years ago].

The properties in (3) can be summarized and further specified with the syntactic schema in (6a) and the feature bundle in (6b), which will also be used as concise devices to define the different varieties of [−H]RCs in the next sections (Caponigro 2021, 2022).

(6) *Summary of the properties characterizing [−H]RCs:*
   a. [(DET) [$_{CP}$ (*wh*-/REL/COMP) …. __ …]]$_{DP/PP}$[1] b. [±D, –N, ±WH]

[−H]RCs have no nominal head, as conveyed by the feature *[–N]* in (6b). Some have a D as a "light head", a property that is marked with *(DET)* in (6a) and the feature *[±D]* in (6b). [−H]RCs can feature (i) a *wh*-expression[2] from the set of those introducing *wh*- interrogative clauses (with possible extra morphology), marked

[1] The subscript *DP/PP* occurring at the far right of the syntactic schema in (6a) does not indicate the actual syntactic categories of [−H]RCs, but indicates the distributional similarities of [−H]RCs with actual DPs and PPs.

[2] I use the term "*wh*-expression" to refer both to a single *wh*-word occurring on its own (e.g., *who, what, when,* etc.) as well as to a *wh*-phrase that consists of a *wh*-word and other material, like a complement (e.g., *what project, how many trees*) or a preposition (e.g., *by means of what*, *with which colleague*) or both (e.g., *together with how many other comrades*).

with *wh-* in (6a) and the feature *[±WH]* in (6b), (ii) a non-*wh* relativizer of the same kind as those introducing headed relative clauses, marked with *REL* in (6a), (iii) a general complementizer of the same kind as those introducing complement/headed-relative clauses, marked with *COMP* in (6a), (iv) a combination of those, or (v) no marking at all. All [−H]RCs have at least one missing constituent, marked with an underscore in (6a).[3]

Despite the shared properties highlighted in (3) and summarized in (6), [−H]RCs occur in different varieties that exhibit differences in interpretation, distribution, and/or morphosyntactic properties. They are discussed in the next sections. Overall, the label *headless relative clauses ([−H]RCs)* should be taken as a way to identify not just one single construction, but a family of related constructions, and to distinguish them from another family of related but different constructions—headed relative clauses. Three main varieties of [−H]RCs have been identified: *free relative clauses*, *light-headed relative clauses*, and *super-free relative clauses* (Caponigro 2021, 2022). In the next sections, each variety is discussed in turn.

[−H]RCs have been mainly neglected in typological investigations and language-specific descriptions and grammars. Formal analyses have been scarce and limited to some varieties of [−H]RCs, within a small set of languages, mainly Indo-European, missing the full richness observed across language families.

A body of crosslinguistic work on [−H]RCs has emerged over the last couple of decades, including a rich set of recent crosslinguistic findings from understudied Indo-European languages and other language families.[4] These data support the generalization about the natural language syntax-semantics mapping in (7) (adapted from Caponigro 2021:1).

(7) GENERALIZATION. Languages can systematically use clauses in the form of [−H]RCs to denote individuals without any specific morphosyntactic marking. Quantification via any type of [−H]RC, instead, requires overt specific morphosyntactic marking; different kinds of markers can be employed within and across languages.

This paper builds on these empirical and typological findings. After studying free relative clauses crosslinguistically for more than two decades and broadening my investigation to the superset of [−H]RCs in the past decade, I feel that we have

[3] See Caponigro & Fălăuş 2020 for the description and the analysis of a [−H]RC in Romanian with two or more missing constituents that had not been studied before.

[4] See Caponigro et al. 2021 for data on sixteen Mesoamerican languages and Pesh (Chibchan), and for references to other languages with [−H]RCs; also, Caponigro, Torrence, & Cisneros 2013 for Melchor Ocampo Mixtec and Nieves Mixtec (Oto-Manguean), Caponigro & Fălăuş 2020, 2023a, 2023b for Romanian (Indo-European, Romance), Duncan 2022 for Kiksht (Chinookan), López Espinoza 2022 for Copala Triqui (Oto-Manguean), Mantenuto & Caponigro 2021a, 2021b for Teramano (Indo-European, Romance).

gathered enough data and gained enough understanding about these constructions across languages to safely conclude that [−H]RCs are widespread, articulated, and productive, and, therefore, (i) we should add them to the set of constructions whose existence in a language we check whenever we engage with language description and typological investigation, and (ii) we should study their main morphosyntactic/semantic features, in the same way as we do for headed relative clauses or embedded interrogative clauses or varieties of adjunct clauses.

I also think we need to start adding a new component to this investigation: a close comparison of the morphosyntax/semantics interface of [−H]RCs and nominals within and across languages in order to establish which common principles determine the mapping in these two families of constructions, each of which can both refer to and quantify over individuals. The present paper contributes to this new step as well. Its remainder is structured as follows: § 2 focuses on the three main varieties of free relative clauses; § 3 deals with light-headed relative clauses; § 4 discusses super-free relative clauses; finally, § 5 concludes with broad remarks and future goals.

2 Free relative clauses

The label *free relative clauses* (henceforth, *FRs*) is used for those [−H]RCs that have no D head and are introduced by (a subset of) the *wh*-expressions that occur in *wh*- interrogative clauses, with or without extra morphosyntactic marking (the *wh*-expression may co-occur with a complementizer in some languages). Besides sharing the general properties in (3) and (6), FRs are characterized by the syntactic schema in (8a) and the feature bundle in (8b) (Caponigro 2021, 2022).

(8) *Properties characterizing FRs:*

a. [$_{CP}$ *wh*- (COMP) …. __ …]$_{DP/PP}$ b. [–D, –N, +WH]

The bracketed string in (2) above is an example of an FR in English that is introduced by the *wh*-word *where*. Three main varieties of FRs are attested crosslinguistically: *maximal free relative clauses*, *existential free relative clauses*, and *free-choice free relative clauses*. The crucial distinction is semantic in nature, although it often correlates with morphosyntactic differences as well. We discuss and exemplify each variety of FR in turn in §§ 2.1–2.3.

2.1 Maximal Free Relative Clauses

2.1.1 Definition and main properties

Maximal free relative clauses (*Max-FRs*) are the FRs that have received the most attention in the syntactic and semantic literature. They share the properties in (8)

with all other FRs and are characterized by the semantic properties in (9) (Caponigro 2021, 2022).[5,6]

(9) *Properties characterizing Max-FRs:*

a. DEFINITENESS. A Max-FR can be replaced and paraphrased by a definite DP—a DP introduced by a definite marker or determiner in a language that has them, like *the* in English—or by a PP with a definite DP as its complement.

b. REFERENTIALITY. A Max-FR is interpreted as referential: it refers to an individual. In this respect, Max-FRs are like proper names, definite DPs, and DPs introduced by demonstratives.

c. MAXIMALITY: A Max-FR is interpreted as maximal: it refers to the largest ('maximal') individual of a set of individuals. This is the same semantic behavior as seen with definite DPs.

Examples of Max-FRs are given in brackets in (10a) and (11a) with the *wh*-words introducing them in bold.

(10) a. Luca devoured [$_{\text{Max-FR}}$ **what** Andrea prepared __].

b. Luca devoured [$_{\text{Definite DP}}$ the thing(s)/food Andrea prepared].

(11) a. Anna went [$_{\text{Max-FR}}$ **where** she had lived __ as a kid].

b. Anna went [$_{\text{PP}}$ to [$_{\text{Definite DP}}$ the place(s) she had lived as a kid]].

The Max-FRs in (10a) and (11a) satisfy the "Definiteness" property in (9a): they can be replaced and paraphrased with definite DPs, as shown in (10b) and (11b). They also satisfy the "Referentiality" property in (9b): the Max-FR in (10a) refers to the thing(s) or food Andrea prepared and the Max-FRs in (11a) to the place(s) Anna had lived when she was a kid. Notice that referentiality is also a semantic property of the definite DPs that replace the Max-FRs in (10b) and (11b). Last, the Max-FRs in (10a) and (11a) exhibit the "Maximality" property in (9c). If Andrea prepared an appetizer, a salad, and a dessert, the Max-FR in (10a) refers to the maximal plural individual resulting from the sum of those three atomic individuals. Crucially, it cannot refer to anything smaller than that—such as the atomic individual consisting of the appetizer or the non-maximal plural individual made up of only the appetizer and the salad. This is the same semantic behavior as that

[5] See Šimík 2020 for a thorough overview of the semantic properties of Max-FRs and the analyses that have been suggested, and van Riemsdijk 2017 for a detailed overview of their syntactic properties and related syntactic proposals.

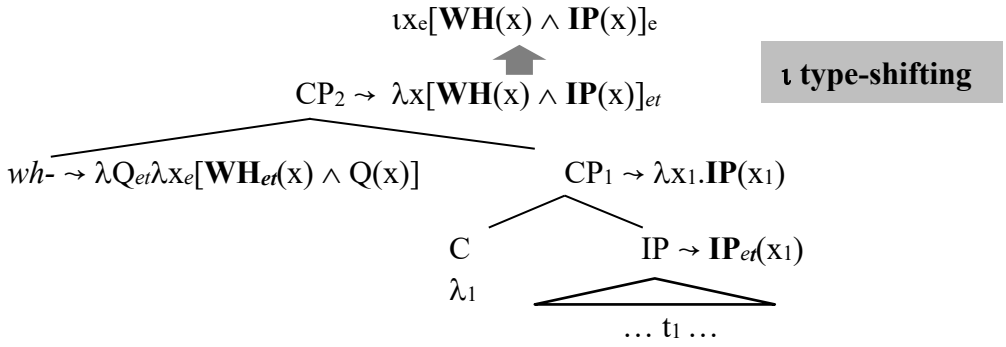
[6] "The properties in [(9)] are partially redundant on purpose. Although definiteness is equivalent to the combination of referentiality and maximality within the semantic framework that we are adopting, the replacement and paraphrase test in [(9a)] provides a quick preliminary step to assess whether a *wh*-clause is a Max-FR." (Caponigro 2021:9).

of the plural definite DP *the dishes by Andrea*. On the other hand, the Max-FR in (10a) cannot be interpreted as triggering quantification over a set of individuals, unlike the indefinite DP *some of the things Andrea prepared*. Similarly, the Max-FR in (11a) has to refer to the maximal place resulting from the sum of all the individual places Anna had lived as a kid—a semantic behavior closely resembling the PP *to the places from her childhood* (with a definite DP as its complement) and unlike the PP *to some of the places from her childhood* (with an indefinite DP as its complement).

2.1.2 Semantic analysis

Jacobson (1995), Dayal (1996: ch. 6, § 4), and Caponigro (2003: ch. 2; 2004) all highlight the parallelism between Max-FRs and definite DPs, arguing for a denotation of Max-FRs that closely resembles the one proposed for definite DPs by Sharvy (1980) and Link (1983). The schema in (12) summarizes the main insights from those analyses.

(12) *General schema for the syntactic and semantic analysis of Max-FRs:*



The 1-place predicate ***IP*** and its argument x_1 in the logical translations in (12) stand for the semantic contribution of the IP of Max-FRs: an open proposition, which is the standard semantic denotation for any kind of *wh*-clause before combining with its moved *wh*-phrase(s). The free variable x_1 is licensed by the *wh*-trace t_1 and then bound by the coindexed λ operator, as standardly assumed for variables translating *wh*-traces. The 1-place predicate ***WH*** stands for the semantic restriction introduced by the *wh*-word (human, non-human, location, etc.). The whole *wh*-phrase semantically behaves like a set restrictor: it applies to the set denoted by CP_1 and returns a subset as the denotation of CP_2. This is the meaning for *wh*-expressions proposed by Caponigro (2003, 2004, 2022). Jacobson (1995), instead, assumes *wh*-expressions in Max-FRs to return the singleton set containing just the maximal

entity of the set they apply to.[7] All authors assume a general meaning-preserving type-shifting operation from *et* to *e*—labelled *ι type-shifting* in (12)—to apply and return the (unique) maximal individual of the set denoted by CP_2. This is the final denotation for a Max-FR, which matches the empirical finding that Max-FRs and definite DPs share the same denotation. This final step—the *ι* type-shifting—is formally defined in (13).

(13) *ι type-shifting*: $\lambda x_e Px \Rightarrow \iota x_e[P(x) \wedge \forall y_e[P(y) \rightarrow y \leq x]]$, *in short:* $\iota x.P(x)$[8]
x and *y* ranging over atomic and plural individuals

This is a purely semantic step with no morphosyntactic trigger. In other words, the syntactic node CP_2 in (12) is assumed to have two meanings: one (a set of individuals) is its basic meaning, the other (an individual) is derived by *ι* type-shifting. The two meanings are equivalent in their informational content (i.e., one can always be derived from the other), but differ in their semantic types.

The *ι* type-shifting operation is what Sharvy (1980) and Link (1983) assume to be the semantic contribution of the definite determiner when it applies to singular and plural count nouns in languages that have such a lexical item. Along these lines, a syntax/semantic analysis for Max-FRs alternative to the one in (12) could assume a silent definite determiner $\varnothing_{the}$ which takes the CP_2 of the Max-FR as its complement returning a DP denoting the maximal individual. Still, I will continue relying on the syntactic and semantic analysis of Max-FRs in (12) in what follows. While I am not aware of independent arguments to assume the existence of the silent lexical item $\varnothing_{the}$ that combines with Max-FRs,[9] Partee (1987) and Chierchia (1998) bring independent semantic evidence for assuming *ι* type-shifting.

Let's now see how the general analysis in (12) applies to the actual Max-FR in (10a), resulting in the compositional semantic analysis in (14).

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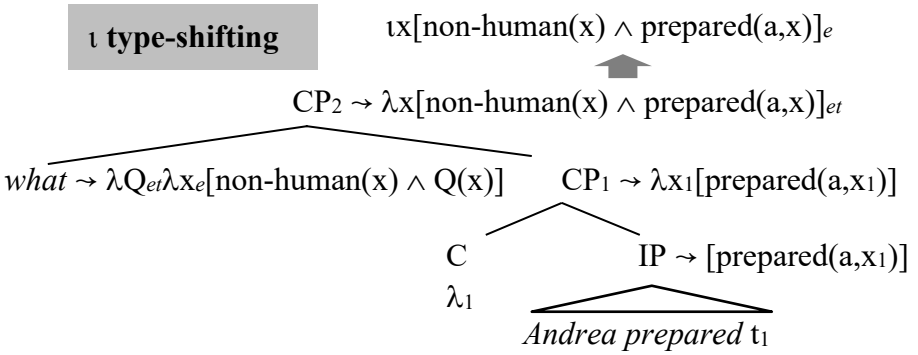
[7] Jacobson (1995) does not discuss the further restriction *wh*-words introduce, which is labelled as ***WH*** in (12). Dayal (1996) focuses on the semantic analysis of Hindi correlative clauses. Its extension to English Max-FRs is only suggested, without a detailed semantic derivation. Since the relative marker in the correlative clause is analyzed as denoting a set of individuals, rather than a set restrictor, I infer that Dayal would extend a similar analysis to *wh*-expressions in Max-FRs.

[8] I am borrowing this "extended" definition of *ι* from Chierchia 1998. Initially, *ι* was used for the descriptor operator from the Fregean tradition, which is defined only when applying to a singleton set with only one atomic individual. Jacobson (1995) extends its use to a singleton set containing an atomic or plural individual in her analysis of Max-FRs in English. Finally, Chierchia (1998) extends the definition to allow *ι* to apply to a join-semilattice of singular and plural individuals and return its join. Chierchia (1998) assumes *ι* to be the semantic contribution of the definite determiner in languages with one or a type-shifter for languages lacking a definite determiner.

[9] I argue in favor of this analysis on syntactic grounds in Caponigro 2002. Although I still find the data and issues presented there intriguing, I am no longer fully convinced by the syntactic proposal.

(14) *Syntactic and semantic analysis of the Max-FR in (10a):*



The IP of the Max-FR denotes an open proposition with the free variable x_1 introduced by the *wh*-trace of *what*. After lambda abstraction binds x_1, the CP_1 of the Max-FR in (14) ends up denoting the set of all and only the individuals that Andrea prepared. The *wh*-word *what*, acting as a set restrictor, applies to this set and returns its non-human subset, the set of all and only the non-human individuals Andrea prepared, as the denotation of CP_2. A type mismatch now occurs. The Max-FR (CP_2) denotes a set of individuals, while the matrix predicate *devoured* selects for an individual-denoting direct object. *ι* type-shifting applies, turning the denotation of CP_2 into the maximal individual of the set of non-human individuals that Andrea prepared—the final denotation of the Max-FR.

2.1.3 On the meaning of *wh*-expressions across constructions and languages

In most of the languages that have been reported to have Max-FRs, *wh*-expressions in Max-FRs look the same as those in interrogative clauses, exhibiting the same morphological shape and the same syntactic behavior. Semantically, though, they act differently, at least if a popular semantic analysis of *wh*- interrogative clauses and their *wh*-words like the one by Karttunen (1977) is assumed. According to this approach, *wh*-words behave like indefinites in denoting generalized quantifiers with existential force. For instance, the *wh*-word *what* and the indefinite *something* would receive the same denotation, as shown in (15a,b), their differences being in their morphosyntactic properties and the rules of semantic combinations that would apply to them. The denotation that we are assuming for *what* in Max-FRs, instead, is significantly different, lacking any quantificational force, as shown in (15c).

(15) a. *what*-INTERROGATIVE → λQλ∃x[non-human(x) ∧ Q(x)]
b. *something* → λQλ∃x[non-human(x) ∧ Q(x)]
c. *what*-Max-FR → λQλx[non-human(x) ∧ Q(x)]

This contrast between the meaning of *wh*-expressions in Max-FRs and *wh*- interrogative clauses may help explain asymmetries that are attested between *wh*-expressions occurring in interrogative clauses and those in Max-FRs, with the latter being a (proper) subset of the former in most languages with Max-FRs. For instance, the *wh*-word *what* can occur in Max-FRs in English, but its equivalent in Italian interrogative clauses *che cosa* is banned from Max-FRs. On the other hand, *who* is highly restricted in Max-FRs in English,[10] while its Italian equivalent *chi* is fully productive. Neither language allows the *wh*-word *why*/*perché* to introduce Max-FRs, while that option is productive in Romanian, Teramano, and several Mesoamerican languages.[11] If each *wh*-word occurring in interrogative clauses has to lexically change its meaning and lose its existential force in order to occur in Max-FRs, then the asymmetries exemplified above within a language and across languages would be less surprising. The picture that emerges for the crosslinguistic investigation of Max-FRs points at the need to collect data about each *wh*-word that can occur in Max-FRs in studying a given language. As we'll see, this lesson applies to the other two varieties of FRs as well.

Although in most languages for which Max-FRs have been documented the *wh*-expressions occurring in Max-FRs are morphosyntactically identical to those in interrogative clauses, there are languages whose *wh*-expressions in Max-FRs exhibit extra morphosyntactic marking, which sometimes resembles the definite determiner. For instance, Max-FRs in K'iche' (Mayan) requires what looks like the definite determiner *le* at the right edge of the *wh*-phrase, after the *wh*-word and its plural marker, as shown in (16). San Pedro Mixtepec Zapotec (Oto-Manguean), instead, obligatorily uses a specialized prefix to mark *wh*-words in Max-FRs, a prefix that is not attested anywhere else in the language, as shown in (17). Finally, Modern Greek (Indo-European) marks the *wh*-words in Max-FRs with what looks like the singular masculine nominative form of its definite determiner *(ó-)*, although such marker never inflects for case (which is, instead required for the regular definite determiner) and always carries word stress (which is never allowed for the regular definite determiner), while it's the *wh*-root to carry stress in interrogative clauses (*pú*), as shown in (18).

(16) x-ki-muli-jk-iib' [**jachin taq *(le)** k-e-xajow-ik].[12]
COMPL-A1PL-gather-ACTA1PL-RECP **who PL DET** ICP-B3PL-dance-SS
'The ones who dance, gathered.'

[10] See Patterson & Caponigro 2016 and Stockwell & Schütze 2022.
[11] See Caponigro et al. 2021 for Mesoamerican languages, Mantenuto & Caponigro 2021a for Teramano, and Caponigro & Fălăuş 2023b for Romanian.
[12] Adapted from Can Pixabaj 2021: ex. 40.

(17) d-áw ná [***(tèl)-pè** b-dziěl].[13]
COMPL-eat 1SG TEL-WH.INAN COMPL-find
'I ate what was found.'

(18) geníthika **[ó-pu /*pú** geníthikan i gonís mu].[14]
be_born.1SG **DET-where/ where** be_born.3PL the.NOM.PL parent.NOM.PL my
'I was born where my parents were born.'

While I believe the data in (16–18) provide further support to the general analysis of Max-FRs as definites, I don't think they should be taken as evidence in favor of the alternative analysis I mentioned earlier in which a silent definite D takes the CP of the Max-FR as its complement. Even in languages where the extra marking on *wh*-expressions in Max-FRs resembles the definite D, the distribution or stress pattern of the marker indicates that it forms a morphological or syntactic unit with the *wh*-expression rather than combining with the whole CP. In other words, while *wh*-expressions without extra marking in Max-FRs behave like set restrictors, as schematized in (19a), *wh*-expressions with extra marking in Max-FRs behave like a definite determiner that carries extra WH restrictions (human, non-human, location, etc.), as schematized in (19b).

(19) a. *wh*-$_{\text{Max-FR}} \rightsquigarrow \lambda Q \lambda x[\mathbf{WH}(x) \wedge Q(x)]$
b. D+*wh*-$_{\text{Max-FR}} \rightsquigarrow \lambda Q \iota x[\mathbf{WH}(x) \wedge Q(x)]$

The two options for *wh*-expressions in Max-FRs in (19a,b) that are attested crosslinguistically mirror the two options for definite nominals across languages: either an overt morphosyntactic marker—a definite D—occurring with the nominal or a bare nominal, whose definite-like interpretation has been argued to be derived via type-shifting (e.g., Chierchia 1998, Dayal 1992, 2004). This observation brings us to the last part of this section, which provides a closer look at the semantic similarities and differences between Max-FRs and nominals (definite DPs and bare nominals).

2.1.4 Semantic similarities and differences with nominals

In this last section, we further compare Max-FRs and nominals with respect to semantic properties that have received limited attention or no attention at all as far as Max-FRs are concerned: homogeneity (§ 2.1.4.1), reference to kinds (§ 2.1.4.2), quantification variability effects (§ 2.1.4.3), and the lack of existential readings in episodic contexts (§ 2.1.4.4). This exploration is limited and preliminary. It aims to draw attention to these properties in Max-FRs and encourage further comparative exploration in relation to nominals.

[13] Adapted from Antonio-Ramos 2021: ex. 48d.
[14] Thanks to Mary Baltazani and Dimitrios Ntelitheos for the data.

2.1.4.1 Homogeneity

It has been observed that definite DPs with a plural or mass N complement like the bracketed ones in (20a,b) exhibit a semantic asymmetry known as homogeneity.[15] They tend to be interpreted as referring to maximal individuals in a positive (upward entailing) declarative clause, like (20a), although a "slightly" non-maximal interpretation seems to be possible as well. If the fridge contained five things and Luca ate four, (20a) could still be judged true. By contrast, the very same definite DPs don't admit exceptions in a negative (downward entailing) environment. (20b) is judged false even if Luca ate only one thing from the fridge.

(20) a. Luca ate [the stuff/things that was/were in the fridge].
b. Luca didn't eat [the stuff/things that was/were in the fridge].

A fact that has remained unnoticed so far is that Max-FRs exhibit homogeneity as well. For instance, if the definite DPs in (20a,b) are replaced by the bracketed Max-FR in (21a,b), intuitions about truth conditions remain the same: (21a) would be true even if Luca ate four out of the five things in the fridge, while (21b) would be false even if Luca ate just one of them.

(21) a. Luca ate [what was in the fridge].
b. Luca didn't eat [what was in the fridge].

Homogeneity is a property of Max-FRs in general, not just those introduced by *what* in English. For instance, it can also be observed in Max-FRs introduced by *where* in English and their equivalents in Italian, as in (22) and (23), respectively. While (22a) and (23a) would both be true if Luca went to three of the four places where he had been on vacation as a kid, (22b) and (23b) would be false if Luca visited even one of those four places.

(22) a. Luca went [where he had been on vacation as a kid].
b. Luca didn't go [where he had been on vacation as a kid].

(23) a. Luca è andato [dove era stato in vacanza da bambino].
Luca is gone where was been on vacation as kid
'Luca went where he had been on vacation as a kid.'
b. Luca non è andato [dove era stato in vacanza da bambino].
Luca not is gone where was been on vacation as kid
'Luca didn't go where he had been on vacation as a kid.'

Max-FRs introduced by *chi* 'who'—among the most productive kind in Italian—exhibit homogeneity as well, as shown in (24). I could truthfully utter (24a), if Luca

[15] See Chierchia 2022 for a recent, thorough, and insightful discussion of the issue, references to the relevant literature, and an elegant proposal providing a unified account of homogeneity in plural definite DPs, plural bare NPs, and donkey pronouns.

had three openings and hired two of the three people I had recommended, while giving the third position to a candidate I hadn't recommended. On the other hand, I'd be clearly lying if I uttered (24b) and Luca had hired one of the three people I had recommended.

(24) a. Luca ha assunto [chi gli avevo raccomandato].
Luca has hired who to-him had.1SG recommended
'Luca hired the person/people I had recommended to him.'
b. Luca non ha assunto [chi gli avevo raccomandato].
Luca not has hired who to-him had.1SG recommended
'Luca didn't hire the person/people I had recommended to him.'

In conclusion, homogeneity strengthens the empirical observation that Max-FRs semantically behave like definite DPs and further supports a semantic analysis of Max-FRs that closely resembles the analysis of definite DPs.

2.1.4.2 Reference to kinds

Carlson's (1977) seminal work and Chierchia's (1998) and Dayal's (2004) crosslinguistic and conceptual developments have established that (i) kinds need to be added to natural language ontology and (ii) definite DPs and/or bare NPs can be used to refer to kinds, depending on the language. Can Max-FRs too be used to refer to kinds? To the best of my knowledge, this question has not been raised. This section starts investigating it. The preliminary conclusion is that Max-FRs too can refer to kinds, with restrictions similar to those for nominals and possibly extra ones due to *wh*-expressions. For instance, English Max-FRs introduced by *what* can occur as the subjects of prototypical kind predicates like *to be extinct*, *to be rare*, *to be common*, or *to be widespread*, as shown in (25a–c).

(25) a. [What lived at the bottom of the Mariana Trench] is now extinct.
b. [What costs less than 99 cents] is {rare}/{not common} these days.
c. [What pollutes water and makes humans sick] is widespread.

Paraphrases of the Max-FRs in (25a–c) with nominals would make use of singular/plural definite DPs and/or plural/mass bare NPs, as shown in (26a–c).

(26) a. [The organism(s) that lived at the bottom of the Mariana Trench] is/are now extinct.
b. [Stuff/Products that cost(s) less than 99 cents] is/are {rare}/{not common} these days.
c. [(The) chemical(s) that pollute(s) water and make(s) humans sick] is/are widespread.

No other Max-FRs can be easily tested for kind readings in English. Max-FRs introduced by *where, when*, and *how* cannot naturally occur in subject position, while Max-FRs introduced by *who* are highly restricted, as mentioned earlier, and particularly degraded in subject position. On the other hand, the Italian counterparts of *who* Max-FRs are in general extremely productive. Still, the whole sentence sounds degraded when a Max-FR introduced by *chi* 'who' occurs as the subject of a kind predicate, as shown in (27a,b).

(27) a. ??[Chi parla 10 lingue] è raro.
who speaks 10 languages is rare
('Those who speak 10 languages are rare.')

b. ??[Chi ha la carnagione scura] è comune nel Sud Italia.
who has the skin dark is common in_the South Italy
('Those who have dark skin are common in Southern Italy.')

Although both singular and plural definite DPs can refer to kinds in Italian, the way they do it and the restrictions they exhibit are different. Interestingly, replacing the Max-FRs introduced by *chi* in (27a,b) with close paraphrases by means of plural definite DPs returns fully acceptable sentences, as shown in (28a,b). On the other hand, if the same Max-FRs are replaced with singular definite DPs, the result remains degraded, as shown in (29a,b).

(28) a. [Le persone che parlano 10 lingue] sono rare.
the people that speak 10 languages are rare
'People who speak 10 languages are rare.'

b. [Le persone con la carnagione scura] sono comuni nel Sud Italia.
the people with the skin dark are common in_the South Italy
'People with dark skin are common in Southern Italy.'

(29) a. ??[La persona che parla 10 lingue] è rara.
the person that speaks 10 languages is rare
('The person who speaks 10 languages is rare.')

b. ??[La persona con la carnagione scura] è comune nel Sud Italia.
the person with the skin dark is common in_the South Italy
('The person with dark skin is common in Southern Italy.')

The crucial feature that the Max-FRs in (27) and the singular definite DPs in (29) share, while the plural definite DPs in (28) do not, is the singular morphological number, as shown by the singular number agreement they trigger on their matrix predicate. This may suggest that Max-FRs introduced by *chi* cannot refer to kinds because of their number morphology. Dayal (1992, 2004) argues that singular (definite) DPs can refer only to taxonomic kinds. The degraded status of (27) and (29) may be taken to show that Max-FRs introduced by *chi* and singular definite DPs with *persona* as their nominal cannot even refer to taxonomic kinds—possibly because the feature 'human' that characterizes *chi* and *persona* doesn't make a

taxonomic hierarchy salient. More crosslinguistic investigation is needed on this issue as well, especially in languages with Max-FRs and singular and plural forms for 'who', like Spanish (*quien* vs *quienes*).

2.1.4.3 (Lack of) existential readings in episodic contexts

It is a well-known crosslinguistic fact that, if a language allows for bare nominals, then they can be interpreted existentially (Chierchia 1998, Dayal 2004). English is a language allowing for bare plural nouns and bare mass nouns and they are interpreted existentially in episodic sentences, as in (30). Either version of (30) is true if some of the things or stuff in the fridge was/were getting rotten.

(30) [Stuff/Things that was/were in the fridge] was/were getting rotten.

Both the version of (30) with the bare plural noun and the one with the bare mass noun are true if three out of the ten items in the fridge are getting rotten. On the other hand, the sentence in (31) would be infelicitous/false in the same scenario, since the bracketed Max-FRs introduced by *what* in (31) that replaces the bracketed nominals in (30) must refer to the maximal individual that is in the fridge, which is made of ten items, rather than just three.

(31) [What was in the fridge] was getting rotten.

This behavior is also observed in Max-FRs introduced by *wh*-expressions other than *what*, as long as they can be replaced and paraphrased with DPs (rather than PPs).[16] It further supports a semantic analysis of Max-FRs that treats them like definite DPs. If Max-FRs can be replaced and paraphrased by PPs, as is the case for some Max-FRs introduced by *where, when,* and *how*, then they allow for either maximal or non-maximal readings, depending on various features of the sentence they occur in. For instance, the Max-FR introduced by the *wh*-word *where* in (32) can be paraphrased without truth-conditional changes by the PP with a definite DP complement, but not by the one with an indefinite DP complement. By contrast, the Max-FR in (33) is interpreted as roughly equivalent to the PP with an indefinite DP complement, while the PP with a definite DP complement is not even fully acceptable. The same pattern holds in Italian.[17]

(32) Captain Kirk went …
… [$_{\text{Max-FR}}$ where Mr. Spock had lived as a kid].
… [$_{\text{PP}}$ to [$_{\text{Definite DP}}$ the place(s) where Mr. Spock had lived as a kid]].
… [$_{\text{PP}}$ to [$_{\text{Indefinite DP}}$ a place/places where Mr. Spock had lived as a kid]].

[16] See further discussion in Caponigro 2003: ch. 2, § 2.4.1.2.
[17] See further discussion in Caponigro 2003: ch. 3, § 3.3.3.

(33) Captain Kirk went …
… [Max-FR where no man had gone before].
… #[PP to [Definite DP the place(s) where no man had gone before]].
… [PP to [Indefinite DP a place/places where no man had gone before]].

The contrast between the interpretative options of Max-FRs like the ones in (31) and (32) and the one in (33) may depend on the fact that the set of places where Mr. Spock had lived as a kid is a well-defined finite set whose maximal individual is easy to construct, while the set of places where no man had gone before is potentially infinite, so without an easily identifiable maximal individual. The reason behind this dual behavior of Max-FRs is an intriguing, unsolved puzzle that deserves further investigation across languages.

2.1.4.4 Quantification variability effects

Caponigro (2003: ch. 5) is the first to notice another semantic similarity between Max-FRs and definite DPs: both exhibit quantification variability effects, i.e., the interpretation of both constructions is affected by adverbials of quantity like *mostly, for the most part, partly, in part, largely, to a great extent, to some extent, with few exceptions, completely* with examples and contrasts like those in (34a–e).[18]

(34) a. [Max-FR What I bought at the yard sale] is **for the most part/in part** expensive.
b. [Plural Definite DP The things I bought at the yard sale] are **for the most part/in part** expensive.
c. [Mass Definite DP The stuff I bought at the yard sale] is **for the most part/in part** expensive.
d. *[Indefinite DP A thing I bought at the yard sale] is **for the most part/in part** expensive.
e. *[Quantificational DP Every/Most/Some/Ten thing(s) I bought at the yard sale] is/are **for the most part/in part** expensive.

(35) [**Most/Some** (of the) things/stuff I bought at the yard sale] are expensive.

(34a–c) show that the interpretation of Max-FRs introduced by *what*, definite DPs with a plural count noun, and definite DPs with a singular mass noun is affected by the presence of an adverbial of quantity in a similar way. In particular the truth conditions of (34a–c) resemble those of (35), in which there is no adverbial of

[18] Lahiri (2002) notices the contrast between the semantic interaction of adverbials of quantity with embedded *wh*- interrogative clauses vs the lack of interaction of the same adverbials with indefinite DPs. Adverbials of frequency have received much more attention (see von Fintel 2004 for a critical survey), but are not relevant for the present discussion since they don't exhibit the contrast in (34a–e). See Caponigro 2003: ch.5 for a detailed description of the interaction of both kinds of adverbials with FRs in general, including Max-FRs.

quantity and the Max-FR or definite DP in subject position has been replaced by a quantificational DPs whose quantifiers matche the quantificational force of the adverbials of quantity in (34a–c). By contrast, the corresponding examples with indefinite and quantificational DPs in (34d,e) are not even interpretable.

Max-FRs introduced by 'who' in languages in which they are productive, like Italian and Spanish, exhibit a more articulated interaction with adverbials of quantities, as mentioned in Caponigro 2003: ch. 5. This aspect of the semantics of Max-FRs too deserves further crosslinguistic investigation.

2.1.5 Conclusions on Max-FRs

The emerging picture shows that Max-FRs across languages are *wh*-clauses that semantically behave in the same way as nominals with an overt definite marker in languages where those nominals can refer to both individuals and kinds (e.g., Romance). The semantic properties of the individual *wh*-expressions and their singular morphology may add further semantic specifications: Max-FRs can refer to kinds in the same way as definite mass DPs (e.g., Max-FRs introduced by *what*) or definite singular DPs (e.g., Max-FRs introduced by *chi* 'who' in Italian). Like Definite DPs, Max-FRs do not allow for existential interpretation, at least not as widely as bare nominals. This behavior is observed across languages, regardless of whether a language has an overt definite determiner at all or uses it to form definite nominals that refer to individuals only, or kinds as well. So far, the detailed study of Max-FRs in a given language hasn't been accompanied by a parallel investigation of the behavior of nominals in the very same language.

2.2. Existential Free Relative Clauses

Existential free relative clauses (henceforth, *Ex-FRs*) are the second major kind of FR. Besides sharing the common FR features in (8), Ex-FRs are uniquely characterized by the semantic properties in (36) (Caponigro 2021, 2022).[19]

(36) *Properties characterizing Ex-FRs:*

a. EXISTENTIAL MEANING. Ex-FRs can be replaced and paraphrased by indefinite DPs—existentially quantified nominal expressions that are introduced by indefinite markers—or by bare nominals, in languages that allow for either.

[19] I assume that Ex-FRs are full clauses (CPs). Grosu (2004) and Šimík (2011) argue that they are not necessarily clauses and propose to label them *Modal Existential Construction* (*MEC*), instead.

b. EXISTENTIAL PREDICATE. If attested in a language, Ex-FRs always occur as the complement of existential 'be' and existential 'have' in that language.

Ex-FRs are not attested in English or other Germanic languages (except for Yiddish and a variety of New York English), but are common in Romance, Balto-Slavic, and Semitic languages, as well as Mesoamerican languages.[20] An example of an Ex-FR from Italian is given in brackets in (37a).

(37) a. A dicembre, con 5ºC, c'era [Ex-FR **chi** stava seduto all'aperto].[21]
in December, with 5ºC, there_was who stay.IND.PST.3SG seated at_the_open
'There were people sitting outdoors in December at 41ºF!'

b. […] c'erano [Indef. DP delle persone che stavano sedute all'aperto].
there_were of-the people that stay. IND.PRS.3PL seated at_the_open
'There were people sitting outdoors […]!'

The Ex-FRs in (37a) satisfies the properties in (36a,b). First, the Ex-FR can be replaced and paraphrased with an existentially quantified DP, as shown in (37b), and, therefore, it satisfies the "Existential Meaning" property in (36a). Both (37a,b) assert the existence of people who were sitting outdoors, i.e., the set of people who was sitting outdoors at that time with that weather is non-empty. Second, the Ex-FR in (37a) occurs as the complement of the existential predicate *c'era* 'there was', satisfying the "Existential Predicate" property in (36b).

Ex-FRs exhibit an intriguing dual pattern across languages with regard to Tense/Aspect/Mood (TAM) restrictions: some languages only allow for Ex-FRs with an irrealis/modal marking, while other languages do not impose any such restrictions. Šimík (2011) finds that all the languages he surveys require the Ex-FR predicate to be in the infinitive or subjunctive form, with the partial exception of Italian. While Italian allows for Ex-FRs with plain indicative morphology if the subject is relativized, as seen in (37a), it requires all the other Ex-FRs to be infinitival, as shown in (39). If an inflected modal is present in order to render the modal flavor of the infinitival form, the sentence is unacceptable, regardless of the mood of the modal.

(38) Non ho [Ex-FR con chi (***posso/ *possa**) parlare].
not have.1SG with who can.IND.1SG/ can.SUBJ.SG speak.INF
'I have nobody to talk to.'

[20] See Caponigro 2003: ch. 3, Šimík 2011, Caponigro, Torrence, & Zavala Maldonado 2021, Duncan 2022, and work they cite. Šimík 2017 provides a thorough review of the relevant literature on Ex-FRs and related constructions.

[21] https://www.tripadvisor.com/LocationPhotoDirectLink-g187323-d1160070-i151782759-Knofi-Berlin.html, accessed on August 4, 2023.

By contrast, only four of the fifteen Mesoamerican languages investigated by Caponigro et al (2021) impose TAM restrictions on their Ex-FRs. Duncan (2022) does not observe any restriction in Ex-FRs in Kiksht either. Radek Šimík (p.c.) has suggested that we may be dealing with two different kinds of existential *wh*-constructions: one would be fully clausal, with no TAM restrictions nor obligatory modal flavor, the other may be smaller than a clause, with required TAM restrictions and modal interpretation. This possible dimension of crosslinguistic variation deserves further investigation.

Regardless of whether there's one or more than one existential *wh*-construction across languages, none of them can be reduced to a subset of Max-FRs occurring as complements of existential predicates. First, there are languages with Max-FRs but no Ex-FRs (e.g., most Germanic languages) or languages with Ex-FRs, but no Max-FRs (e.g., Pesh). Also, the *wh*-expressions in Ex-FRs are a subset of those occurring in interrogative clauses, but not necessarily the same subset as those occurring in Max-FRs. This is the case even in languages that imposed no TAM restrictions—languages in which Max-FRs and Ex-FRs can look identical (see Caponigro et al. 2021 for relevant data). Last and least surprisingly, languages that characterize *wh*-expressions in Max-FRs with what looks like a definite D marker (see discussion in § 2.1.3 above) obligatorily drop the marker in *wh*-expressions in Ex-FRs, as shown in (40) for Modern Greek (cf. (18)).

(39) a. Eho [**pu** / ***o-pu** na krifto].[22]
have.1S where D-where to hide
'I have a place to hide in case of danger.'

These crosslinguistic findings point at a clear conclusion: although both are *wh*-clauses whose interpretation resembles those of nominals, Max-FRs and Ex-FRs are independent constructions and should be both studied, without assuming that the presence of one in a language guarantees the presence of the other in the same language. As part of this research strategy, each *wh*-expression should be checked for whether it can occur in Ex-FRs in a given language, regardless of whether it can occur in Max-FRs.

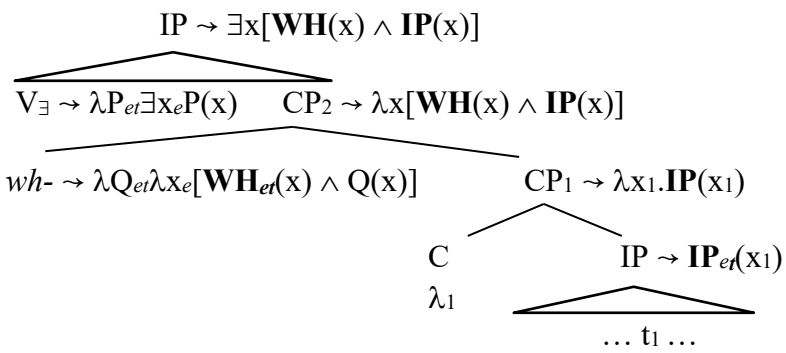
As for the comparison between Ex-FRs and nominals, the semantic behavior of Ex-FRs seems to resemble those of narrow scope indefinite nominals, like bare plural/mass nominals in English, although, unlike those nominals, the distribution of Ex-FRs is syntactically constrained to the complement position of existential predicates. I'll return to this comparison in the last section (§ 5).

I conclude with the schema in (40), which provides the main features of the syntactic and semantic analysis of Ex-FRs in Caponigro (2003, 2004, 2022). The syntactic structure and semantic composition are the same as those of Max-FRs up to CP_2, including the meaning of *wh*-expressions. CP_2 denotes a set of individuals

[22] Thanks to Maria Baltazani and Elias Koutsoupias for the data.

as usual. Since it occurs as the argument of a matrix predicate looking for a set-denoting argument, it can directly combine with the matrix predicate without the need for any type-shifting, unlike Max-FRs.

(40) *General schema for the syntactic and semantic analysis of Ex-FRs:*



2.3 Free-Choice Free Relative Clauses

Free-choice free relative clauses (henceforth, *FC-FRs*) are the last main kind of FR. Besides satisfying the general FR properties in (8), they are uniquely characterized by the properties in (41a,b) (Caponigro 2021, 2022).[23] Examples are given in (42) and (43).

(41) *Properties characterizing FC-FRs:*

a. FREE-CHOICE INFERENCE. A sentence containing an FC-FR obligatorily triggers an inference of ignorance or indifference.

b. FREE-CHOICE MARKER. An FC-FR always contains a free-choice (FC) marker.

(42) a. [FC-FR **Whatever** Paloma is cooking right now] uses onions.[24]

b. *Asserted content:* [Max-FR/DP{What}/{The stuff that} Paloma is cooking right now] uses onions.

c. *Ignorance FC inference:* The speaker doesn't know what Paloma is cooking right now.

(43) a. Pablo (simply) voted for [FC-FR **whoever** was at the top of the ballot].[25]

b. *Asserted content:* Pablo voted for [DP the person who was at the top of the ballot].

[23] See Šimík 2020 for an overview of the relevant issues and literature. FC-FRs in English (and in other languages as well) are often labeled "-*ever* free relative clauses".

[24] Adapted from Dayal 1997: ex. 27a.

[25] Adapted from von Fintel 2000: ex. 18.

c. *Indifference FC inference:* Pablo didn't care about who was at the top of the ballot.

Example (42a) shows a bracketed FC-FR in the subject position of its matrix clause. It is introduced by the bolded *wh*-word *whatever*, which results from the morphological enrichment of the *wh*-root *what* with the FC suffix *-ever*. Following Dayal's (1997) seminal analysis for English and von Fintel's (2000) further development, the meaning contribution of the FC-FR in (42a) manifests itself at two different levels. The asserted content of (42a) is the same as that of (42b), in which the FC-FR has been replaced with a Max-FR or a definite DP. The FC-FR in (42a), though, obligatorily triggers the ignorance inference (a presupposition, according to von Fintel) that the speaker doesn't know the identity of what Paloma is cooking, as stated in (42c). Notice that both the Max-FR and the definite DP in (42b) are compatible with a situation in which the speaker doesn't know the identity of what Paloma is cooking, but, crucially, they are also compatible with a situation in which the speaker is fully knowledgeable about what Paloma is cooking. In other words, they do not obligatorily trigger an ignorance inference.

Example (43a) shows a bracketed FC-FR in the complement position of the preposition *for* in the matrix clause. It is introduced by the morphologically enriched *wh*-word *whoever* in bold. Example (43a) asserts the same as (43b), in which the FC-FR has been replaced with a definite DP. Unlike (43b), though, (43a) with an FC-FR necessarily triggers the indifference inference that Pablo doesn't care about the actual identity of the candidate at the top of the ballot, as stated in (43c).

These two inferences have been grouped under the same "free choice" label to highlight the fact that they both trigger a form of variation or indeterminacy on the actual identity of the individual(s) that fit the descriptive content of the *wh*-clause. According to Dayal's and von Fintel's analyses, an FC-FR in English does refer to a maximal individual, like a Max-FR, but which maximal individual it refers to can vary depending on the relevant modality and the related modal agent: epistemic modality and the speaker in (42), or counterfactual modality and Pablo—the individual the matrix subject refers to—in (43). In other words, although the *-ever* suffix occurs on the *wh*-expression, it does not affect the meaning of the *wh*-expression itself nor the meaning of the whole FR, which remain the same as in Max-FRs: the *wh*-expression of an FC-FR semantically behaves like a set restrictor as in a Max-FR (see (19)a) and the whole FC-FR denotes an individual, like a Max-FR. The FC morpheme *-ever* combines the FC-FR with the remainder of its matrix clause, affecting the truth conditions of the whole sentence by requiring the individual the FC-FR denotes to be able to vary across almost identical worlds.[26]

[26] For a detail discussion, see Dayal 1997, von Fintel 2000, and Caponigro 2003: ch. 4, § 3.

Caponigro & Fălăuş (2018) provide evidence that the nature of the ignorance or indifference inference in FC-FRs and the semantic contribution of the FC morpheme can vary across languages. In particular, they show that FC-FRs in Italian and Romanian, which morphosyntactically resemble FC-FRs in English, lack indifference inferences and only trigger ignorance inferences. Moreover, the ignorance inferences they trigger differ from those in FC-FRs in English, while closely resembling those triggered by DPs with FC determiner *any* in English. Because of this similarity in semantic behavior, they argue that FC *wh*-expressions in Italian and Romanian should be analyzed as *any* in English and provide a compositional analysis along the line of Chierchia's (2013) analysis of *any* as a polarity item with existential force, triggering alternatives that are then exhaustified.

Dayal's and von Fintel's approach predicts that the *wh*-expressions occurring in FC-FRs should be the same as (or a subset of) those occurring in Max-FRs, since they are treated as the same lexical items. On the other hand, Caponigro & Fălăuş treat them as morphologically and semantically different. Therefore, they don't predict any specific relations between the sets of *wh*-expressions in those two kinds of FRs. Crosslinguistic data seem to support the latter approach. There are languages that have one kind of FR but lack the other (Caponigro et al 2021) or languages that have both FRs but with only partially overlapping set of *wh*-expressions. For instance, the *wh*-expression *whichever* + NP can easily introduce FC-FRs in English, while *which* + NP is never allowed in Max-FRs (the same is true in Romanian; see Caponigro & Fălăuş 2023a). In Italian, *quando* 'when' and *come* 'how' can introduce Max-FRs, but there's no FC equivalent that can introduce FC-FRs.

FC-FRs are the FRs that have been less studied crosslinguistically. Further research is needed to establish which inferences FC-FRs trigger in each language and their exact nature, and what the morphosyntax/semantics interface of FC-FRs looks like in detail. What is crucial for our current assessment of the syntax-semantics mapping generalization in (7) is that neither kind of inference nor any kind of quantification is obligatorily triggered without overt morphosyntactic marking: an FC marker of some kind is needed.[27]

3 Light-headed relative clauses

Moving away from FRs, *light-headed relative clauses* (henceforth, *LHRs*) are the next major kind of [−H]RC. Besides satisfying the properties in (3) for [−H]RCs in

[27] The morphosyntactic nature of the FC marker can vary as well: it can be suffix like *-ever* in English or a prefix, or it can result from the reduplication of the *wh*-word, or it can be morphologically independent from the *wh*-word (see Caponigro et al. 2021 for relevant data and discussion).

general, LHRs are uniquely characterized by an overt D head introducing them, immediately followed by the remainder of the LHR, which can contain a *wh*-expression, a relative marker, a complementizer, or no marker at all. The characterizing features of LHRs are summarized by the syntactic schema in (44a) and the feature bundle in (44b) (Caponigro 2021, 2022).[28]

(44) *Properties characterizing LHRs:*

a. [D [$_{CP}$ (*wh*-/REL/COMP) …. __ …]]$_{DP/PP}$ b. [+D, –N, ±WH]

D heads in LHRs can be of three main kinds, though they are not necessarily all instantiated in all languages with LHRs: articles, demonstratives, or quantifiers. An example of LHR introduced by a demonstrative D in English was given in (1), while (45) provides an example of an LHR introduced by a quantificational D in Yucatec Maya and (46) one of an LHR introduced by a definite D in Spanish.

(45) [$_{LHR}$ **Tuláakal** k-u púuts'-ul-o'ob], k-u y-áalkab-∅-o'ob.[29]
all IPFV-A3 flee-SS.ICPLV-B3PL IPFV-A3 EP-run-SS.ICPLV-B3PL
'All those who escape run (from him).'

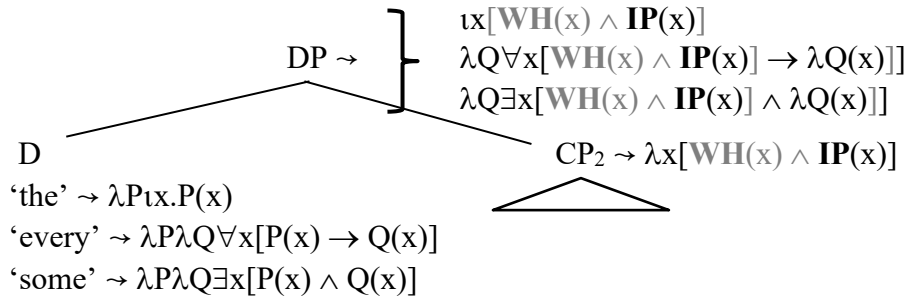
(46) [$_{LHR}$ **El** que no trabaja] no come.[30]
the.MASC.SG COMPL not works not eats.
'{The one}/{he} who doesn't work doesn't eat.'

Although limited, the crosslinguistic data about LHRs that have been collected so far suffice to conclude that LHRs are extremely productive and form a family of constructions, rather than just a single construction.[31] Across languages and even within the same language, there may be LHRs whose morphosyntax is closer to that of [−H]RCs or headed relative clauses or neither (Caponigro et al 2021). These data also support the syntax-semantics mapping generalization in (7): it is the D of an LHR that determines the kind of meaning that the whole LHR conveys. If the D head is a definite or demonstrative D, then the LHR behaves like a referential DP. If the D head is a quantifier, then the LHR behaves like a quantificational DP with the same quantificational strength as its D head.

A syntactic/semantic analysis for LHRs that captures this behavior is schematized in (47).

[28] The label is due to Citko (2004), who also provides the first in-depth description and syntactic analysis of LHRs that I am aware of. She focuses on Polish LHRs with a *wh*-word and compare them to Max-FRs, which look identical in Polish, except for lacking the D head.
[29] From AnderBois & Chan Dzul 2021: ex. 33b.
[30] Slightly adapted from Plann 1980:80, ex. II.1.a.
[31] See Mantenuto & Caponigro 2021b for a description of different varieties of LHRs in Teramano.

(47) *General schema for the syntactic and semantic analysis of LHRs:*



LHRs are the same as Max-FRs all the way up to the level of CP_2, which ends up denoting a set of individuals in both constructions. The 1-place predicate ***WH(x)*** stands for the familiar restrictions conveyed by the *wh*-expression. It's shaded since LHRs can but don't have to have a *wh*-expression: neither the LHR in (45) or (46) has one, while the LHR in (1) can optionally have the *wh*-word *who*. The crucial difference between LHRs and Max-FRs is the D head, which determines the final meaning of an LHR and avoids the type-mismatch and the need for some repairing type-shifting. D combines with the set-denoting CP_2 complement and returns either an individual, if D is a definite article (as shown in (47) for 'the') or a demonstrative, or a generalized quantifier, if D is quantificational (as shown in (47) for 'every' and 'some').

4. Super-free relative clauses

Super-free relative clauses (henceforth, *SFRs*) are the last main variety of [−H]RC. They are uniquely characterized by the syntactic structure schematized in (48a) and the feature bundle in (48b) (Caponigro 2021, 2022).

(48) *Properties characterizing SFRs:*

a. [CP (REL/COMP) …. __ …]DP/PP b. [−D, −N, −WH]

Like all [−H]RCs, SFRs lack an N head and satisfy all the other properties in (8). Unlike LHRs, SFRs lack a D head as well, resembling FRs in this regard. But they are even "freer" than FRs in lacking a *wh*-expression. SFRs can be introduced by a complementizer, as in (49a,b) from Iliatenco Me'phaa (Oto-Manguean), or by a non-*wh* relative pronoun, as in (50a,b) from Sierra Populuca (Mixe–Zoquean), or by no marker at all, as in (51) from Chuj (Mayan). Crucially, the bracketed SFRs in (49)–(51) are full clauses with complete TAM marking, rather than nominalized clauses or subclausal constituents.

(49) a. Ni-rax-ii [tsí ni-to'-oo].[32]
PFV.1SG-greet-3AN.SUBJ COMP.AN PFV-enter-3SG
'I greeted the person/people who entered.'

b. Xtáa [tsí na-ka].[33]
exist.aN COMP.AN IPFV- 3SG.go
'There is someone who is leaving.'

(50) a. Ø=tuj-taH-wɨ [ʔan=waaga-na-nɨk-wɨ=pVʔ].[34]
3ABS=shoot-PASS-COMPL 1ERG=together-ASSOCAPPLgo-COMPL=REL
'The person who came with me was shot.'

b. Ø=ʔit-wɨ [ta=kuʔaʔm-ket-neʔ-wɨ=pVʔ].u[35]
3ABS=be-COMPL 1ABS:INCL=search-descend-PERF-COMPL=REL
'There is someone who looks after us.'

(51) Ay [ix-in-man-a'].[36]
EXT PFV-A1SG-buy-TV
'I bought (things). /I went buying.' (Lit. 'There's I bought.')

SFRs represent a crucial testing ground for the generalization in (7) and the comparison between the semantic behaviors of [−H]RC and nominals. They have no D head determining the referential or quantificational nature of their final denotation. They lack a *wh*-expression with its semantics effects. The final denotation of SFRs is uniquely determined by general rules governing type mismatches between predicates and their arguments, and type shifters available in the grammar to handle those mismatches.

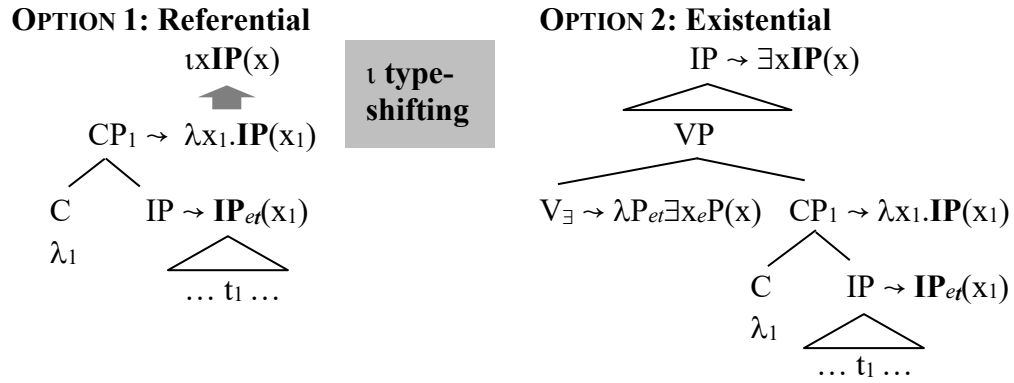
SFRs have been largely ignored in the literature with almost no language-specific study nor crosslinguistic investigation. The fact that SFRs are not attested in Romance nor Germanic may have contributed to this unfortunate situation. Caponigro et al. (2021) describe SFRs in eight languages from five different language families, all from Mesoamerican or nearby areas, while Caponigro & Polinsky (2011) discuss SFRs in Adyghe (Northwest Caucasian) within a larger study of the many functions of relativization in the language.

The tentative crosslinguistic picture that starts emerging shows that, if a language allows for SFRs, then SFRs are interpreted as referential and maximal (like Max-FRs) by default, as shown in (49a) for Iliatenco Me'phaa and (50a) for Sierra Populuca. The only exception is whether a language allows for SFRs as the complement of existential predicates. In this case, SFRs are interpreted as existential quantified (like Ex-FRs), as shown in (49b) for Sierra Populuca, (50b)

[32] Adapted from Duncan & Torrence 2021: ex. 69c.
[33] Adapted from Duncan & Torrence 2021: ex. 70.
[34] Adapted from López Márquez 2021: ex. 89c.
[35] Adapted from López Márquez 2021: ex. 89b.
[36] Adapted from Royer 2021: ex. 105.

for Iliatenco Me'phaa, and (51) for Chuj. This behavior of SFRs is captured by the syntactic and semantic analysis in (52).

(52) *General schema for the syntactic and semantic analysis of SFRs:*



The two semantic derivations in (52) share the same steps all the way up to CP_1. This is also the very same semantic derivation as the one for LHRs without a *wh*-word in § 3. In all these constructions, CP_1 denotes a set of individuals. If an SFR occurs in an argument position in which an individual-denoting constituent is required, then a type mismatch occurs. It is the same type mismatch as the one we already discussed for Max-FRs. We handle it by means of the same strategy: ι type-shifting applies and turns the set denoted by CP_1 into its maximal individual, as shown by Option 1 in (52). On the other hand, if an SFR occurs in the complement position of an existential predicate like those we discussed for Ex-FRs, then the very same semantic process we argued for Ex-FRs applies to this SFR as well: the matrix predicate existentially quantifies over its set-denoting complement, as shown by Option 2 in (52).

The next research step would be to investigate the way nominals behave in languages with SFRs and (i) compare the semantic behavior of the two families of constructions within the same languages and (ii) compare SFRs and nominals in languages with nominals occurring with overt definite and/or indefinite Ds vs languages allowing (only) for bare nominals. Although this kind of investigation is still missing, a very recent study by Little et al. (to appear) is an excellent example of how to conduct such a comparative investigation and what kind of enlightening results it can produce. I will briefly touch on it in the next section.

5 Conclusions

A clear picture is emerging about [−H]RCs within and across languages. While [−H]RCs exhibit diverse morphosyntactic shapes, their semantic output is uniform: they refer to a maximal individual by default, unless an overt morphosyntactic

feature makes them denote a generalized quantifier. This generalization may result from an information-preserving strategy. All varieties of [−H]RCs end up denoting a set of (atomic) individuals after applying λ-abstraction over the variable licensed by the trace of the missing constituent, as discussed in the previous sections. From a set of atomic individuals, one can always construct the corresponding join-semilattice and the join (the maximal individual) of the latter. The other way around works as well: given a join, one can build its join-semilattice and its set of atoms. Therefore, the shift in [−H]RCs from the set of (atomic) individuals to the join via the join-semilattice preserves information. On the other hand, any form of quantification over a set of individuals alters the truth-conditions of the sentence in a way that cannot be predicted based on the set only. Further in-depth work on [−H]RCs in individual languages is needed to further corroborate or falsify the generalization above.

Comparing the semantic behavior of [−H]RCs with those of nominals, many similarities emerge together with some interesting differences. The remainder of this final section is dedicated to comparative considerations between the morphosyntax/semantics interface of [−H]RCs and that of nominals, broadening and generalizing the comparison between Max-FRs and nominals in § 2.1.4.

Nominals combined with overt D heads allow DPs to denote varieties of individuals and generalized quantifiers. LHRs were shown to make use of a similar strategy, although with a more restricted set of Ds.

Many languages also allow for bare nominals—nominals with no overt D. The semantic behavior of bare nominals only partially resembles those of [−H]RCs without extra morphosyntactic marking, i.e., Max-FRs and SFRs. As already mentioned in § 2.1.4.3 (see references there), bare nominals—depending on the language—can or must be interpreted as (narrow scope) indefinites in episodic sentences, regardless of their syntactic position. By contrast, as we saw, FRs and SFRs behave like (narrow scope) indefinites only when complements of existential predicates, regardless of episodicity. The information-preserving considerations I suggested earlier would predict the semantic behavior of FRs and SFRs, but not the one of bare nominals as indefinites, for which various solutions have been suggested (e.g., Chierchia 1998, Dayal 1992, 2004). Why these solutions cannot apply to FRs or SFRs is a future challenge for a general theory of the syntax/semantic interface.

New work by Little, AnderBois, & Coon (to appear) starts addressing precisely these issues, together with elaborating a methodology for comparing [−H]RCs and nominals across languages that I hope will become a model for future research. Little et al. adopt the framework to identify and describe [−H]RCs that is introduced by Caponigro et al (2021) and focus on Ch'ol and Yucatec Maya—two Mayan languages chosen for their [−H]RCs and their differences in the nominal domain. Ch'ol doesn't have a definite nor an indefinite determiner and its bare nominals can

be interpreted as definites or indefinites. Yucatec Maya, instead, has both a definite and an indefinite determiner and allows for no bare nominals except in very restricted, well-defined syntactic environments (e.g., as complements of the existential construction 'there's').

Despite these major differences in their nominal domain, FRs in both languages follow the generalization in (7): they behave like Max-FRs everywhere, except in the complement position of existential predicates, where they behave like Ex-FRs. This is particularly striking in Ch'ol, a language whose bare nominals can flexibly behave like definites or indefinites without overt marking. What principles account for this nominal behavior and why can't they apply to FRs as well? Little et al. propose that there are two ɩ type-shifters in the grammar: one for nominals and one for clauses.

Little et al. also examine the behavior of constructions that look like SFRs in both languages and discover an interesting contrast with FRs. These apparent SFRs behave as bare nominals do in the two languages: they occur freely and are interpreted as definites or indefinites under the same conditions as nominals in Ch'ol, while these apparent SFRs can only occur in the complement position of existential predicates in Yucatec Maya. This behavior may look problematic for Little et al. at first: SFRs are clauses, ɩ type-shifter for clauses should apply, and SFRs should behave like FRs. It would also be a clear counterexample to our generalization about [−H]RCs in (7). Little et al., though, discover another important difference between FRs and SFRs. A careful investigation of their discourse conditions reveals that the interpretation of SFRs is always anaphoric to a discourse-salient set. Little et al. account for this discourse dependency by assuming that all SFRs in both languages are headed by a silent N behaving like an anaphor over sets of individuals. Therefore, the apparent SFRs in Ch'ol and Yucatec Maya turn out not to be true [−H]RCs, but headed relative clauses with an actual N head, although silent.

I hope that work along these lines will continue and grow to benefit language description, linguistic typology, and the theorizing about the syntax/semantics interface. [−H]RCs are well-attested across languages, their similarities and differences with nominals are crucial to understand both domains and the general syntax/semantics interface, and the crosslinguistic dimension of this investigation is fundamental to achieve a more complete picture of the options that are available in human language to refer to and quantify over individuals—and not only.

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