From interrogatives to relatives:
A comprehensive account of wh-constructions*

Radek Šimík

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Abstract

This paper looks at the mutual relation among a number of types of wh-constructions. It proposes that wh-constructions (and wh-words) are organized in what I call a wh-hierarchy - beginning with simplest wh-interrogatives, going via (un)conditionals and correlatives, free relatives, light-headed relatives, and finishing with the most complex headed relatives. This hierarchy is claimed to follow from an incremental structural growth of wh-words, mirroring the growth of the respective wh-clauses (foc-top-rel-mod). The hierarchy receives empirical support from many grammatical and linguistic domains, particularly morphology (wh-word lexicalization patterns), syntax (wh-in-situ vs. ex-situ, structural height of wh-movement landing site), typology (cross-linguistic availability of wh-words in the individual constructions), diachrony, and L1-acquisition. The paper builds on data from a range of genealogically and geographically distant languages, including Indo-European, Uralic, Caucasian, Mesoamerican, or Papuan.

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1   Introduction

Wh-words are extremely versatile linguistic devices that have fascinated and puzzled linguists for decades (Katz & Postal 1964; Hamblin 1973; Chomsky 1977; Karttunen 1977; Reinhart 1998; Caponigro 2003; Cable 2010; Kotek 2019; among many others) and whose behavior is believed to reflect some of the core properties of both syntax and semantics. As succinctly summarized by Caponigro & Fălăuş (2019), wh-words are "logical" in that they represent a well-defined closed class of expressions which are involved in logical operations and relations like set-formation, lambda-abstraction, quantification, and more generally operator–variable relations. As such, wh-words belong to the essential toolbox of virtually any natural language.[1]

Probably the first use of wh-words that crosses one's mind is the interrogative use, as in *What happened?* or perhaps *I know/asked what happened.* Another prominent use, familiar to speakers of many languages of Europe, is that of a relative pronoun as in *the man who slept.* Besides nominally headed relatives, wh-words are productively employed in other types of relative clauses, including headless relatives (free or light-headed), as in *I ate what you cooked,* or correlatives and unconditionals (*Whatever you cooked, I'll eat it*). Last but not least, wh-words are very frequent as derivational bases for indefinite pronouns (*somewhere, anywhere*) and can often act as indefinite pronouns themselves.

In this paper, I focus on the relative facet of wh-words and compare it to the interrogative one, arguing that the available evidence, drawn from diverse linguistic domains, strongly points to the following thesis:

(1)   Wh-based relative pronouns/clauses are derived from interrogative ones.

This thesis stands in opposition to competing possibilities—either that the derivational relation is opposite or that interrogatives and relatives are in principle independent of one another. Taking a theoretical perspective, the thesis is by far not trivial or generally accepted. Consider one commonly employed assumption, namely that relative clauses denote properties, whereby the fronted relative pronoun plays the role of deriving a property from a proposition (e.g., Rodman 1972; von Stechow 1982; Caponigro 2003):

(2)   the man [who John likes t]

   a.   ⟦John likes t⟧ = John likes x
        the open proposition that John likes x

   b.   ⟦who John likes t⟧ = $\lambda x \,.\, x$ is a human and John likes x
        the property of being a human that John likes or, in other words,
        the set of human individuals that John likes

The derivation of questions, on the other hand, is often considered significantly more complex than this. Below is the kind of derivation proposed by Karttunen (1977), various versions of which (often even more complex) are still broadly adopted. Karttunen proposes that the formation of a question involves at least two question-specific operations – encoded below by the abstract operators Q^1 and Q^2. The derivation starts with what he calls a protoquestion, derived by Q^1, a simplified version of which is provided in (3b). The wh-word then functions as a standard existential quantifier taking scope over this protoquestion – (3c). Finally, the question meaning is derived by abstracting over the propositional variable p introduced in the protoquestion, encoded here by Q^2 – (3d). The result is a property of propositions or, in other words, the set of propositions that correspond to the true answers to the question *Who does John like?*

(3)   know [Q^2 who Q^1 John likes t]

   a.   ⟦John likes t⟧ = John likes x

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[1]The single notable exception known thus far is Abaza, in which wh-words are expressed by verbal morphology (Arkadiev 2020).

b. $\llbracket Q^1 \text{ John likes t} \rrbracket = [p \text{ is true and } p = \text{John likes } x]$

c. $\llbracket \text{who } Q^1 \text{ John likes t} \rrbracket = \exists x \, . \, x \text{ is a human and } p \text{ is true and } p = \text{John likes } x$

d. $\llbracket Q^2 \text{ who } Q^1 \text{ John likes t} \rrbracket = \lambda p \, . \, \exists x \, . \, x \text{ is a human and } p \text{ is true and } p = \text{John likes } x$
the property of being a true answer to *Who does John like?* or, in other words,
the set of true answers to *Who does John like?*

Of course, there are many other ways of deriving question meanings and not everybody adopts the so-called Hamblin (1973)–Karttunen (1977) theory according to which questions correspond to the set of their propositional answers. But this is not the right moment to go into detail; it suffices to reiterate the point that the meaning of questions is *typically* considered more complex than the meaning of relative clauses. The point of this article is to argue that empirical facts suggest the exact opposite of this picture.

The thesis that wh-based relatives are derived from interrogatives is not everything that this paper has to offer. My intention is to cover a much broader empirical ground on which wh-interrogatives and wh-based headed relatives are just two extreme points on a scale – what I call the WH-HIERARCHY. More specifically, I will argue that wh-words and the corresponding wh-constructions are hierarchically organized from the simplest wh-interrogatives, via unconditionals and correlatives, then free and light-headed relatives, and finally the most complex headed relatives. The existence of the hierarchy will be supported by evidence from various domains of grammar and language – from morphology and syntax to typology, diachrony and L1-acquisition.

The broad constructional and empirical coverage naturally comes at the cost of analytical depth and detail. While I provide explicit syntactico-semantic analyses of the relevant constructions, provide representative examples from various languages, and – where necessary – go to a reasonable empirical detail, the paper has a certain programmatic flavor. This is fully intentional and – or so I hope – also functional in that it opens fruitful research perspectives and directions.

The paper is organized as follows. Section 2 briefly introduces the range of wh-constructions of interest, particularly interrogatives, unconditionals, correlatives, and different kinds of relatives. Section 3 introduces the wh-hierarchy and proposes its syntactico-semantic treatment. The analyses proposed or assumed for the individual constructions under discussion are almost never new, but not always broadly accepted. What matters most is the incrementally increasing analytical complexity (at the level of morphology, syntax, and semantics) of the wh-words and the corresponding wh-cosntructions, along the lines of the proposed wh-hierarchy. I would like to kindly ask the expert reader to bear with me while reading this section, as some of the analytical decisions may seem poorly motivated. The multi-faceted empirical evidence in favor of the proposed analytical constellation is provided in section 4. I will show that the hierarchy receives non-trivial support from the cross-linguistic distribution of the individual constructions, the morphological and syntactic patterns, as well as diachronic and developmental evidence. Section 5 concludes and highlights the most important open issues in the study of wh-constructions.

2   Constructions to be considered

The constructions of interest are exemplified in (4). The examples come from English whenever possible and are complemented with German ones when not, or where the English correspondent is too marginal. The constructions are interrogatives (I), embedded interrogatives (EI), correlatives (CoR), unconditionals (UnC), (plain) free relatives ((p)FR), ever free relatives (eFR), light-headed relatives (LHR), and headed relatives (HR). These constructions represent robust classes when considered from a cross-linguistic perspective and display sufficiently *sui generis* properties in order for them to be considered separate constructions, although not all languages have the whole array (English being an example) and not all constructions can be clearly distinguished from one another in all languages (Turkish correlatives and unconditionals being an example; Demirok 2017a).

(4)   a.   [What did Tom cook?]   I

      b.   I know/asked [what Tom cooked].   EI

      c.   [Was Tom gekocht   hat], das   hat Susi gegessen.   CoR
           what Tom cook.PTCP has   that.DEM has Susi eat.PTCP
           'Susi ate what Tom cooked.' / 'Whatever Tom cooked, Susi ate it.'

      d.   [Whatever Tom cooked], I ate it / I wasn't there.   UnC

      e.   Sue ate [what Tom cooked].   (p)FR

      f.   Sue ate [whatever Tom cooked].   eFR

      g.   Susi hat {das   / alles}   gegessen, [was Tom gekocht   hat].   LHR
           Susi has that.DEM everything eat.PTCP   what Tom cook.PTCP has
           'Susi ate the things / everything that Tom cooked.'

      h.   Sue ate the meal [which Tom cooked].   HR

Let me spend some time on characterizing some of these constructions, in order to avoid confusion and to ease the classification into the individual types. Interrogatives (I), and especially root interrogatives require no introductory discussion; their status is clear and their properties well-known, even if they can differ significantly from language to language. Some of these properties, esp. pertaining to the position of the wh-word, will be discussed below. Embedded interrogatives (EI; also called indirect questions) also represent a category that is, for the most part, straightforward. Still, it is good to take note of the fact that not all languages have embedded interrogatives derived by using wh-words. Examples are Adyghe (aka Circassian, Northwest Caucasian; Caponigro & Polinsky 2011) or Hausa (Chadic; Zimmermann 2018), which use a relativization strategy to express the intended meaning. Embedded interrogatives will mostly be set aside in this paper (see section 5 for some discussion).

Correlatives (CoR) are left-adjoined clausal structures where the referent introduced by the wh-word is anaphorically picked up by a pronominal – typically a demonstrative – in the main clause (*was–das*). It is typical of correlatives that this anaphoric relation is obligatory. Correlatives are structurally and semantically similar to conditionals; one could even argue that conditionals are a kind of correlative (e.g. Arsenijević 2009). Also for this reason, I will refer to the wh-clause as the (correlative) antecedent and the main clause to which it is, pre-theoretially speaking, adjoined, is the (correlative) consequent.

Unconditionals (UnC) have a similar overall structure as correlatives – they consist of an (unconditional) antecedent, containing a wh-expression, and an (unconditional) consequent. They differ from correlatives in three important respects: first, they are typically (i.e., not always) accompanied by what we might call the ever-morpheme (realized by a suffix on the wh-word, as in English, but possibly also by verbal morphology, like the subjunctive in Bulgarian; Pancheva Izvorski 2000); second, the referent introduced by the wh-expression is not necessarily picked up in the consequent, giving rise to pairs like (5); third, if the referent is picked up, then not necessarily by a demonstrative (and sometimes obligatorily by a personal pronoun).

(5)   a.   Whoever$_i$ called, I didn't recognize her$_i$.
      b.   Whoever called, I wasn't here.

Free relatives (FR) are embedded wh-clauses with the distribution and meaning of nominal or prepositional phrases (Caponigro 2003; van Riemsdijk 2017; Šimík 2021; see Bücking 2021 for the most recent discussion of PP-like free relatives). They correspond to definite descriptions (possibly contained in a PP). They come in two major formal variants – ever free relatives (eFRs) (4f), which contain the ever-morpheme – typically, but not necessarily the same as in UnCs – and plain free relatives (pFRs) (4e), which do not contain the morpheme.[2] There are differences between pFRs and eFRs beyond the

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[2]There is a noticeable parallelism between pFRs and eFRs on the one hand and CoRs and UnCs on the other, which is sometimes reflected in analytical approaches. More particularly, correlatives are sometimes treated on a par with (plain) free relatives, i.e., essentially nominals (Srivastav 1991b); likewise, ever free relatives have – at some level of representation – been treated on a par with unconditionals (Hirsch 2016). This will be relevant in my discussion of Tsez FRs; see section 4.3.

ever-morphology, like the fact that only eFRs allow for complex wh-phrases (like 'which box'; pFRs only allow wh-pronouns like 'what'; Groos & van Riemsdijk 1981; Donati 2006; Citko 2010; a.o.) or the much more complex semantics and pragmatics of eFRs, related to the presence of the ever-morphology (Dayal 1997; Tredinnick 2005; Šimík 2021).

Light-headed relatives (LHR) are wh-clauses headed by a pronoun, which can be definite ('that'), indefinite ('something'), or quantificational ('everything'); see Citko (2004). The wh-words used in LHRs are typically the same as those used in pFRs; this is illustrated in (4g), where *was* 'what' is used rather than *das* 'that', which would be expected in a headed relative.[3] While this is a strong tendency, it is not a rule; English uses *which* (from the HR series) rather than *what* (from the FR series) in LHRs; see (6). Semantically, LHRs function as determiner restrictors with the pronominal head playing the role of the determiner. They are thus somewhat similar to FRs with the difference that they can have – by virtue of the overt pronominal head – a different "force" than just a definite one. Together with FRs they are sometimes referred to as "headless" relatives, where "head" implies a nominal head (see, e.g., Caponigro 2021).

(6)   something *what / which

Headed relatives (HRs) are wh-clauses "headed" (in a pretheoretical sense) by a nominal phrase. For many, this is the default construction that one imagines upon hearing the term "relative clause". Despite there being many different types within and across languages (see, e.g., Cinque 2020 for recent in-depth discussion), they need little introduction in this context.

Two important remarks are in order. First, while all of the above-mentioned constructions can make use of wh-words, they often do not (have to). Thus, besides wh-word-based HRs, most languages have complementizer-based HRs (*...the box which/that...*). Similarly, LHRs can be introduced by complementizers (*...something which/that...*) and so can FRs in many languages (some Arabic varieties or some Meso- and North American languages; see, e.g., Sadler & Camilleri 2018; Caponigro et al. 2021; Duncan 2022). While complementizers (whether general subordinators or specific relativizers) are not in the center of my attention in this article, it must not be ignored that they themselves often exhibit wh-morphology (or, relatedly, demonstrative morphology) and are thus in some sense related to wh-words proper.[4]

The second point is that while I consider wh-words, it is important to keep in mind that I do not always mean interrogative expressions, but rather expressions systematically related to them. The systematic relation can be (and often is) identity (*which* is used both for interrogatives and relatives). However, sometimes relative wh-words are morphologically derived from wh-words (the relative form of the Bulgarian interrogative *koj* 'who/which' is *kojto*) and sometimes they share the same morphological base with interrogatives (Hindi *k-* vs. *j-* alternation in interrogatives vs. (cor)relatives).

3   The wh-hierarchy and its grammatical nature

While all the constructions considered can make use of wh-words, they are not on a par in this respect. They differ along the lines of various parameters. To give a few examples (to be discussed at length in section 4): Some constructions are more likely than others to make use of wh-words. Some constructions are more likely than others to retain interrogative morphology. While some constructions can make use of wh-in-situ, others necessarily rely on wh-ex-situ. What is more, the differences turn out not to be accidental. They are constrained by a certain implicational hierarchy, which I will call the wh-hierarchy, stated in (7).

(7)   Wh-hierarchy

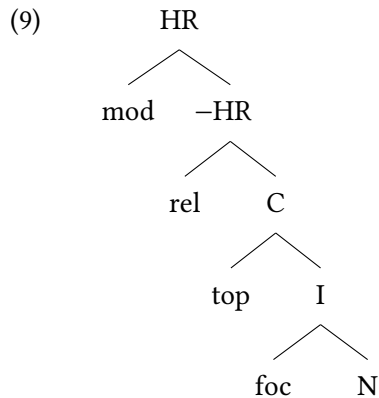[3]For completeness, I note that wh-words with the ever-morpheme cannot be used in (L)HRs.

[4]The literature on this topic is rich and a survey goes beyond the scope of this paper. For relevant discussion, see Kayne (1977); Sportiche (2011); Meyer (2017); Baunaz & Lander (2018); Poletto & Sanfelici (2018); Wiland (2019); É. Kiss (2023); among many others.

I < UnC < CoR < FR < LHR < HR

It will be useful to also make use of a simplified version of (7), where some of the constructions are collapsed, namely unconditionals and correlatives (C; meant to also include conditionals) and free and light-headed relatives (−HR, i.e. headless relatives in the sense of Lehmann 1984 and Caponigro 2021); see (8).

(8)　Simplified wh-hierarchy
　　　I < C < −HR < HR

I propose to model the simplified hierarchy in (nano)syntactic terms, where the "<" sign corresponds to "is structurally contained in" or "is dominated by", as illustrated by the schematic representation of a wh-pronoun in (9). In that I follow the tradition of representing pronouns as syntactic phrases rather than heads (see Cardinaletti & Starke 1999, Déchaine & Wiltschko 2002, and Barbiers et al. 2010 for wh-words specifically) and of allowing superset-based phrasal spellout (Starke 2009). The interrogative pronoun is based on a stem, referred to here simply by the N(ominal) category, expressing the wh-sort (HUMAN, THING, PLACE, etc.). The functional structure above this lexical stem mirrors the standard cartographic structure of clausal left periphery (Rizzi 1997, 2001 and much subsequent literature). The interrogative pronoun is derived by adding the foc feature, which turns the predicative base into a restricted variable specified to be bound by a question operator. The correlative pronoun is derived by adding the top feature, which makes the restricted variable topical in the sense that it must be picked up by a (donkey-)anaphoric pronoun and commented on in the consequent of a conditional-like biclausal structure. The headless relative pronoun is derived by the rel feature and the result amounts to a lambda-abstractor (combined with a restrictor) which turns a proposition into a property of entities. The result can then directly participate in restricting the denotation of a determiner phrase.[5] Finally, the headed relative pronoun is derived by mod, which mediates the relation between the relative clause and its nominal head, amounting to intersective predicate modification.

(9)

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        HR
       /  \
    mod    −HR
           /  \
         rel    C
               /  \
             top    I
                   /  \
                 foc    N
```

I assume a tight syntactic and semantic relation between the features forming wh-pronouns and clause-level operators essential in deriving the corresponding wh-clauses. In syntax, this can be modeled by the Agree relationship, where the operator (often covert) functions as the probe and the corresponding features on the wh-word (spelled out as part of the wh-word) as the goal. For purposes of the syntax–semantics interface, the goal functions as an index which is bound by a dedicated operator – the probe. A simplified logical form of an interrogative clause is provided in (10).

(10)　　[Q_i [$_{TP}$ Dan cooked [foc$_i$ what]]]

With the exception of rel (see section 3.4), the interpretive load is thus not on the pronoun itself, but rather on the operator it syntactically agrees with, whereby the specific morphology used – in our case wh-morphology – whether interrogative, relative, or otherwise – may serve as a cue as to which oper-

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[5]The connection between correlatives and relatives will become clearer when discussing the clausal syntax.

ator (probe) is being implicated. This general approach to the interpretation of wh-based words gained momentum in the work of Kratzer & Shimoyama (2002/2017) and was later fruitfully adopted across frameworks and in the analysis of various empirical phenomena including indefinites or indeterminates (Kratzer & Shimoyama 2002; Butler 2004; Yanovich 2005), interrogative wh-words (Beck 2006), negative polarity and free choice items (Chierchia 2006, 2013 and much subsequent work), negative concord items (Zeijlstra 2004), modal expressions (Zeijlstra 2007), ever free relatives and unconditionals (Aloni 2007; Rawlins 2013; Hirsch 2016; Šimík 2018; Fălăuş & Nicolae 2022), and lately even focus-sensitive, scalar, and aspectual particles (Bassi et al. 2022; Branan & Erlewine 2022; Mihoc 2021). In this paper, I propose to extend the same logic to wh-words used in the family of (cor)relative cosntructions.

In what follows, I provide a particular syntactic–semantic proposal for each of the constructions considered. The proposals are not original; sometimes they are standard, other times controversial (but always previously argued for, in one form or another). The technical implementation is somewhat simplified (although explicit) and the particular choice of the technical toolbox is not crucial. What is important is the overall constellation of proposals, whereby the syntactic and semantic complexity of the wh-clause incrementally grows along the wh-hierarchy.

3.1 Interrogatives

An interrogative pronoun is formed by the foc-feature, which contributes an index to be bound by a question operator in the clausal left periphery, as schematized in (11a), repeated from above.[6] The proposal is inspired by Beck (2006) and Eckardt (2007); see also Romero & Meertens (2022) for a recent refinement. The denotation of the foc-marked wh-word *what* is a restricted variable; (11b).[7] The input to the Q-operator is an open proposition, see (11c), which the Q-operator turns into a standard question meaning, formalized here, for simplicity's sake, as a set of propositions which correspond to the possible answers (Hamblin 1973). An important aspect of the analysis is that the wh-word itself is not interrogative. It only carries a feature – here called foc – which enters into an Agree/binding relationship with a left-peripheral operator (Q), which is the one that brings about the interrogative interpretation.

(11)   What did Dan cook?

   a. $[Q_i \, [_{\text{TP}} \text{ Dan cooked } [\text{foc}_i \text{ what}]]]$

   b. $[\![\text{foc}_i \text{ what}]\!]^g = g(i) \, : \, \text{THING}_w(g(i))$

   c. $[\![[_{\text{TP}} \text{ Dan cooked } [\text{foc}_i \text{ what}]]]\!]^g$
        $= \lambda w[\text{THING}_w(g(i)) \wedge \text{COOKED}_w(\text{DAVE}, g(i))]$

   d. $[\![[Q_i[_{\text{TP}} \text{ Dan cooked } [\text{foc}_i \text{ what}]]]]\!]^g$
        $= \{p \, : \, \exists x[p = \lambda w[\text{THING}_w(x) \wedge \text{COOKED}_w(\text{DAVE}, x)]]\}$

3.2 Unconditionals

Unconditionals are essentially interrogatives used as antecedents of conditionals (Rawlins 2013).[8] I assume that the wh-word itself is simply interrogative (it carries the foc feature and enters into an Agree relationship with Q). Yet it is typically accompanied by an additional morpheme – what I call the ever-morpheme – which adds semantic complexity in that it triggers the insertion of two more propositional operators: the exhaustive operator EXH and the universal propositional operator [∀] (Menéndez-Benito 2005; Aloni 2007; Rawlins 2013); see (12a). The former functions similarly to a covert 'only' attached to

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[6]It has recently been argued that the relation between the wh-word and the question operator is not direct, but rather mediated by the so-called Q-particle, which has a choice-functional semantics (Hagstrom 1998; Cable 2010; Kotek 2019). I believe that my present analysis can be reconciled with these proposals, but I will not attempt to do it here.

[7]Beck (2006) crucially assumes, following Kratzer 1991, that the index is interpreted by a distinguished assignment specifically designed to interpret focus. The presentation here is simplified.

[8]For a recent alternative, where the wh-word is not treated as an interrogative, but rather as a quantificational indefinite, see Szabolcsi (2019) and Fălăuş & Nicolae (2022).

the wh-word. It strenthens the meaning of a question from a set of propositions to a set of mutually exclusive propositions; (12b). The latter is applied after the whole (un)conditional structure is composed; (12c). It takes a set of propositions (more precisely, a set of conditionals) as its input and returns the proposition that all members of the set are true; (12d).

(12) Whatever Dan cooked, Sue was happy.

    a. $[\forall]\,[[Q_i\ \text{EXH}_j\ \text{Dan cooked}\ [\text{foc}_i\ \text{what}]\ \text{ever}_j]\ [\text{Sue was happy}]]$

    b. $[\![[Q_i\ \text{EXH}_j\ \text{Dan cooked}\ [\text{foc}_i\ \text{what}]\ \text{ever}_j]]\!]^g$
    $= \{p : \exists x[p = \lambda w[\text{EXH}_x(\text{COOKED}_w(\text{DAN}, x))]]\}$

    c. $[\![[Q_i\ \text{EXH}_j\ \text{Dan cooked}\ [\text{foc}_i\ \text{what}]\ \text{ever}_j]\ [\text{Sue was happy}]]\!]^g$
    $= \{p : \exists x[p = \lambda w \forall w' \in \text{ACC}_w[\text{EXH}_x(\text{COOKED}_{w'}(\text{DAN}, x)) \to \text{HAPPY}_{w'}(\text{SUE})]]\}$

    d. $[\![[\forall][[Q_i\ \text{EXH}_j\ \text{Dan cooked}\ [\text{foc}_i\ \text{what}]\ \text{ever}_j]\ [\text{Sue was happy}]]]\!]^g$
    $= \lambda w_0 \forall p' \in \{p : \exists x[p = \lambda w \forall w' \in \text{ACC}_w[\text{EXH}_x(\text{COOKED}_{w'}(\text{DAN}, x)) \to \text{HAPPY}_{w'}(\text{SUE})]]\}$:
    $p'(w_0) = 1$

    (where $\text{EXH}_x(p[x]) = p[x] \wedge \forall y[p[y] \to x = y]$)

While the syntax-semantics of unconditionals may seem fairly complex, it is important to keep in mind that the semantics of the wh-clause remains identical to what we have seen for wh-interrogative.

3.3   Correlatives

Like unconditionals, I treat correlatives as a subtype of conditionals, in which the correlative clause corresponds to the antecedent (Andrews 1975; Bittner 2001; Brasoveanu 2008, 2012; Liu 2016; Demirok 2017a).[9] I argue that the wh-words in correlatives are not plainly interrogative as in the constructions described above, but rather carry an additional feature, namely top, which triggers the insertion of a specialized correlative operator, call it Cor, in the left periphery of the conditional-like structure. I assume that in the presence of top, the index on foc is deactivated. (This does not mean, however, that foc is not present, its presence can be visible morphologically; see section 4.2.) Consequently, only top is in need of semantic licensing, i.e., the left periphery of the correlative must contain Cor, but not Q; see (13a). The semantics of the correlative antecedent is indistinguishable from the semantics of an interrogative: it denotes an open proposition; (13a). The difference steps in with the Cor-operator, which plays two roles, it functions as a connector between the correlative antecedent and consequent, creating standard conditional semantics, and at the same time searches for a coindexed topical phrase (the wh-phrase), which it semantically binds; (13c). This is a *semantic topic* in the sense that it is semantically specified to be talked about (referentially picked up) in the second argument of Cor – the consequent of the correlative structure; (13d). In other words, the antecedent raises a topic (the wh-word), the consequent reintroduces it in the form of a donkey-anaphoric pronoun (typically a demonstrative) and comments on it.[10]

(13) Was Dan gekocht hat, das hat Susi gegessen.
    what Dan cooked has that has Susi eaten
    'Susi ate what Dan cooked.'

    a. $[\text{Cor}_i\ [\text{Dan cooked}\ [\text{top}_i\ [\text{foc what}]]\ [\text{Susi ate that}_i]]$

    b. $[\![[\text{Dan cooks}\ [\text{top}_i\ [\text{foc what}]]]\!]^g$
    $= \lambda w[\text{THING}_w(g(i)) \wedge \text{COOKED}_w(\text{DAVE}, g(i))]$

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[9]This is in conflict with another popular view, which treats correlatives on a par with (free) relative clauses (see, e.g., Srivastav 1991a; Bhatt 2003; Lipták 2004. The evidence put forth in section 4 supports the conditional-based analysis.

[10]Correlatives come in different flavors, from generic, which are most common cross- and intra-linguistically, to definite, which report something about a single referent. I assume that this distinction can be modeled by (i) the type of accessibility relation contributed by Cor and (ii) the operator that Cor introduces (universal vs. existential/definite).

c. $[\![\text{Cor}_i\ [\text{Dan cooks }[\text{top}_i\ [\text{foc what}]]]\!]^{g[i/x]}$
$= \lambda Q \lambda w \forall s, x[s \in \text{ACC}_w \wedge \text{THING}_s(x) \wedge \text{COOKED}_s(\text{DAVE}, x) \rightarrow Q(s)]$

d. $[\![[\text{Cor}_i\ [\text{Dan cooks }[\text{top}_i\ [\text{foc what}]]\ [\text{Susi eats that}_i]]\!]^{g}$
$= \lambda w \forall s, x[s \in \text{ACC}_w \wedge \text{THING}_s(x) \wedge \text{COOKED}_s(\text{DAVE}, x) \rightarrow \text{ATE}_s(\text{SUE}, x)]$

The semantic specification of Cor models the fact that correlative constructions must involve a coreference/binding between a wh-word in the antecedent and a demonstrative (or pronominal) in the consequent; cf. (14). In this context it is good to point out that not all languages distinguish morphologically between unconditionals and correlatives. In Turkish or Kiksht, for instance, a structure like (14) would be grammatical and would receive the intended unconditional meaning (Demirok 2017a; Duncan 2022). In German, however, the unconditional meaning must be explicitly encoded by particles (*auch immer*) that indicate the presence of the appropriate unconditional operators.

(14)   *Was   Dan gekocht hat, Susi war froh.
        what Dan cooked has Susi was happy
        Intended: 'Whatever Dan cooked, Susi was happy.'

3.4   Free relatives

Free relatives, as well as the other relative clause types discussed below, are different from interrogatives, unconditionals, and correlatives in one crucial respect: while the latter types of constructions can be analyzed using propositional semantics, (free) relatives necessarily involve a semantic shift from a proposition to a property of entities (Caponigro 2003; Chierchia & Caponigro 2013; Šimík 2021; cf. Hall & Caponigro 2011; Bücking 2021 on FRs introduced by adverbial wh-words). Since free relatives are typically used as arguments or adjuncts (rather than predicates), they are subsequently shifted to an entity, more specifically the maximal entity that with the property expressed by the free relative – a process considered to be a default among the type-shifts (Dayal 2004).[11]

I argue that the rel feature is involved in the above-mentioned property shift. There are empirical reasons (see section 4.3) to assume that the effect of rel must be local, i.e., the wh-word must move and trigger the property shift at the level where the proposition is completed – CP, for simplicity; (15a).[12] The index contributed by rel percolates to the wh-phrase level and triggers lambda abstraction over a variable restricted by the descriptive contents of the wh-phrase (cf. Heim & Kratzer 1998; Adger & Ramchand 2005); (15b). The resulting property is then shifted to the maximal plural entity satisfying the description (modeled here as an individual concept), (15c), which in turn can be distributed as a referential NP. In our example, it is the internal argument of *ate*, giving the result in (15d).

(15)   Sue ate what Dan cooked.

a.   Sue ate $[_{\text{CP}}\ [\text{rel}_i\ [\text{top}\ [\text{foc what}]]]_i$ Dan cooked $t_i]$

b. $[\![[_{\text{CP}}\ [\text{rel}_i\ [\text{top}\ [\text{foc what}]]]_i$ Dan cooked $t_i]\!]^{g}$
$= \lambda w \lambda x[\text{THING}_w(x) \wedge \text{COOKED}_w(\text{DAN}, x)]$

c. $[\![\text{MAX}[_{\text{CP}}\ [\text{rel}_i\ [\text{top}\ [\text{foc what}]]]_i$ Dan cooked $t_i]\!]^{g}$
$= \lambda w \sigma x[\text{THING}_w(x) \wedge \text{COOKED}_w(\text{DAN}, x)]$

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[11]There is a growing body of literature showing that free relatives in some languages can also retain the property-type semantics and become arguments to existential predicates, giving rise to so-called existential or indefinite free relatives. This is a productive construction type esp. in American languages; see Kotek & Erlewine (2016); Polian & Aissen (2021); Duncan (2022). Property-type wh-clauses are arguably also involved in modal existential constructions; see Šimík (2011). Another subtype of free relatives that I set aside here are the so-called transparent free relatives; for recent discussion see Grosu (2016).

[12]Alternatively, the rel feature is base-generated in the left-periphery and combines with the wh-word only after movement (by an operation called undermerge by Pesetsky 2007; see also Sportiche 2005; Wiland 2009; Kondrashova & Šimík 2013). This alternative is in a good position of deriving the "no relative wh-in-situ" generalization (see section 4.3), but also faces theoretical and empirical challenges.

d. $[\![\text{Sue ate }\textsc{max}[_{\text{CP}} [\text{rel}_i [\text{top [foc what]]]}_i \text{ Dan cooked } \text{t}_i]]\!]^g$
$= \lambda w[\textsc{ate}_w(\textsc{sue}, \sigma x[\textsc{thing}_w(x) \wedge \textsc{cooked}_w(\textsc{dan}, x)])]$

Free relatives typically exist in two main types – so-called plain free relatives, described above, and ever free relatives, which involve the ever-morpheme, also used in unconditionals (see section 3.2). An ever free relative counterpart of the example just discussed is in (16).

(16)   Sue ate whatever Dan cooked.

The presence of the ever-morpheme has non-trivial consequences for both semantics (Dayal 1997; von Fintel 2000; Tredinnick 2005; Abenina-Adar 2019; Šimík 2021) and syntax (Donati & Cecchetto 2011; van Riemsdijk 2017; Caponigro 2019, advance publication; Donati et al. 2022). Their analysis has been subject to ongoing controversy. The traditional assumption that they are simply a subtype of free relatives (Dayal 1997; Caponigro 2003; a.o.) has recently been challenged by an analysis in which they are closer to headed relatives (Donati & Cecchetto 2011; Donati et al. 2022), but also an analysis in which they are akin to unconditionals (and hence wh-interrogatives; Hirsch 2016; Šimík 2018). The multi-faceted evidence discussed below supports the position that they indeed share properties with unconditionals/wh-interrogatives. I skip an analysis of ever free relatives at this point (see esp. Šimík 2018 for an analysis consistent with the overall constellation assumed here), for reasons of space, but will come back to it briefly when discussing Tsez free relatives (section 4.3).

3.5   Light-headed relatives

Light-headed relatives are sometimes analyzed on a par with (plain) free relatives and together with them can be referred to as headless relatives (implying relatives lacking an overt *nominal* head; Lehmann 1984; Caponigro et al. 2021), a convention adopted here, too.[13] Light-headed relatives differ from free relatives in that they are headed by a pronoun (aka a light head), typically a demonstrative ('that (one)'), indefinite ('something', 'nothing'), or universal ('everything'). They can be analyzed as property-denoting free relatives selected by a semantic determiner (formally a pronoun), which functions as an overt type-shifter (cf. the covert $\textsc{max}$ operator in (15c)). The range of shifts is broader than in free relatives and correlates with the semantics of the light heads. In (17), for instance, the light head is a quantificational determiner, which means that it turns the whole complex DP into a quantifier; (17b). I assume that the wh-word used in light-headed relatives has the same featural make-up as the one used in free relatives. This seems to align with the empirical facts in that the wh-words used in light-headed and free relatives are typically identical, i.e., the same set of wh-words is used and they have the same morphological shape (see Šimík 2021 and section 4.2).[14]

(17)   Susi hat alles   gegessen, was   Dan gekocht hat.
       Susi has everything eaten   what Dan cooked has
       'Susi ate everything that Dan cooked.'

a. Susi ate $[_{\text{DP}}$ everything $[_{\text{CP}} [\text{rel}_i [\text{top [foc what]]]}_i \text{ Dan cooked } \text{t}_i]]$

b. $[\![[_{\text{DP}} \text{ everything } [_{\text{CP}} [\text{rel}_i [\text{top [foc what]]]}_i \text{ Dan cooked } \text{t}_i]]]\!]^g$
$= [\![\text{everything}]\!]^g(\lambda w \lambda x[\textsc{thing}_w(x) \wedge \textsc{cooked}_w(\textsc{dan}, x)])$
$= \lambda P \lambda w \forall x[\textsc{thing}_w(x) \wedge \textsc{cooked}_w(\textsc{dan}, x) \rightarrow P_w(x)]$

c. $[\![\text{Susi ate } [_{\text{DP}} \text{ everything } [_{\text{CP}} [\text{rel}_i [\text{top [foc what]]]}_i \text{ Dan cooked } \text{t}_i]]]\!]^g$
$= \lambda w \forall x[\textsc{thing}_w(x) \wedge \textsc{cooked}_w(\textsc{dan}, x) \rightarrow \textsc{ate}_w(\textsc{susi}, x)]$

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[13]There is a good deal of terminological confusion. "Headless relatives" are sometimes intended to refer to what is called here free relatives (e.g. Citko 2004) and "free relatives" are sometimes intended to refer to what is called here headless relatives (e.g. Flynn & Foley 2004). The term light-headed relatives (headless, but non-free relatives) is due to Citko (2004).

[14]English constitutes a notable exception to this generalization because its light-headed relatives are introduced by wh-words typical of (nominally) headed relatives; see the discussion of example (6). A plausible analysis would involve a covert nominal head in the structure of the light-headed relatives; see Cinque (2020) for relevant discussion.

3.6 Headed relatives

Headed relatives are by far the best-studied, but also the most complex subtype of relative clauses. I do not intend to do justice to the various formal and semantic types of headed relatives (see Cinque 2020 for a recent comprehensive analysis) and will only deal with the prototypical postnominal restrictive finite relative clause, typical for languages in which wh-based headed relatives exist. Headed relatives differ from light-headed (or free) relatives in that before they become restrictors of a (quantificational) determiner, they intersect with a nominal head. I argue that the mod feature on wh-words enters into agreement with an operator, similar to Chung & Ladusaw's (2006) Modify (abbreviated as Mod below). Since Mod takes the nominal head as its complement – assuming that it is part of the NP's extended projection (Chung & Ladusaw 2006) – and the relative clause as its specifier (Cinque 2020), mod agrees with Mod in a Spec-Head configuration (possibly phrased in terms of upward Agree; Bjorkman & Zeijlstra 2019).[15] Mod, just like the rule of predicate modification, conjoins its two arguments; (18b). Within the relative clause, the wh-word moves, the index on the rel feature percolates to the whole fronted wh-phrase and triggers lambda abstraction; (18c).[16] After Mod takes the relative clause and the nominal head as its argument, (18d), the resulting property restrits a determiner and the whole DP is used, for instance, as an argument; (18e).

(18)   Sue ate the meal which Dan cooked.

a.   Sue ate [$_{DP}$ the [$_{ModP}$ [Mod$_j$ [$_{NP}$ meal]] [$_{CP}$ [mod$_j$ [rel$_i$ [top [foc which]]]]$_i$ Dan cooked t$_i$]]]]

b. $\llbracket \text{Mod} \rrbracket^g = \lambda P \lambda Q \lambda w \lambda x [P_w(x) \wedge Q_w(x)]$

c. $\llbracket [_{CP} [\text{mod}_j [\text{rel}_i [\text{top [foc which]]]}]_i \text{ Dan cooked t}_i]] \rrbracket^g$
     $= \lambda w \lambda x [\text{THING}_w(x) \wedge \text{COOKED}_w(\text{DAN}, x)]$

d. $\llbracket [_{ModP} [\text{Mod}_j [_{NP} \text{meal}]] [_{CP} [[\text{mod}_j [\text{rel}_i [\text{top [foc which]]]}]] \text{ Dan cooked t}_i \rrbracket^g$
     $= \lambda w \lambda x [\text{MEAL}_w(x) \wedge \text{COOKED}_w(\text{DAN}, x)]$

e. $\llbracket (18a) \rrbracket^g = \lambda w [\text{ATE}_w(\text{SUE}, \iota x [\text{MEAL}_w(x) \wedge \text{COOKED}_w(\text{DAN}, x)])]$

3.7 Summary

I have provided plausible analyses of the wh-constructions under discussion. In these analyses, the syntactic and semantic complexity of the wh-words and the corresponding wh-constructions grows incrementally. The "smallest" interrogative (foc-marked) wh-word denotes a restricted variable bound by a Q-operator and is used in wh-interrogatives and unconditionals. In correlatives, the variable becomes topical (top-marked), introducing referents to be commented on. This is a semantic process and as such it is mediated by a specialized semantic operator which binds the variable and the demonstrative/pronominal correlate in the commenting consequent clause. What interrogatives, unconditionals, and correlatives all have in common is that they can be (and are, in the above analyses) represented as propositions and do not necessarily require a shift to properties. In relative clauses, the wh-word carries the additional rel-feature, which contributes an index that functions as a lambda-abstractor, deriving a property from a proposition. As such, it can only be interpreted in the left periphery and hence requires movement. In free relatives, the property is shifted to the maximal plural entity with that property, a process considered the default among lowering operations. In light-headed relatives, the property is shifted by an overt pronoun/determiner. Finally, headed relatives build on the property derived by the

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[15]The right-branching structure for the relative clause/SpecModP, (18a), is used for simplicity's sake. Cinque (2020) assumes that the Spec is on the left (in accord with Kayne 1994) and that the nominal head moves higher within its extended nominal projection.

[16]I use the so-called head external analysis for the sake of illustration. A more complete analysis would make use of the so-called matching or raising structure. For recent discussion, mostly in favor of matching, see Pankau (2018); Salzmann (2019); Cinque (2020).

wh-movement, but contribute an additional feature, called mod, which requires the relative clause to become a semantic modifier of a nominal head.

The analyses assumed above, or some alternative formal implementations thereof, have been argued for independently. The evidence I provide in the next section supports this incremental treatment of the wh-constructions under discussion and indirectly also each individual analysis.

4   Evidence

In this section, I will provide multi-faceted evidence for the implicational hierarchies in (7) and/or (8), repeated below for convenience, and thereby also for the incremental growth of grammatical complexity proposed in section 3.

(19)   Wh-hierarchy
        I < UnC < CoR < FR < LHR < HR

(20)   Simplified wh-hierarchy
        I < C < −HR < HR

In section 4.1 I show that the cross-linuistic availability of wh-words in the individual constructions aligns with the wh-hierarchy: Wh-words are most likely to be used in wh-interrogatives and unconditionals and least likely to be used in headed relatives. Section 4.2 provides morphological evidence for the incremental (nano)syntactic treatment of wh-words: the higher on the wh-hierarchy a wh-word is, the more likely it is to acquire additional morphology. Section 4.3 considers two types of syntactic evidence. First, it discusses and defends the robust generalization that there is no wh-in-situ in relative clauses. The generalization is modeled by the assumption that the use of wh-words as relative operators requires overt wh-movement. Second, it shows that the higher a wh-construction is on the wh-hierarchy, the higher the wh-word moves in that construction (if it moves). The brief section 4.4 complements the typological and grammatical evidence by evidence from diachrony and L1-acquisition.

4.1   Cross-linguistic distribution of wh-constructions

Having an inventory of interrogative pronouns could be a reasonable candidate for an absolute universal, if it were not for the Caucasian language Abaza, which expresses wh-interrogatives by verbal affixes rather than pronouns (Arkadiev 2020). (I will briefly return to Abaza below.) Nevertheless, it is common for a language to have a class of interrogative pronouns, which can defined as pronouns that indicate the locus of ignorance in root wh-interrogatives. Most languages can use the same pronouns in embedded wh-interrogatives, even though there are languages where this strategy alternates with a non-wh relative clause-based strategy (e.g. in Hausa and Akan; Zimmermann 2018). The use of interrogative pronouns, or wh-words, as I will call them, for other than interrogative functions is typologically not very common, to the extent that it is sometimes considered a property of "Standard Average European" (Haspelmath 1998; Comrie 1998).[17] More specifically, the availability of wh-words in relative clauses is assumed to be a property characterized not so much by genealogical affinity, but by a geographical area – the area of Europe and adjacent regions – mostly including languages from the Indo-European, Uralic, and Semitic families. Today we know that wh-words are productively used for relative functions also in Mesoamerican and North American languages (see esp. Caponigro et al. 2021). It remains unclear to what extent it is due to contact with European languages. I am aware of two languages in which wh-words are used in relative clauses and where language contact can hardly

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[17]I intentionally ignore the use of wh-words as morphological bases for indefinite pronouns, which is much more common and also better typologically described than their use for operator functions (Haspelmath 1997). The commonality of wh-based indefinites reflects, I believe, their semantic affinity to interrogatives (see, e.g., Haida 2007; Hengeveld et al. early access). More particularly, similarly as wh-words in unconditionals (see 3.2), indefinite-creating affixes indicate that the variable contributed by the wh-base is bound by a suitable operator (Kratzer & Shimoyama 2002; Yanovich 2005; *inter alia*).

be at stake, namely the Yam (Papuan) languages Komnzo (Döhler 2018) and Nama (Siegel 2019).[18]

Despite the relatively limited cross-linguistic distribution of non-interrogative wh-constructions, there is an implicational universal, formulated in (21), which can only hardly be explained by language contact. A part of this universal, namely that wh-words are used in headed relatives only if they are also used in headless relatives, cf. (21a), was previously formulated by Lehmann (1984: 326). The sub-universal in (21b) would merit more investigation. The reason is that correlatives or unconditionals are often omitted in grammatical descriptions.

(21) **Cross-linguistic distribution of wh-constructions**
      If a language uses wh-words for some function in the simplified wh-hierarchy (20), it also uses wh-words for constructions that are lower in the hierarchy, but not necessarily conversely.

      a. If a language uses wh-words for headed relatives, it also uses them for headless relatives, correlatives/(un)conditionals, and interrogatives.

      b. If a language uses wh-words for headless relatives, it also uses them for correlatives/(un)conditionals, and interrogatives.

      c. If a language uses wh-words for correlatives/(un)conditionals, it also uses them for interrogatives.

The generalization is illustrated on a genealogically diverse sample of languages in Table 1.

| Language | Wh-words used in | | | | Source |
	I	C	−HR	HR	
Abaza	✗	✗	✗	✗	Arkadiev 2020
					Arkadiev & Caponigro 2021
Papuan Malay	✓	✗	✗	✗	Kluge 2017
Hausa	✓	✓	✗	✗	Jaggar 2001
Chinese	✓	✓	✗	✗	
Japanese	✓	✓	✗	✗	Gawron & Harada 1996; Yagi 2022
Turkish	✓	✓	✗	✗	Demirok 2017a
Haida	✓	✓	✓	✗	Enrico 2003; Cable 2005
Chuj	✓	✓	✓	✗	Kotek & Erlewine 2018
San Pedro Mixtepec Zapotec	✓	?	✓	✗	Antonio-Ramos 2021
Komnzo	✓	✓	✓	✓	Döhler 2018; C. Döhler, p.c.
Czech	✓	✓	✓	✓	
Greek	✓	✓	✓	✓	Daskalaki 2020

Table 1: Availability of wh-words across constructions and languages

Without going into analytical details, I suggest that the generalization follows from the incremental featural make-up of wh-words proposed above combined with a superset-based spellout mechanism, like the one employed in nanosyntax (Starke 2009). If a wh-word (or wh-morpheme) in a language is stored in the lexicon as a tree containing all the features above (mod, rel, top, foc), it follows that it can use the wh-words for headed relatives and all the less complex functions as well. If it only stores its wh-words as containing top and foc, for instance, it can only use them for correlatives and interrogatives, but not for more complex functions.

Under this approach to deriving the universal in (21), one could expect that the generalization holds not at the level of languages, but at the level of individual wh-words. This is indeed what we generally seem to find: while some wh-words can be used for a broad range of functions (e.g. the English *where* is

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[18]Christian Döhler (p.c.) reports that this is a more general property of at least two of the three subgroups of the Yam languages and that it may in fact be an areal phenomenon in southern New Guinea.

used in all the constructions under discussion), others are more restricted (e.g. the English *how*, which cannot be used in headed relatives; cf. Starke 2001).[19]

4.2 Morphology

It is common for wh-words to retain their morphological form independently of the wh-construction they are used in. An example of this is Czech, where, for instance, the wh-word *kde* 'where' is used in the same form in interrogatives, correlatives, headless relatives, and headed relatives. Not all languages follow this simple pattern, however. In Bulgarian, for example, the interrogative word for 'which/who' is *koj*, while its relative counterpart is *kojto*. In other words, relative wh-words can be morphologically derived from interrogative ones (but never vice versa). Yet another pattern is attested in Hindi, in which the very wh-morpheme is affected: while interrogative series are introduced by *k-*, (cor)relative series are introduced by *j-* (cf. *kidhar* 'where.ɪ' vs. *jidhar* 'where.ʀ'). I will refer to the morphemes that derive relative pronouns rel-morphemes, whether they augment the interrogative wh-word (Bulgarian) or replace the wh-morpheme itself (Hindi).

When considered from the perspective of the wh-hierarchy (19), a systematic pattern emerges, formulated in the implicational universal (22).

(22)   **Morphology of wh-words**
       A wh-word used in some wh-construction is morphologicaly based on the corresponding wh-word used in a wh-construction which is lower on the wh-hierarchy.

Table 2 provides a few particular instances of the generalization in (22).[20] The "+" in the unconditional row indicates the need to include the ever-morpheme, such as *ðípote* in Greek (Giannakidou & Cheng 2006), or its functional analog, such as the subjunctive mood in Bulgarian (Pancheva Izvorski 2000). The shaded area shows where the interrogative morphology gets obligatorily augmented (Hungarian, Bulgarian), replaced (Hindi), or where it becomes completely unavailable (Turkish). If the rel-morpheme is in brackets (as in the Hungarian *(a)ki*), it means that it is optional to some some degree, possibly with interpretive consequences. In Hungarian, for instance, interrogative wh-words in correlatives sound proverbial (cf. É. Kiss 2002); their relative counterparts – prefixed by *a-* – are neutral and productive.

	Komnzo what	German what	Turkish who	Hungarian who	Bulgarian who	Hindi where	Greek who	Slovenian where	Abaza REL.ABS
Q	ra	was	kim	ki	koj	kidhar	pjos	kje	j(ə)-
UnC	ra+	was+	kim	ki+	koj(to)+	j/kidhar+	opjos+	kjer+	j(ə)-
CoR	ra	was	kim	(a)ki	kojto	jidhar	opjos	kjer	?
−HR	ra	was	✗	aki	kojto	jidhar	opjos	kjer	j(ə)-
HR	ra	das	✗	aki	kojto	jidhar	o opíos	kjer	j(ə)-

Table 2: Morphology of interrogative and (cor)relative pronouns

In a language like Komnzo, a wh-word is stored in the lexicon with all of the features a wh-word may have – from foc to mod – making it possible for it to spell out all wh-word types – from interrogative to headed relative. In German, the wh-word *was* (or its wh-morpheme) only spans the area from foc to rel. The mod feature is only included in the *d*-counterpart to the wh-word. In Turkish and Hungarian, the interrogative base covers the area from foc to top and, finally, in Bulgarian, Hindi, Greek, or Slovenian the plain wh-word only contains foc – all the other features – from top to mod – are spelled out by

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[19]On such a level of granularity, it would be surprising not to find "exceptions". E.g. the English *who* can be used in headed relatives, but not really in plain free relatives (Patterson & Caponigro 2016). Facts like these indicate that superset-based spellout is not the only limiting factor on which wh-words get attested in which functions.

[20]Some selected sources for the data in Table 2 are: Döhler 2018; C. Döhler p.c. (Komnzo); Demirok 2017a (Turkish); É. Kiss 2002; Szabolcsi 2019; Bacskai-Atkari & Dékány 2021 (Hungarian); Pancheva Izvorski 2000; Rudin 2009; Franks & Rudin 2015 (Bulgarian); Srivastav 1991b; Bhatt 2011 (Hindi); Giannakidou & Cheng 2006; Daskalaki 2020 (Greek); Arkadiev 2020; Arkadiev & Caponigro 2021 (Abaza).

additional/different morphology. In Greek, the prefix *o-* on the interrogative base spans the top and rel features. The mod feature, used in headed relatives, is carried by additional morphology, namely the determiner-like element *o* in *o opíos*. It is worth pointing out that this element is not just a single feature (head), but a bundle of features, spelling out not only mod, but also the associated phi- and case-features. This is illustrated in (23), taken from Daskalaki (2020: 283/288) (glosses are adapted to reflect my analysis).[21]

(23) a. ðjaleksa ta peðja [HR ta opja protines].
chose.1SG the kids.ACC MOD.N.PL REL.which.N.PL recommended.2SG
'I chose the kids who you recommended.'

   b. o maθitis [HR jia ton opio mu milises]
the student.NOM about MOD.PL.ACC REL.which.PL.ACC CL.1SG.GEN talked.2SG
'the student about whom you talked to me'

A precise morphosyntactic analysis of the Greek headed relative pronoun is beyond the scope of this paper.

An attentive reader will have noticed that the Greek and Slovenian pattern is not predicted by my analysis of unconditionals (see section 3.2). The reason is that wh-words used in unconditionals have the same featural makeup as those in interrogatives (setting the ever-morphology aside). The fact that unconditional wh-words obligatorily make use of the rel-morpheme is thus unexpected. One potential response to this problem is to assume that the wh-word itself is in fact a hidden relative clause. This *prima facie* dubious assumption is empirically motivated by the fact that wh-words and relatives – and free relatives in particular – can in fact alternate in unconditionals. Consider the Slovenian unconditionals in (24), taken from Šimík (2020: 14) (glosses adapted; structural description added). Example (24a) is a standard unconditional, making use of the relative wh-word *kdor* 'who.REL' and the ever-morpheme *koli*. Example (24b), on the other hand, is what I call a doubling unconditional. I argued in Šimík (2020) that doubling unconditionals involve free relative clauses (as indicated by the FR constituent) and that plain unconditionals can be derived from their doubling counterparts by relative sluicing. The assumption that (24a) involves sluicing (or more precisely an antecedent-contained deletion of the TP *pride* 'comes', conditioned by identity with the matrix TP) is supported by the optional left-peripheral particle *že*, which can "survive" the sluicing (cf. Marušič et al. 2018). The relative operator origin of the wh-word *kdorkoli* 'whoever' is thus a plausible explanation of the use of the relative morpheme *-r* on it. It remains to be seen to what extent this analysis is applicable to Greek.[22]

(24) a. Naj pride kdorkoli (že), bom zadovoljen.
let come.3SG who.REL.EVER PRT will.be.1SG satisfied
'Whoever comes, I'll be happy.'

   b. Naj pride [FR kdor (že) pride], bom zadovoljen.
let come.3SG who.REL PRT come.3SG will.be.1SG satisfied
'Whoever comes, I'll be happy.'

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[21] An analogous pattern obtains in Spanish, as illustrated by the nominal phrase in (i).

(i) la persona [HR con la quien hablamos]
the person.SG.F with MOD.SG.F who.REL speak.1PL
'the person with whom we speak'

[22] It is also possible that the relative morpheme is a remnant of diachronic development. In Slovenian, the relative morpheme does not only appear on ever-indefinites (*kdorkoli*), but also on negative concord indefinites, cf. *nikdor* 'anybody/nobody', where it is less likely that sluicing is involved synchronically. Notice, however, that there is independent evidence for sluicing as synchronic/diachronic source of wh-based indefinite forms (Haspelmath 1997; Bylinina & Testelets 2005; Hiraiwa & Nakanishi 2021).

4.3 Syntax

Two syntactic issues are of immediate concern to us: (i) whether a wh-word moves to the clausal left periphery and, (ii) if it moves, then to which position. I discuss these two issues in turn.

4.3.1 No relative wh-in-situ

Roughly two-thirds of the languages included in Dryer's (2013) sample (615 out of 879) are of the wh-in-situ type, i.e., the wh-word in interrogative constructions is located in a position where its non-wh-counterpart would be. Compared to that, the situation in relative clauses is dramatically different. Out of the roughly 50+ languages for which wh-based relative pronouns are attested, there appears to be no single uncontroversial example of relative wh-in-situ. Thus we can formulate (a candidate for) the absolute universal (25).[23]

(25) **No relative wh-in-situ**
      Relative pronouns (used in free, light-headed, and headed relatives) never appear in situ.

A similar generalization was first noticed by Schwartz (1971) in the context of a discussion of prenominal vs. postnominal headed relatives, but has received little attention in the generative literature.[24] Cecchetto & Donati (2015: 50) briefly discuss the generalization for the case of free relatives and argue that it is explained by their relabeling mechanism, as only a fronted wh-word can relabel a clause to a nominal. It seems, however, that the relabeling analysis does not have a good handle on (light-)headed relatives, which are, arguably, labeled by their (pro)nominal elements rather than the wh-word. The generalization was also recently discussed by Demirok (2017b), with special attention to the contrast between free relatives (where wh-in-situ is non-existent or extremely marginal) and correlatives (where wh-in-situ is possible). Demirok also focuses on one of the potential counterexamples to (25), namely free relatives in Tsez (also discussed below), as described by Polinsky (2015). Demirok's response to the Tsez facts is to allow for lambda abstraction triggered by covert wh-movement. Once this option is allowed, however, the generalization in (25) remains a mystery; it is unclear why covert wh-movement would not be much more generally available in relative clauses, just as it is – by many linguists' assumption – in wh-interrogatives.

In light of the generalization (25) and the dubious status of the exceptions discussed below, I hypothesize that (25) is explained by the assumption in (26), which in turn is in line with the conservative analysis of relativization presented in section 3.4.

(26) **Wh–lambda hypothesis**
      Wh-movement triggers lambda-abstraction (shifts a proposition into a property) only if it is overt.

Notice that the hypothesis does not entail that all overt wh-movement is for lambda-abstraction purposes. Many alternatives to the so-called operator-movement nature of wh-movement (esp. in wh-interrogatives) have been proposed over the years, including movement for clause-typing (Cheng 1991), for focus-licensing (Sabel 1998; Stepanov 1998), for exhaustive interpretation (Cable 2008; Horvath 2013), or for common prosodic phrasing of the wh-word and the Q-operator (Richards 2010). It also does not entail that there is no covert movement of wh-phrases. As argued by Kotek (2016), for instance, covert wh-movement could be motivated by eschewing intervention effects (similarly as overt movement/scrambling/topicalization in German; cf. Beck 2006; Grohmann 2006). The hypothesis in (26) is also compatible with the movement of *empty* operators, which could in principle be at play in resumption-based relatives (Demirdache 1991) and possibly in internally headed relatives (see Hanink 2021 for recent discussion). Finally, I would not like to rule out the possibility that overt wh-movement in interrogative, unconditional, or correlative constructions can be for lambda-abstraction purposes.

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[23]A common objection concerns internally headed relatives (see Hanink 2021 for a recent discussion). It is important to realize, however, that internally headed relatives never make use of in-situ wh-words.

[24]For relevant typological discussion, see esp. de Vries (2002, 2005).

Even though I have assumed an open-proposition-based analysis of these constructions (see sections 3.1, 3.2, and 3.3, respectively), it cannot be ruled out that in some languages or constructions the wh-movement is construed as lambda-abstraction and that the path to the meaning leads via properties, just as in relative clauses (see e.g. Xiang 2021 for a recent analysis along these lines). I would argue, however, that such an analysis (or, taking the processing perspective – parsing) is not the default.

Most languages that use wh-words in relative clauses are in accordance with the generalization in (25). I will now concentrate on those which constitute an apparent counterexample to (25).[25]

Tsez   According to Polinsky (2015), Tsez uses wh-words for interrogatives, unconditionals, correlatives, and free relatives. Polinsky argues that wh-words can be in situ in all these constructions, which is illustrated for the case of free relatives in (27).

(27)   [ħuł   babi-y-ä   šebi   žek'-ä(-si)   ] ik'i-s.
           yesterday father-os-ERG who/what.ABS hit-PST.WIT.INTERR-ATTR   I.go-PST.WIT
           'Whoever father beat yesterday left.'

Wh-in-situ in free relatives is inconsistent with (25) and predicted to be impossible by (26). It is good to note that Polinsky offers a number of solid arguments that Tsez free relatives cannot be reduced to correlatives. There is one alternative which Polinsky does not explicitly consider, however, and that is that the free relatives she discusses are of the ever-type. Notice that (27) is translated using *whoever* (rather than, say, *(the one) who*) and that is the case for most examples discussed.[26] While Tsez also has dedicated morphology for ever free relatives (realized on the wh-word and the verb), it is not unseen that languages have multiple strategies of expressing the ever morphology, possibly reflecting the various interpretive facets attested for ever free relatives (see Šimík 2018, 2021 for a cross-linguistic view of the interpretation of ever free relatives). Perhaps the most striking example of that is Telugu, which has three distinct morphemes for three different interpretations of ever free relatives; see Balusu (2017). At the same time, at least one language, namely Turkish, does not have an overt ever morpheme (Demirok 2017a). (This concerns unconditionals, as Turkish has no free relatives, but the issue is analogous.) Why should it be relevant that the wh-in-situ free relatives discussed by Polinsky could be ever free relatives in disguise? The reason is that ever free relatives share properties with unconditionals. According to Hirsch (2016) and Šimík (2018), ever free relatives are represented at LF by two wh-clauses: an unconditional (which is akin to a wh-interrogative; see section 3.2) and a donkey-anaphoric free relative. As I argued in Šimík (2018), the analysis gives rise to the expectation that ever free relatives exhibit a mixture of properties of free relatives on the one hand and unconditionals/interrogatives on the other. One property that ever free relatives share with unconditionals/wh-interrogatives is that they generally allow for the use of complex wh-phrases such as 'which book' (see Cecchetto & Donati 2015 and Caponigro 2019 for discussion). Another one is that ever free relatives (in Czech) do not license the use of epistemic modals. As it appears, Tsez free relatives generally make use of the interrogative form of the verb; see (27). This and – I would argue – the possibility of wh-in-situ might well be properties which reflect the unconditional/wh-interrogative facet of ever free relatives. Exploring the predictions of this re-analysis of Tsez free relatives is left for another occasion.

Before I move on, I would like to mention one more property of Tsez free relatives, which bears relevance to the issue at stake. While wh-words in Tsez free relatives clearly do not have to be clause-initial, it also holds that they cannot be postverbal, which is a position available to their non-wh-

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[25]Bambara is sometimes cited as a counterexample (see, e.g., de Vries 2005). However, according the Mande expert Valentin Vydrin (p.c.), the Bambara relativizer *mìn* is not a wh/relative-pronoun at all.

[26]The only exception is example (i), in which the wh-word is not initial, but it is preceded by a single pronominal constituent, a situation that is reminiscent of what happens in some other laguages (see below).

(i)   [Debe-r (šebi)   y-eti-xo(-si)]   mi-tow   yoł.
          2SG-LAT who.ABS.(.II) II-like-PRS-ATTR 2SG.ABS-FOC be.PRS
          'Who you really like is yourself.'

counterparts. One could therefore explore the hypothesis that the wh-word moves, after all. Movement to non-initial positions is indeed attested in relative clauses in other languages, as will be discussed below.[27]

Hittite, Komnzo   Hittite potentially poses an even greater challenge than Tsez to the generalization in (25). The reason is that it appears to have wh-in-situ even in headed relatives (Hoffner & Melchert 2008; Huggard 2011, 2015), for which there is little chance of being related to wh-interrogatives in a way that ever free relatives are. Consider example (28) (from Huggard 2015: 160), in which the relative wh-word is preceded by its own predicate within the relative clause.

(28)   ^{LÚ}ᴋ]ᴀš₄.ᴇ   [(taruḫzi   kui)]š   2 ^{NINDA}wagataš   1 ᴍᴀ[ɴᴀ ᴋÙʙᴀʙʙᴀʀ] ʟᴜɢᴀʟwaš
        runner.ɴᴏᴍ.sɢ win.ɴᴘsᴛ.3sɢ who.ɴᴏᴍ.sɢ 2 wagada.bread.ᴀᴄᴄ.sɢ 1 mina   silver   king.ɢᴇɴ.sɢ
        [(kiššaraz=š)]et dāi.
        head.ᴀʙʟ.sɢ=his take.ɴᴘsᴛ.3sɢ
        'The runner who wins takes two wagada-breads and one mina of silver from the hand of the King.'

As argued by Huggard (2015), wh-words in relative clauses of the "determinate" type are in fact clitics. The position of the relative wh-word *kuiš* 'who' in (28) can thus be explained by a postsyntactic cliticization process. Whether Hittite allows for genuine wh-in-situ in headed relatives is a complex and controversial issue. While Huggard (2015) argued that it does, Lyutikova & Sideltsev (online first) argue, based on extensive corpus evidence, that relative wh-words always move to the left periphery, although not always to the initial position.

Although not described in terms of prosody, the data pattern reported by Döhler (2018) for Komnzo relative clauses is similar to the one of Hittite. Relative pronouns often appear in the second position within the relative clause. Nevertheless, this position is not an in-situ position, as reported by Christian Döhler (p.c.): while wh-words in interrogatives are positioned relatively freely and can be genuinely in situ (in the position of the non-wh counterpart), relative wh-words are always either initial or in the second position (more commonly so, in fact). This is illustrated by the contrast between (29a), an embedded interrogative clause, and (29b), a headed relative clause (from Döhler 2018: 328, 108, respectively).

(29)   a.   be   fam   kwot   karäré   tosin mafan   kwa
              2sɢ.ᴇʀɢ thought properly 2sɢ:sʙᴊ:ɪᴍᴘ:ɪᴘꜰᴠ.do torch who.sɢ.ᴅᴀᴛ ꜰᴜᴛ
              yarithr.
              2|3sɢ:sʙᴊ>3sɢ.ᴍᴀsᴄ:ɪᴏ:ɴᴘsᴛ:ɪᴘꜰᴠ.give
              'You have to think properly to whom you will give the torch.'

        b.   dödö mane=me ŋarenwre   fath
              dödö which=ɪɴs 1ᴘʟ:sʙᴊ:ɴᴘsᴛ:ɪᴘꜰᴠ.sweep clearing
              'that dödö with which we sweep the place'

Hindi   While the primary relativization strategy in Hindi is correlativization (Srivastav 1991b; Dayal 1996; Bhatt 2003; Brasoveanu 2012), headed relatives are also available in this language. And it has been reported that the wh-in-situ observed in Hindi correlatives is also an option for Hindi headed relatives (Lehmann 1984; Mahajan 2000; de Vries 2005). This is illustrated in (30a) (from Mahajan 2000: 204). Nevertheless, as claimed by Lehmann (1984), wh-in-situ is only available in *appositive* (i.e., not restrictive) headed relatives. This is illustrated by example (30b) (from Rajesh Bhatt, p.c.), which shows that wh-in-situ cannot appear in a relative clause headed by a negative polarity determiner, making the whole complex NP non-referential, which in turn is something impossible for NPs modified by appositive relatives. Why should the contrast between appositive and restrictive relatives be relevant in

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[27]See Borise (under review) for a recent argument that the preverbal position of wh-phrases in Georgian (an areal kin of Tsez) is derived by A-bar movement.

this context? Only restrictive relatives necessarily involve lambda-abstraction, followed by intersection with the nominal head. In appositive relatives, the wh-word can be represented as a variable coindexed with the (necessarily referential) relative clause head; in other words, an appositive relative clause can be treated as a proposition rather than a property (see, e.g., Del Gobbo 2003), which in turn renders wh-movement for purposes of lambda abstraction unnecessary.

(30) a. mujhe vo aadmii [Siitaa -ko jo acc^{h}aa lagtaa] hɛ pasand nahĩĩ hɛ
I.DAT DEM man Sita -DEM REL nice seem.IMP be.PRES like NEG be
'I don't like the man, who Sitea likes.'
b. #ek-bhii kitaab [Ram-ne jis-kii taariif kii thii] Mina-ne mujhe nahiiN dikhaayii
one-even book Ram-ERG REL-GEN praise do be Mina-ERG me.DAT NEG show
Intended: 'Mina didn't show me any book that Ram had praised.'

Udmurt, Latin We have seen that Komnzo relative wh-pronouns can appear in the second position of the relative clause. Something similar has been reported for other languages, too, such as Udmurt and Latin.[28] An example from Udmurt is in (31) (from Dékány et al. 2020: 30) and one from Latin is in (32) (from Bianchi 2000: 72). For both these languages, it is claimed the availability of pre-relative pronoun material is related to the richness of left peripheral syntax, which in turn is related to information structural manipulations (cf. Rizzi 1997). What is important is that the relative pronoun is clearly ex-situ, as predicted by (26). That said, the baseline analysis of headed relative clauses presented in 3.6 (and, in fact, any analysis known to me) has no straightforward handle on pre-relative pronoun material. I take this to be a more general problem, not one specific to the analysis employed here. It is yet to be seen how facts like these can be reconciled with my analysis and with (26).

(31) Pijaš [Ižkaryśen kudinyz tynad adžiśkono] kotčyšjosty jarate.
boy Izhevsk.EGR which.INS/COM 2SG.GEN see.PTCP cat.PL.ACC like.3SG
'The boy whom you have to meet in Izhevsk likes cats.'

(32) coluber mala gramina pastus, frigida sub terra tumidum quem bruma tegebat
snake.NOM bad plants fed.with cold under earth tumid.ACC which.ACC winter kept
'the snake fed with bad plants which the winter kept tumid under the cold earth'

(from Vergilius: *Aeneid II,* 471–472)

4.3.2 Landing site of wh-movement

The generalization that I am concerned with in this subsection is that the height of wh-movement landing site tends to correlate with the complexity of the wh-expression involved. In other words, wh-movement in interrogatives tends to target positions that are lower than wh-movement in relative clauses.

(33) **Landing site of wh-movement**
Given a language L, construction C, and a landing site S such that wh-movement targets S in C in L, the wh-movement of a wh-word which is higher on the hierarchy than the one in C targets a landing site which is at least as high as S in L.

(where height is understood in terms of asymmetric c-command)

I would argue that the generalization follows from the incremental growth of the wh-word, which is matched by the incremental growth in the clause structure. If a language exhibits wh-movement in the wh-constructions under consideration, it comes as no surprise that the wh-movement targets a position close to the operator that the wh-word is syntactically and semantically associated with.[29]

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[28]Colloquiual Russian is claimed to allow for this too; see Dékány et al. (2020: 31).

[29]This could either be modeled in terms of the Spech-Head / upward Agree relation (Bjorkman & Zeijlstra 2019) or in terms of Richards 2010' (2010) prosodic requirement.

A well-known and straightforward representative of the generalization in (33) is Hungarian, in which interrogative wh-words target a position which is structurally lower than the corresponding wh-words in relative clauses, as illustrated in (34) (from Kenesei 1994: 298).

(34) a. Nem tudja   hogy Péter tegnap   kit   láttot.
          NEG know.3SG COMP Peter yesterday who.ACC saw.3SG
          'He doesn't know who Peter saw yesterday.'

      b. a tanú   (*hogy) aki   (*hogy) Pétert   tegnap   látta
          the witness COMP REL.who COMP   Peter.ACC yesterday saw.3SG
          'the witness who Peter saw yesterday'

In line with (33), wh-words in unconditionals and correlatives can marginally be preceded by topicalized constituents; see (35a) (from Kenesei 1994: 304) and (35b) (from É. Kiss 2002: 244).

(35) a. Pétert   aki   látta, szóljon.
          Peter.ACC REL.who saw.3SG speak.IMP
          'Whoever saw Peter, (please) speak up.'

      b. Másnak   aki   vermet ás, maga   esik bele.
          other.DAT REL.who pit.ACC digs himself falls in.it
          'Who digs a pit for someone else, falls in it himself.'

Comparable observations have been made for Italian. In (36), for instance (from Benincà 2001; Bertollo & Cavallo 2012), it is shown that interrogative wh-words can be preceded by topics, but relative wh-words – whether free relative or headed relative – cannot.

(36) a. Con Mario, di   che cosa   volevi parlare?
          with Mario about what wanted talk
          'What did you want to talk about with Mario?'

      b. Ho   incontrato {chi di pane / *di pane chi} ne mangia molto.
          have.1SG met   who of bread   of bread who it eats   much
          'I have met (those people) who eat(s) a lot of bread.'

      c. il ragazzo a cui   il libro lo porterò domani
          the boy   to whom the book it bring   tomorrow
          'the boy to whom I'll bring the book tomorrow'

It is also possible to find an asymmetry in the expected direction between headed relatives and free relatives. In Slovenian, for instance, the complementizer *da* can surface in headed relatives, but not in the corresponding free relatives. If the complementizer is mod-related (see section 3.6), it follows that it cannot surface in free relatives, which only involve the rel-feature (see section 3.4). The data in (37) build on Hladnik (2015) and are complemented by data from Marko Hladnik (p.c.).

(37) a. Živi v pokraijni, kjer   (da)   imajo najboljše vino.
          lives in region   where.REL COMP have best   wine
          'He lives in a region where (it is claimed) they have the best wine.'

      b. Živi, kjer   (*da) imajo najboljše vino.
          lives where.REL COMP have best   wine
          (Intended:) 'He lives where (it is claimed) they have the best wine.'

A relevant contrast between correlatives and free relatives is attested in Czech; see (38) (from Biskup & Šimík 2019: 137). While Czech correlatives are transparent for A-bar extraction, the corresponding (string-identical) free relatives are not.[30] This contrast has been corroborated by experimental findings; see Šimík et al. (2022).

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[30]In Biskup & Šimík (2019) we note that the relevant contrast holds in other Slavic languages, too.

(38) a. To je ten chlap, kterému$_1$ [$_{CoR}$ co   dáš   t$_1$], to   ztratí.
          this is the man   which.DAT   what.ACC give.2SG   that lose.3SG
          'This is the man such that what(ever) you give him, he will lose it.'
      b. *To je ten chlap, kterému$_1$ ztratí [$_{FR}$ co   dáš   t$_1$].
          this is the man   which.DAT lose.1SG   what.ACC give.2SG
          Intended: 'This is the man who is such that he loses what(ever) you give him.'

4.4 Diachrony and acquisition

The wh-hierarchy (7)/(19) also receives support from diachrony and L1-acquisition. Both types of evidence clearly point to the primacy of wh-interrogatives and the derived nature of relatives (whether headless or headed). Where correlativization is at stake, it arguably represents an intermediate step between wh-interrogatives and relatives. There is also evidence that headless relatives are developmental precursors of headed relatives. Assuming the analysis presented in section 3, the diachronic or acquisition-related development corresponds to the incremental addition of new functions/features to the already developed/acquired ones. This in turn is in line with Friedmann et al.'s (2021) growing trees hypothesis.

Diachronic evidence   While some authors propose that wh-based relative clauses have developed directly from embedded wh-interrogatives (see Heine & Kuteva 2006; Bacskai-Atkari & Dékány 2021), there is also evidence for a more fine-grained diachronic path. First, Belyaev & Haug (2020) argue that wh-based correlatives have developed from conditionals with antecedents containing wh-based indefinites. Their analysis of (un)conditionals and correlatives is compatible with the approach sketched in 3.2 and 3.3: the wh-words in these structures are treated as indeterminate/Hamblin pronouns (Ramchand 1997; Kratzer & Shimoyama 2017), which can be considered as a technical variant of the variable-based approach assumed here.[31] Belyaev & Haug support their claim by showing that correlatives with a universal reading are diachronic precursors of correlatives with a definite reading. The argument relies on the assumption that the universal reading can be more directly derived from interrogative semantics, which involves a set of alternatives, which in turn lend themselves to being universally quantified, much like what is standardly assumed for unconditionals (see section 3.2).

Moving one step up the hierarchy, I note that it is a relatively broadly accepted idea that (light-)headed relatives in contemporary Indo-European languages have developed from the corresponding correlatives (Urbańczyk 1935; Bauer 1960; Haudry 1973; Lehmann 1984; Kiparsky 1995; Mitrenina 2012; Meyer 2017; for suggestive but differently interpreted evidence see Gisborne & Truswell 2020; for a dissenting view see Probert 2015). The idea is that the originally left-adjoined correlative clause is used as the restrictor of the donkey-anaphoric (E-type) definite (typically demonstrative) determiner within the consequent. I note that this is only possible if the correlative clause is (re)analyzed as property-denoting (in order to be able to act as a restrictor), which, according to hypothesis (26), is only possible if there is overt wh-movement. Notice that overt wh-movement in correlatives does not have to be motivated by lambda-abstraction; it can start out as a discourse-related movement, for instance, which later gets reanalyzed as lambda-abstraction.

As far as free relatives are concerned, they either might have developed from correlatives or – via ever free relatives – from unconditionals. The path from unconditionals to ever free relatives received some support for Spanish and Dutch in Aguilar-Guevara et al. (2011) (also see the references cited therein).

I am not aware of any research suggesting that there would be a diachronic shift from headless (free or light-headed) to headed relatives.

Evidence from acquisition   There is ample evidence that wh-interrogatives are the first wh-constructions to be acquired. They are usually mastered before or around the age of two (Brown 1968;

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[31]Belyaev & Haug (2020) do not discuss unconditionals explicitly, but they can be considered as a subtype of conditionals containing wh-based indefinites. In fact, some of Belyaev & Haug's examples appear to be instances of unconditionals.

Thornton 2016). What follows – generally by the age of two-and-half – is the acquisition of temporal and conditional clauses (often introduced by the wh-word for 'when'); see Clancy et al. (1976); Reilly (1982, 1986); Katis (1997). Conditionals and possibly more generally adverbial clauses are arguably closely related to correlatives and free relatives. As for argumental free relatives (introduced, for instance, by 'what'), they are acquired earlier than the corresponding headed relatives, in particular some time between two-and-half and three, a phenomenon called the "developmental primacy of free relatives" by Flynn & Foley (2004) (see Flynn & Lust 1980 for an early argument to this effect).[32] Headed relatives, esp. the wh-based ones, are acquired well after the third year of age in English (Diessel 2004) and even later in French (Labelle 1990). In Czech, a language with frequent and productive wh-based relativization, wh-based headed relatives are acquired earlier (probably around three years of age), but still significantly later than wh-interrogatives and conditionals (Matiasovitsová et al. 2022). Moreover, the order of acquisition is not merely a function of parental input in the sense that the more a construction is produced by the parents, the more effective its acquisition by the child. Matiasovitsová et al. (2022) argue that the being exposed to constructions lower on the hierarchy fosters the development of more complex constructions. There is not much rigorous research into the acquisition of *bona fide* correlatives (i.e., not conditionals), but the limited evidence there is suggests that correlatives are acquired fairly early. For instance, Sharma (1974) reports early (before three years of age) acquisition of correlatives in Hindi. Šimík et al. (to appear) conducted an elicited imitation task to determine the order of acquisition of Czech correlatives and the string-identical light-headed relatives. Children around three years of age make significantly fewer errors in correlatives than light-headed relatives, despite the former being less frequent in child-directed speech (Matiasovitsová et al. 2022). This is consistent with the idea correlatives are semantically simpler (denoting propositions) than light-headed relatives (denoting derived properties).

Interim conclusion   I conclude that the attested diachronic and L1-acquisition patterns are consistent with the wh-hierarchy, at least in the simplified version (8). There is evidence that correlatives stem from (un)conditional structures with wh-words/indefinites, which are in turn are essentially wh-interrogatives reused as (un)conditional antecedents. It is plausible that (light-)headed relatives (and possibly free relatives) have developed from correlatives (and unconditionals). A similar path or rather temporal ordering is evident in L1-acquisition. The early and robust acquisition of wh-interrogatives is followed by the acquisition of conditional, temporal, and other adverbial clauses, which plausibly correspond to correlatives and free relatives. Headed relatives are the last to be acquired.

5   Conclusion and open issues

Wh-constructions are syntactically and semantically highly complex entites, which have received plenty of attention in the generative and formal-semantic literature. The same holds of the constitutive elements of these constructions, namely wh-words, whose syntactic and semantic properties have often been in the spotlight of revolutionary linguistic research. The downside of this complexity is that most research concentrates on individual constructions and even their selected aspects. In this paper, I have taken a bird's eye view of the landscape of wh-constructions, in order not to lose sight of the forest for the trees. I hope to have demonstrated that the landscape is organized in a systematic and theoretically intriguing manner. Cross-linguistic, morphological, syntactic, but also developmental evidence (section 4) all point to the conclusion that wh-constructions are hierarchically organized, beginning with the most fundamental wh-interrogatives, followed by (un)conditionals and correlatives, then by free and light-headed (aka headless) relatives, and finishing with the most complex headed relatives.

I proposed to model this wh-hierarchy in syntax, by assigning wh-words a functional structure which incrementally grows along the hierarchy and which mirrors the functional structure of the

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[32]This primacy of free, or rather headless relatives, might well be independent of wh-word acquisition, as it has also been observed for languages which do not employ wh-words for relativization, such as Chinese (Packard 1988) or Korean (Lee 1991).

clausal left periphery. The syntactic nature of the hierarchy is manifested not just in syntax (esp. wh-movement), but also in morphology (via superset-based phrasal spellout), semantics (via incrementally increasing semantic complexity), and diachronic and L1-acquisition pathways. In section 3 I offered particular syntactico-semantic analyses of all the wh-constructions under discussion. These analyses build on previous literature, but are not always considered standard. I believe that the multi-faceted evidence provided in this paper can be used in support of these analyses. At the same time, however, I would be hesitant to militate for a single analysis/parsing for each individual wh-construction. It is possible that one wh-construction can be analyzed/parsed in multiple ways – some simple, others more complex. Wh-interrogatives represent a good example. While the evidence I have put forth suggests that their analysis should be very simple, one cannot rule out the possibility that the simple analysis is complemented by more complex machinery for expressing more complex meanings associated with interrogativity, such as exhaustivity, multiple interrogatives, propositional attitudes and so forth.

The comprehensive view of wh-constructions that I have put forth necessarily leaves some issues open and raises questions. For instance, it is likely that the proposed wh-hierarchy is only one (albeit important) factor determining the nature of the individual wh-constructions. An important factor that I have neglected concerns the use-conditions of the individual constructions. For instance, while unconditionals and correlatives appear quite low on the hierarchy and are therefore, in a sense, "simple", they happen to be relatively infrequent and stylistically marked in languages which productively use wh-words for more complex wh-constructions such as free or headed relatives. The wh-hierarchy relates to grammatical competence and has little to say about performance factors, which, however, may well have an impact on the overall system. Another factor left aside in this paper is the sortal restriction of individual wh-words. More specifically, there is evidence that some wh-sorts are – cross-linguistically – more likely to be employed for functions higher on the hierarchy than others. The one that seems to be most flexible in this respect is the wh-word 'where'; the one that is mostly very restricted is 'who'. A related issue is how the wh-hierarchy interacts (if at all) with Keenan & Comrie's (1977) accessibility hierarchy. The last factor that merits special attention is the factor of embedding and in particular the contrast between root and embedded interrogatives. It is clear, for instance, that some properties attributed to the complexity hierarchy, such as the loss or growth of complexity of wh-morphology, can arise due to embedding alone. Example of that are languages (such as Akan and Hausa, ?; but also Romance, Kellert 2018), whose embedded interrogatives can take the form of headless or headed relative clauses. A similar concern applies to wh-movement: while root interrogatives can involve wh-in-situ even in canonically wh-movement languages, provided that the right discourse conditions are met, wh-in-situ in embedded interrogatives is clearly much more restricted (see Bobaljik & Wurmbrand 2015).

One notable missing piece in the wh-hierarchy concerns modal existential constructions (Šimík 2011). The reason why I have excluded them for the moment is that they are puzzling in multiple ways. They almost exclusively use interrogative wh-morphology; only rarely do they allow for wh-words with rel-morphemes (particularly in Hungarian). This suggests that they should be very low on the wh-hierarchy, even lower than, say, correlatives. At the same time, however, their wh-words undergo obligatory wh-movement, which is typical of relative clauses. Also, there are good reasons to assume that they denote properties (Caponigro 2003; Šimík 2013) rather than open propositions (cf. Pancheva Izvorski 2000; Šimík 2009). Last but not least, despite their morphological affinity to wh-interrogatives, they are relatively limited in cross-linguistic distribution; with the exception of Yiddish, they are not attested in Germanic languages, for instance, which otherwise make productive use of most other constructions on the hierarchy.

Besides these fairly general issues, the wh-hierarchy invites one to explore various specific empirical and theoretical issues, pertaining to all domains of grammar. To give an example of a syntactico-semantic issue, I note that some Slavic languages (like Czech or Slovenian) possess multiple strategies for expressing unconditionals; some employ wh-in-situ, others wh-ex-situ. This apparent optionality appears to have interpretive consequences, with the ex-situ variant being more interpretively restricted (similarly to ever free relatives) than the in-situ variant. It is tempting to tie this to the wh-hierarchy,

whereby the wh-movement is an indicator of higher syntactic complexity, which in turn limits the interpretive options. When it comes to morphology, the wh-hierarchy calls for a much more rigorous nanosyntactic analysis of the attested lexicalization patterns. While the wh-morpheme itself is virtually always a prefix on the sortal (nominal) stem, the rel-morpheme can be both a prefix (as in Greek or Hungarian) or a suffix, or rather a postfix (as in Bulgarian or Slovenian). These and other morphological properties will definitely be instructive in spelling out a more precise analysis of wh-words – within and across languages.

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