

On the paradigmatic morphosyntax of *wh*-elements

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This paper discusses the distribution of *wh*-elements across different constructions. In particular, it attempts to develop an account for the observation that *wh*-elements do not distribute freely across different syntactic environments; rather, their distribution is paradigmatic or construction-specific. Such distribution raises issues for current minimalist frameworks, as *wh*-elements are expected to undergo Merge irrespective of the particular construction being derived. The proposed account captures the relevant distribution by means of language-specific lexical properties of *wh*-elements in accord with a licensing mechanism operating at the Sensory-Motor interface. This paper moreover discusses the licensing of *wh*-elements in the contexts of interrogative, free and headed relative constructions.

1. Introduction

Recent developments in Minimalism have emphasized the simplicity of Merge, the sole structure-building operation underlying human linguistic competence (e.g., Chomsky 2013, 2015, 2021; Chomsky et al. 2019). Unlike previous versions of Minimalism (e.g., Chomsky 1995, 2001, 2008), Merge is no longer assumed to be a ‘last resort’ operation, i.e., triggered by requirements of valuation and/or deletion of uninterpretable/edge features. Rather, Merge is free to apply when it can. The burden of explanation for linguistic phenomena has thus increasingly fallen onto ‘third-factor’ principles (e.g., computational efficiency; Chomsky 2005) and the interfaces with which narrow syntax (Merge) interacts: the Sensory-Motor (S-M) interface, responsible for the vocal and gestural aspects of language, and the Conceptual-Intentional (C-I) interface, broadly concerned with the semantico-pragmatic aspects of language.

Minimizing the complexity of the Merge operation is a central goal of Minimalism, as envisaged by the Strong Minimalist Thesis (SMT), satisfied ‘to the extent that the structures of I-language are generated by the simplest operations’ (Chomsky 2021:12). A free-Merge system is intuitively simpler than a system requiring extra syntactic machinery to trigger applications of Merge (e.g., syntactic Agree). In fact, free Merge is the simplest combinatorial operation imaginable, recursively combining objects in a binary fashion with no linear order among them (Chomsky et al. 2019).

Against this backdrop, the present paper discusses some distributional properties of *wh*-elements that *prima facie* seem to be incompatible with the SMT. In particular, it attempts to develop an analysis for the observation that the distribution of *wh*-elements appears to be

restricted to particular morphosyntactic paradigms or constructions. The construction-specific distribution of *wh*-elements can be briefly illustrated with English *what* and *who*, which despite their availability in different constructions, are ruled out in specific environments; e.g., *what* in Headed Relatives (HRs) (1d) and *who* in Free Relatives (FRs) (2b-c) (Patterson & Caponigro 2016; Chomsky 2013:fn. 44); see section 2 for further discussion.

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|-----|----|--|---------------------|
| (1) | a. | <i>What</i> did you do? | Q |
| | b. | <i>What</i> Glenn said didn't make much sense. | FR _{SUBJ} |
| | c. | I love <i>what</i> I do. | FR _{OBJ} |
| | d. | *The book <i>what</i> you read. | *HR |
| (2) | a. | <i>Who</i> did you see? | Q |
| | b. | * <i>Who</i> Glenn married didn't make much money. | *FR _{SUBJ} |
| | c. | *I love <i>who</i> I married. | *FR _{OBJ} |
| | d. | The girl <i>who</i> Glenn married | HR |

Under the assumption that Merge is free nothing in principle prevents the generation of the ungrammatical sentences in (1d) and (2b-c). In other words, *what* and *who* (or whatever underlies their featural composition in the syntactic computation) are expected to undergo External Merge — i.e., to be drawn from the (pre-syntactic) lexicon — irrespective of the particular construction in which they ultimately surface. In fact, this is expected on the natural assumption that derivations lack any knowledge about the type of construction that is being derived (e.g., Chomsky 1981:7).

In line with minimalist assumptions, I take the above to be desirable, and assume that (1d) and (2b-c) (as well as other comparable cases) can indeed be generated by narrow syntax. The source of the paradigmatic distribution of *wh*-elements must then be individuated elsewhere. In this paper, I argue that the type of distributional asymmetries in (1)-(2) are best accounted for by the lexical properties of the *wh*-elements operating in conjunction with conditions holding of the S-M, rather than the C-I, interface (cf. Rugna 2023:ch. 2).

The present paper is structured as follows. After providing a more articulated survey of the empirical domain in section 2, I argue in section 3 in favor of the hypothesis that *wh*-elements lack any intrinsic semantic specifications, as a consequence of which they behave as variables that may be bound by various operators (Heim 1982; Nishigauchi 1990; Postma 1994) at the C-I interface. Their lack of semantic specifications in turn militates against an explanation of the paradigmatic distribution of *wh*-elements in terms of C-I-related conditions. In section 4, I develop the proposal that *wh*-elements bear, as part of their lexical entries, the information about the particular environment in which they can surface. This information is ultimately licensed at the S-M interface under specific morphosyntactic conditions, such as the presence of particular semantic operators (e.g., Q, σ). I moreover discuss the conditions regulating the licensing of *wh*-elements in the Q, FR and HR paradigms. Finally, section 5 concludes the discussion.

2. Main data: paradigmatic gaps and paradigmatic allomorphy

The paradigmatic distribution of *wh*-elements encompasses a wide range of morphosyntactic phenomena. In this paper, we focus on two related phenomena: paradigmatic gaps and paradigmatic allomorphy.¹

Paradigmatic gaps occur when a *wh*-element fails to be licensed in particular constructions despite expectations. For instance, the absence of *what* in HRs as seen in (1) can be considered to be a paradigmatic gap on the basis of both intra- and cross-linguistic considerations. For starters, HRs in English do not categorially reject *wh*-elements (3); hence the unavailability of *what* in HRs cannot be imputed to a general ban against *wh*-elements.

- (3) a. A book **what/which* you should read is Syntactic Structures.
 b. The girl **what/who* John invited to the party is Mary.

Cross-linguistically, moreover, the equivalents of *what* are clearly available in HRs. This point can be illustrated with both the closely-related German *was* (4) and Dutch *wat* (5), and, more forcefully, with data like (6), from dialects/varieties of English that can license *what* in HRs.

- (4) Das Beste, *was* Microsoft heute tun kann, ist, Yahoo zu kaufen.
 The best what Microsoft today do can is Yahoo to buy
 ‘The best that Microsoft can do today is to buy Yahoo.’
 (German; Brandt & Fuß 2014:301)

- (5) Dat is het meisje *wat* die mensen heeft geropen.
 That is the girl what those people have called
 ‘That is the girl who called those people.’
 (Dutch; Boef 2012:53)

- (6) The girl *what*’s coming over.
 (Dialectal English; Edwards 1993:228)

Based on the above considerations, (standard) English *what* may be said to be missing from the HR paradigm (which instead includes *which* and *who*).²

The same conclusion can carry over to English *who* in FRs. Many speakers find the status of *who* to be degraded or altogether ungrammatical in FRs, irrespective of whether the FR surfaces in object (7a) or subject (7b) position (see in particular Patterson & Caponigro 2016; cf. Chomsky 2013:fn. 44.). Similarly to what we observed for *what* above, intra- and cross-linguistic considerations would lead one to expect *who* to be available in the FR paradigm. In particular, *what* is grammatical in FRs (cf. (1b-c) above), as are the counterparts of *who* in other

¹ Construction-specific morphosyntactic properties are not discussed here. See Rugna (2023a, 2023b:ch. 3) for an analysis of the paradigmatic properties of the Italian relativizer *che* under the hypothesis that it is a DP (e.g., Manzini & Savoia 2003), and Rugna (2023b:ch. 4) for an analysis of the paradigmatic distribution of relativizers in English and Romance (non-)tensed and (non-)restrictive headed relative clauses.

² English *what* is also absent from the Indefinite paradigm (e.g., *I ate *what bad*; cf. I ate *something bad*), as evidenced by the availability of the closely-related German *was* and Dutch *wat* in the relevant paradigm. I abstract away from the Indefinite paradigm in this paper; see Rugna (2023:12f.) for discussion of gaps in the Indefinite paradigm and further parametric differences between German and Dutch (cf. Postma 1994; Hachem 2015).

languages, such as Italian *chi* (8), Spanish *quién* (9), and German *wer* (10) (taken from Patterson & Caponigro 2016:342).

- (7) a. *I love *who* I married.
 b. * *Who* Glenn married didn't make much money.
- (8) Hanno premiato solo *chi* è arrivato primo.
 have.3P award.PRF.3P only who is arrive.PRF first
 'They gave an award only to the person who arrived first.'
- (9) Le dí las gracias a *quién* me ayudó.
 3S give.PST.1S DET thanks to who 1S help.PST.3S
 'I thanked the person who helped me.'
- (10) *Wer* diese Tat verübt hat, sollte nie wieder frei
 who.NOM this crime commit.PRF.3S has, should never again free
 kommen.
 get
 'The person/people who committed this crime should never be let free.'

A comparable situation can be observed in Italian. In this case, it is the *wh*-element *che* 'what' that is not available in FRs (11), at least not in the standard language.³

- (11) a. *Amo *che* faccio.
 love.1S what do.1S
 'I love what I do.'
 b. *Che* dici non ha senso.
 what say.2S NEG has sense
 'What you're saying doesn't make sense.'

Turning now to paradigmatic allomorphy, the phenomenon may be illustrated by Italian (12) and Slovenian (13). As can be seen, Italian and Slovenian (among other languages) make use of morphophonologically specialized forms for *wh*-elements occurring in specific constructions. Thus *cui* (an oblique form of the element corresponding to *who/what*) is restricted to HRs in Italian, whereas Slovenian *kar* 'what' is confined to FRs (13b) and so-called light-headed relatives (13c) (adapted from Šimík 2018:ex. (7)).

- (12) a. A *chi*/**cui* hai dato il libro?
 To who have.2S given the book
 'Who did you give the book to?'

³ Caponigro (2003:26) points out that some varieties of Italian license *che cosa* (lit. 'what thing'), a variant of *che*, in FRs. I do not know whether *che* (without *cosa*) is allowed by these speakers in FRs. Manzini (2012:299) judges (i) as grammatical (her ex. (7)), which illustrates the possibility for variation in the use of free relative *che* in (non-standard) varieties of Italian ((i) is deviant in my own Italian).

(i) %Fai *che* ti pare.
 Do what you likes
 'Do as you like.'

- b. Gianni parla solo con *chi/*cui* vuole parlare
 G. speaks only with who wants speak-INF
 ‘Gianni speaks only to those he wants to speak with’
- c. L’uomo a *cui/*chi* hai dato il libro
 The man to who have.2S given the book
 ‘The man to whom you gave the book.’
- (13) a. Vem, *kaj/*kar* je Maja skuhala.
 Know.1SG *what* AUX.3S Maja cooked
 ‘I know what Maja cooked.’
- b. Pojdem sem, *kar/*kaj* je Maja skuhala.
 Ate AUX.1S what AUX.3S Maja cooked
 ‘I ate what Maja cooked.’
- c. Pojdem sem vse / nekaj / tisto, *kar/*kaj* je Maja skuhala.
 Ate AUX.1S everything / something / that what AUX.3S Maja cooked
 ‘I ate everything / something / that thing that Maria cooked.’

It should go without saying that paradigmatic allomorphies also imply paradigmatic gaps (e.g., the Q paradigm of Italian lacks *cui*; cf. (12a)). The two phenomena thus seem to be strictly connected and should ideally find a unifying explanation. In particular, the question arises as to how the relevant grammars can ‘know’ that a particular *wh*-element belongs to a specific (set of) paradigm(s).

3. *Wh*-elements in the lexicon and their status as variables

Under the minimalist framework assumed in this paper (Chomsky 2013, 2015, 2021; Chomsky et al. 2019), the locus of explanation for morphosyntactic phenomena falls onto third-factor principles and/or interface conditions. Therefore a crucial preliminary question that must be addressed with respect to the distribution discussed above is how *wh*-elements should be formally represented in the lexicon and at the interfaces. In other words, what sort of features are *wh*-elements underlyingly composed of?

There are two alternative views on the matter. According to one hypothesis, referred to here as the *multiple-entries hypothesis*, lexica may redundantly specify the association of a phonological exponent with different semantic specifications. In particular, the multiple-entries hypothesis postulates that a lexicon may contain such objects as ‘interrogative’ or ‘relative’ *wh*-pronouns. Although it was not explicitly formulated as such, this hypothesis is effectively taken by such early works as Chomsky (1964), Katz & Postal (1964), Baker (1970), among others, insofar as they treat *wh*-elements in Qs as inherently endowed with Q semantics. More recently, the multiple-entries hypothesis is taken by some authors working under the cartographic framework (see, e.g., Bacsai-Aktari & Dékány 2021, who assume that [+rel]/[+wh] features are relevant for clause-typing).

On the other hand, proponents of the *single-entry hypothesis* (e.g., Postma 1994; Manzini & Savoia 2003; Barbiers et al. 2010; Boef 2012; Roussou 2020; a.o.) claim that a redundant lexicon should be disfavored upon empirical considerations. For instance, the observation that morphophonological syncretisms between interrogative and (free) relative pronouns are quite wide-spread cross-linguistically (cf., e.g., Smits 1989; Caponigro 2003; Bhat 2004; a.o.) is taken to cast doubt on the postulation of multiple homophonous lexical entries. More

specifically, if the interrogative reading associated with *what* in (1) is triggered by some intrinsic property of *what*, then it would become a purely accidental fact that the lexical entry for interrogative *what* is homophonous with the entry for *what* in FRs (2). What would also be missing is an explanation for why such syncretisms are cross-linguistically wide-spread.

According to the single-entry hypothesis, the lexicon contains a single representation for a given *wh*-form that underlies its uses across different constructions. To capture the different ‘functions’ a *wh*-element may perform, the lexical entry of a *wh*-element is assumed to be rather underspecified from a semantic point of view. In particular, such underspecification would make *wh*-elements act as variables (in the sense of Heim 1982) at C-I (cf. Nishigauchi 1990; Postma 1994), where they may ultimately be bound by various operators independently merged in the syntactic structure.

The behavior of *wh*-elements as variables can be illustrated clearly by the following examples from Japanese (Nishigauchi 1990; cf. Cheng 1991 for the same conclusion with arguments from Mandarin Chinese). As can be seen in (14), the same morphophonological form of the *wh*-element *dare* ‘who’ is associated with a variety of readings, depending on the type (and structural position) of the operator independently merged in the structure. Thus *dare* in (14a) receives an interrogative interpretation as it is bound by the operator *ka* occupying a sentence-peripheral position; in (14b), *dare* is instead read in the scope of the universal operator *mo*, thus receiving universal quantification; in (14c), *dare* receives an existential interpretation by virtue of the operator *ka* occupying a phrase-internal position.

- (14) a. *Dare-ga* *ki-masu* *ka*
 who-N come Q
 ‘Who’s coming?’
- b. *Dare-ga* *ki-te mo,* *boku wa* *aw-a-nai.*
 who-N come Q, I T meet-want
 ‘For all x, if x comes. I want to meet (x).’ Or
 ‘Whoever comes in, I will mit (him).’
- c. *Dare-ka-kara* *henna* *tegami-ga* *todoi-ta.*
 Who-Q-from strange letter-N arrived
 ‘A strange letter came from somebody.’

Such behavior of *wh*-elements can also be illustrated with Indo-European languages. Postma (1994) explicitly argues, independently of Nishigauchi (1990), that *wh*-elements in German and Dutch should be treated as open variables that acquire their readings configurationally. Thus, for instance in (15) the interpretation of Dutch *wat* ‘what’ is disambiguated syntactically: the interrogative reading is associated with movement of *wat* to a left-peripheral position (15a), while the existential reading arises when *wat* remains in situ (15b).

- (15) a. *Wat* *heb* *je* *gedaan?*
 What have you done?
 b. *Jan* *heeft* *wat* *gedaan.*
 John has what done
 ‘John has done something.’

In sum, according to Postma (1994), the interrogative and indefinite readings of *wat* are not lexically encoded as such: they are the result of the interaction between the semantic property

of *wat* as an open variable and the syntactic structure in which it occurs (see also Barbiers et al. 2010).

As another empirical piece of evidence from Indo-European for the behavior of *wh*-elements as variables, consider Italian *chi* ‘who’ in (16)-(17), where it acquires rather different interpretations. Specifically, in the FR in (16a), *chi* is interpreted as a definite description, as in the paraphrase in (16b); in the Existential Free Relative (also known as Modal/Irealis Free Relatives or indefinite constructions in the literature; cf. Caponigro 2003; Šimík 2011) in (17a), *chi* is instead interpreted in the scope of an existential quantifier, as in the paraphrase in (17b).

- (16) a. Amo *chi* ho sposato.
 love.1S who have.1S married
 (lit.) ‘I love who I married.’
- b. Amo *la persona* che ho sposato.
 love.1S the person that I married
 ‘I love the person I married.’
- (17) a. Ho con *chi* parlare quando sono triste.
 have.1S with who speak-INF when am sad
 ‘I have somebody to talk to when I am sad.’
- b. Ho *qualcuno* con cui parlare quando sono triste.
 have.1S somebody with whom speak-INF when am sad
 ‘I have somebody to talk to when I am sad.’

(Italian; Caponigro 2003:86)

Insofar as it avoids a redundant lexicon and increases explanatory and descriptive adequacy, the single-entry hypothesis is favored on minimalist grounds. At the same time, the assumption that *wh*-elements have underspecified lexical entries does not predict the sort of paradigmatic distribution presented in §2. In this case, the multiple-entry hypothesis seems to have an advantage, as it might account for paradigmatic gaps and allomorphy via the assumption that semantic information is directly encoded on the lexical entry. As such, the absence of *who* from the FR paradigm, for instance, might be explained away by the lack of an association between the phonological exponent /hu/ and the semantic features associated with the FR paradigm (whatever these may be; cf. §4.2).

Nonetheless, in this paper I essentially side with proponents of the single-entry hypothesis in assuming that *wh*-elements do not bear any intrinsic quantificational force as part of their lexical entries, allowing them to act as open variables at C-I. This assumption makes more transparent the availability of *wh*-elements across different constructions, as well as why such cross-constructional syncretisms should hold in several languages.

More concretely, I assume that the semantic underspecification of *wh*-elements is encoded on their lexical entries in the form of a [wh] feature. Taking the standard position that *wh*-elements project DPs, I moreover assume that the [wh] feature corresponds to a particular value associated with the D category. This value, I suggest, is what distinguishes *wh*-elements from other exponents of the D category, such as definite determiners, at C-I (which may perhaps be valued as [t] or [σ], expressing, e.g., uniqueness and/or maximality).

Apart from the [wh] feature, I assume further that *wh*-elements may lexicalize ϕ -features,⁴ which encode such familiar specifications as gender, number, person and animacy (cf. Déchaine & Wiltschko 2002). At C-I, I assume that some ϕ -features may act as restrictors on the range of the variable introduced by *wh*-elements (e.g., Heim & Kratzer 1998:244; Heim 2008). This is particularly the case of the animacy feature, whose specification as [human] restricts the range of the variable to human entities.

Given these assumptions, the lexical entry for *wh*-items like *what* and *who* may be minimally represented as in (19a) and (19b), respectively. These entries are meant to represent the association of a phonological exponent with a particular set of features computed by narrow syntax and interpreted as variables (potentially restricted by ϕ -features) at C-I. For concreteness, I assume in line with realizationist/Late Insertion approaches to the syntax-morphology interface (e.g., Distributed Morphology; Halle & Marantz 1993; Arregi & Nevins 2012) that this association happens post-syntactically, at S-M, on the basis of the abstract features received from narrow syntax.⁵

- (19) a. [DP D: [wh], ϕ : [∅]] → /wat/
 b. [DP D: [wh], ϕ : [human]] → /hu:/

As in the single-entry hypothesis, such entries as those in (19) allow us to capture in a straightforward way why *wh*-elements often occur across different syntactic environments cross-linguistically. Quite simply, the featural composition underlying a *wh*-element can undergo Merge in different constructions and receive different interpretations depending on the operator that ultimately binds it at C-I. Regardless of these different interpretations, the same phonological exponent may be associated with the underlying abstract features at S-M, thereby accounting for cross-constructional syncretisms.

However, such minimal entries are clearly insufficient to capture the paradigmatic distribution of *wh*-elements. Without further specifications, it remains unclear why, e.g., the entry in (19a) should be ruled out in HRs, especially considering the potential availability of (19b) in these contexts. A possible solution to this issue, which I explore in the remainder of this paper, is that the entries in (19) be enriched so as to contain the instructions for their licensing environments at S-M. In other words, I propose that while *wh*-elements spell out the abstract features interpreted as variables at C-I (as under the single-entry hypothesis), they can do so only if an appropriate context or licensing environment is met at S-M. Therefore the entries in (19) must be enriched so as to also contain *contextual features*, as illustrated in (20) (contextual features will be marked with a preceding '+' throughout).

- (20) a. [DP D: [wh], ϕ : [∅]] → /wat/ ₋+Q/+FR
 b. [DP D: [wh], ϕ : [human]] → /hu:/ ₋+Q/+HR

It is important to note that the sole purpose of contextual features as understood here is to inform the S-M interface that a phonological exponent can be associated with a set of abstract features only if the relevant context is satisfied. Lacking a specification for, e.g., the +HR or

⁴ At least in the case of nominal *wh*-elements. I abstract away from the internal featural composition of *wh*-adverbs such as *where* and *how*.

⁵ Little hinges on this assumption for our present concerns, however. As far as I can tell, the conclusions reached in this paper are also compatible with the idea that the association between phonological exponent and abstract features takes place prior to transfer of syntactic material to the interfaces, as in lexicalist/Early Insertion approaches (e.g., Manzini & Savoia 2018; Collins & Kayne 2020).

+FR features will make the lexical entry crash in the relevant contexts at S-M. By assumption, this is what characterizes, for instance, (standard) English *what* and Italian *che*, respectively (cf. §2). On the other hand, the fact that, e.g., the lexical entry for *what* bears the +Q and +FR features allows the entry to be licensed in the contexts of interrogatives and free relatives.⁶

Given the cross-linguistic variation in the paradigmatic distribution of *wh*-elements, moreover, the contextual features must be associated idiosyncratically with a lexical entry for each particular I-language. This allows us to understand the cross-linguistic variation as a facet of the lexicon and of the S-M interface, as is desired from a minimalist standpoint (e.g., Berwick & Chomsky 2011; Chomsky et al. 2019).⁷

The postulation of contextual features on the lexical entries of *wh*-elements raises the question of what these should amount to, or, in other words, how S-M can interpret them. The issue is particularly acute considering the ban against construction-specific statements. I propose to understand contextual features as a form of selection, in particular one for specific semantic operators present in the portion of structure that is accessible at S-M. The gist of the proposal is that the relevant morphosyntactic context is evaluated at S-M after transfer from narrow syntax and the contextual/selection feature can be licensed accordingly. Thus, while the notion of construction remains unavailable to the grammar, the relevant construction-specific distribution is accounted for in terms of operators merged in the syntactic structure that are accessed and interpreted by the interfaces independently of the facts described here. The next section attempts to develop this analysis by focusing on the licensing environment for the +Q, +FR and +HR features.

4. On the licensing of contextual features at S-M

4.1. On +Q

I assume that the contextual +Q-feature on the lexical entries of *wh*-elements is licensed by a Q-operator. More specifically, I assume that the spell-out of *wh*-elements specified as +Q may be licensed if a Q-operator is present in the portion of syntactic structure that is accessible at S-M. Let me stress that +Q refers to a morphosyntactic contextual/selection feature, i.e., it does not refer to the spell-out of the Q-operator, which may remain covert or be spelled out independently of the *wh*-element, depending on language-particular rules. Therefore, the independently merged Q-operator on the one hand binds the open variable introduced by the *wh*-element, giving rise to its interrogative reading at C-I; on the other hand, the Q-operator licenses the contextual +Q-feature at S-M.

I assume further, as is standard, that the Q-operator is part of the left periphery of the clause, notated here as a value on C (i.e., [C: [Q]]). In languages like Japanese, Tlingit and others, the

⁶ I assume that a single lexical entry can contain more than one contextual feature as part of its featural composition. Hence in the case of (20a), for instance, both +Q and +FR are present on the lexical entry for *what* at all times. The implications of this assumption are left open to future research. I thank an anonymous reviewer for raising this point.

⁷ An anonymous reviewer wonders what exact motivation/mechanism leads to the assignment of different contextual features in different languages on present assumptions. As with any other type of parameter, the reason has to do with idiosyncratic aspects of the S-M interface (which may in turn be described on diachronic/functional grounds). As the reviewer correctly points out, this leads to a descriptive mechanism for the assignment of contextual features rather than to an independent/predictive one. At the same time, it is difficult to see at present how the facts described in this paper can be accounted for from independent properties of specific languages. Indeed, to the best of my knowledge there are no known properties that can be independently correlated with the availability of *wh*-forms in particular paradigms.

Q-operator may be overtly manifested as a particle (cf. (21a) and (21b)). In languages like English and Italian, among other languages, the Q-operator is covert, though its effects are present at both C-I (triggering the interrogative semantics; cf. Dayal 2017 for recent discussion) and at S-M (in the form of, e.g., a specific prosodic contour, T-to-C movement, etc.; cf. also Bruening 2007:143 for pertinent remarks).

- (21) a. Dare-ga ki-masu ka
 who-N come Q
 ‘Who’s coming?’
 (Japanese; Nishigauchi 1990:18)

- b. Wáa sá sh tudinookw i éesh?
 how Q he.feels your father
 ‘How is your father feeling?’
 (Tlingit; Cable 2010:1)

I therefore propose that *wh*-elements such as *what* can be licensed in Qs not only because of their underspecified semantics, ‘rescued’ by the Q-operator at C-I (Beck 2006:12), but also because they meet the contextual specification that is part of their lexical entry; see (22), which is meant to illustrate the structure of (the edge of) an interrogative sentence at S-M and the subsequent mapping of the phonological exponent /wat/ licensed by the satisfaction of the +Q-feature by the Q-operator.

- (22)
-
- CP
 / \
 DP C
 [D: [wh], φ: [∅]]
 → /wat/ _ +Q/+FR C[Q]

Conversely, if the lexical entry did not bear the +Q specification, it could not be licensed in Qs, as I assume is the case for *wh*-elements such as Italian *cui* (cf. (12)).

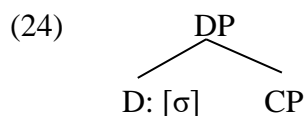
4.2. On +FR

Similarly, to what I took to be case for +Q above, I assume that +FR refers to the presence of a structurally present semantic operator, which I dub σ following Hinterwimmer (2008) (cf. Caponigro’s 2003 δ). The role of σ is to trigger the reading of FRs such as (23a) as definite descriptions at C-I, informally as in the paraphrase in (23b) (Jacobson 1995; cf. Šimík 2018 for recent discussion on the semantics of FRs).

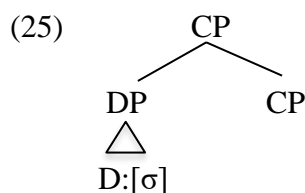
- (23) a. I ordered *what* he ordered for dessert.
 b. I ordered *the thing* he ordered for dessert.

On the syntactic side, I assume that σ projects a DP. The presence of the σ -operator is thus compatible with different competing analyses of FRs that assume the presence of a D-layer. For instance, it is compatible with accounts such as those of Groos & van Riemsdijk (1981),

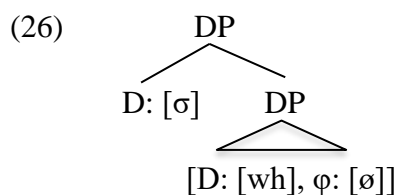
Caponigro (2002), Citko (2004), among others, which assume a structure of FRs along the lines of (24), where a DP selects the CP of the FR.



It is also compatible with the account in Caponigro (2003), where σ (δ , in his terms) is included in a left-peripheral projection in the CP-layer of the Free Relative, as in (25).



The presence of a DP-projecting σ -operator can also be made compatible with more recent accounts that assume special syntactic processes to derive the DP-like distribution of FRs, such as Donati (2006), Donato & Cecchetto (2011) and Ott (2011). Without entering into details, Donati & Cecchetto argue that what differentiates FRs from other *wh*-clauses, such as Qs, is the fact that in the former type of construction the *wh*-element can assign its D-label to the entire CP, in a process they dub relabeling. In Ott's (2011) proposal, the DP-like distribution of FRs is instead obtained under a phase-based framework (e.g., Chomsky 2001, 2008) by assuming that the C-head of the FR is 'removed' from the computation after the syntactic structure is transferred to the interfaces, thereby leaving only the *wh*-DP at the next phase. I refer the reader to the cited works for further details. Under such accounts, where no DP other than the *wh*-element is involved, σ could be assumed to undergo Merge directly with the *wh*-DP, forming a complex syntactic object with the underlying structure illustrated in (26).⁸



Some empirical support for the structure in (26) comes from the Greek data in (27), where the determiner *o-* is prefixed to the *wh*-elements *pjus* 'who' and *pja* 'what' (these unprefixated *wh*-forms are otherwise available in the Q paradigm, among others; cf. Roussou & Vlachos 2022 for recent discussion).

- (27) a. *ðjaleksa* *opjus* *protines*
 chose.1S the-who.M.PL recommended.2S
 'I chose who you recommended.'

⁸ To be precise, the structure in (26) would have to be treated as atomic under Donati & Cecchetto's proposal, since they do not allow for relabeling by phrases. I leave open the question of how such atomicity could be obtained. Under Ott's proposal, there are no requirements on the phrasal status of the *wh*-element.

- b. đjaleksa opja protines
 chose.1S the-what.N.PL recommended.2S
 ‘I chose what you recommended.’

(Greek; Daskalaki 2020:282)

As evidence for the fact that *o-* in Greek directly contributes to the semantics of FRs in (27) — and that it thus spells out σ under the present approach —, Daskalaki (2020) shows how *wh*-elements prefixed with the determiner *o-* fail to introduce Existential FRs (28). One of the distinctive characteristics of Existential FRs (among others) is that they cannot be paraphrased by a definite description (recall the contrast in Italian between (16) and (17) in §2.1). Crucially, Existential FRs in Greek must be introduced by bare *wh*-elements (i.e., those unprefixed by *o-*), as shown by the contrast in (28), suggesting the direct implication of *o-* in the semantics of FRs like (27).⁹

- (28) a. *đen exo se opjon na miliso.
 NEG have.1S to the-who SBJV talk.1S
 b. đen exo se pjon na miliso.
 NEG have.1S to who SBJV talk.1S
 intended: ‘I don’t have anyone to talk to.’

The above data suggest that σ can be spelled out in some languages and that σ can Merge with *wh*-elements directly (i.e., without the mediation of CP). Given these considerations, I will therefore assume that σ may either undergo Merge with CP or with the *wh*-DP, leaving open the consequences of this assumption for the semantic analysis of FRs. What is crucial for our purposes is that S-M can make reference to the context of FRs in order to license *wh*-elements bearing the +FR specification. This result can be achieved if reference is made to a structurally present σ -operator that is responsible for the definite reading of FRs at C-I.

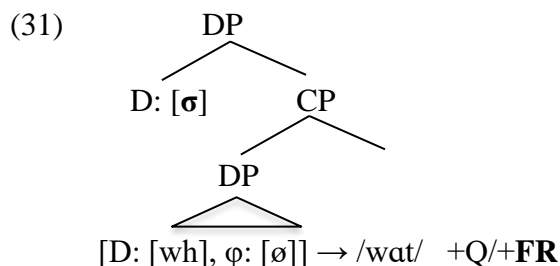
If this is on the right track, then we can understand the unavailability of such items as English *who* and Italian *che* ‘what’ in FRs (§2.1) by assuming that, for the relevant speakers, their lexical entries do not specify +FR (i.e., the σ -operator) as a possible licensing environment; cf. (29)-(30).

- (29) English lexical entries:
- | | | | |
|----|--------------------------------|---------|---------|
| a. | [DP D: [wh], ϕ : [∅]] | → /wat/ | _+Q/+FR |
| b. | [DP D: [wh], ϕ : [human]] | → /hu/ | _+Q/+HR |
- (30) Italian lexical entries:
- | | | | |
|----|--------------------------------|--------|---------|
| a. | [DP D: [wh], ϕ : [∅]] | → /ke/ | _+Q |
| b. | [DP D: [wh], ϕ : [human]] | → /ki/ | _+Q/+FR |

Thus, consider for instance (31), which is meant to represent the relevant portion of structure of a FR available at the S-M interface (irrelevant details omitted; I assume for simplicity that the σ -operator selects the CP of the FR, though, as noted, this analytical choice is not crucial for our present concerns). In (31) the DP at the edge of the CP can receive phonological content

⁹ Giannakidou & Cheng (2006) as well assume that *o-* contributes to the semantics of FRs (in their terms, as the spell out of an iota operator, following Jacobson 1995). However, in their analysis, *o-* takes the entire CP projected by the FR as a complement, rather than just the *wh*-element.

because the English lexicon contains a suitable entry that matches its featural specifications; moreover, the contextual feature (+FR) is met, on current assumptions, by the structural presence of the σ -operator.



4.3. On +HR

The licensing of the contextual +HR feature at S-M is assumed here to depend on the presence of an antecedent.¹⁰ The presence of an antecedent is a good candidate for the licensing of the +HR feature as it can sufficiently distinguish between Q and FR environments, among others, as well as generalize over different types of headed relative clauses (e.g., restrictive vs. non-restrictive). That the +HR feature makes reference to an antecedent, rather than to the presence of any DP in the structure, is evidenced by such FRs as Italian (32), where the +HR-element *cui* is excluded.

- (32) Ho dato il premio a **cui/chi* se lo è meritato.
 Have.1S given the award to whom REFL it is deserved
 ‘I gave the award to those who deserved it.’

The question that arises is how the notion of ‘antecedent’, which is strictly connected to that of binding/coreference, can be made accessible to the S-M interface. Part of the problem has to do with the Inclusiveness Condition, which prevents the introduction of properties not intrinsic to lexical items into the narrow syntactic derivation (Chomsky 1995; Chomsky et al. 2019). This thus casts out of the derivation ‘extraneous’ objects assumed under previous frameworks (e.g., Chomsky 1981), such as bar-levels, traces, and, crucially for our purposes, indexes. Furthermore, under the standard Y-model of grammar, the C-I and S-M interfaces are assumed to work independently of one another, so that the S-M interface cannot directly probe into representations available at C-I (see Chomsky 1995:219f.).

One possible solution to this issue, which I explored in Rugna (2023a), is to exploit the (Reverse) Agree operation (Zeijlstra 2012; Bjorkman & Zeijlstra 2019). Without entering into the details of that analysis, the essence of the proposal there is that if Agree can be invoked as a means of establishing a dependency between the antecedent and the relativizer,¹¹ and if S-M

¹⁰ Alternative hypotheses one may entertain for the licensing of +HR are: (i) that +HR is licensed by some sort of D-operator, similarly to what I argued to be case of +FR in §4.2; and (ii) that +HR is licensed by movement or deletion of the relativizer’s NP complement as postulated in the Raising (e.g., Kayne 1994; Bianchi 1999) or Matching (e.g., Sauerland 1998; Citko 2001) analyses of headed relative clauses. I do not discuss these hypotheses here for reasons of space, though see Rugna (2023b:§2.3.3.2 and §2.3.3.3) for further discussion and arguments against these alternatives.

¹¹ The dependency established in DP-binding has been captured via (syntactic) Agree by various researchers, e.g., Kratzer (2009); Reuland (2011); Landau (2015); among several others.

recognizes whether Agree has taken place or not, then, by assumption, +HR *wh*-elements can be licensed just in case Agree has taken place (see also Brandt & Fuß 2014; Furuya 2017; cf. Rooryck & Vanden Wyngaerd 2011 for a similar proposal applied to the empirical domain of reflexives). Assuming further that Agree is a different operation than DP-internal Concord (Chomsky 2001: fn. 6; Norris 2014; Baier 2015, among others), this analysis can account for the contrast in (33). In particular, the +HR feature of *cui* can be licensed under Agree with the antecedent in (33b), though not in the interrogative in (33a), where no antecedent is present and hence no Agree relation can take place.

- (33) a. *Di *cui*_[+HR] uomo parli?
 Of what man speak.2S
 ‘What man are you talking about?’
- b. L’ uomo di *cui*_[+HR] parli è Gianni.
 The man of what speak.2S is G.
 ‘The man you are talking about is Gianni.’

One question that arises is why Agree between the *wh*-element *cui* and the NP *uomo* ‘man’ should take place in (33b), though not in (33a). The intuition that I would like to pursue is that the type of Agree connecting relativizers to their antecedent should be conceived of as a general operation by which elements come to be part of the same chain — i.e., as part of the same discontinuous referential object. In cases like (33a), the *wh*-determiner and the nominal complement both belong to the same DP phrase; hence no chain relation is established between them. In cases like (33b), on the other hand, the NP ‘head’ of the relative requires to be somehow connected to the relativizer, so that it can receive an interpretation in the gap position. If such a connection is established via some form of Agree, as I am suggesting, then the contrast between (33a) and (33b) in the application of Agree between the *wh*-element and the NP can follow straightforwardly.

Although Agree is in current practice thought of as an asymmetric valuation operation between two independently merged elements — i.e., a (valued) Probe and a (unvalued) Goal —, note that in the original formulation in Chomsky (2000: 122) Agree is stated simply on the basis of identity in some feature of the probe-goal pair.¹² In this sense, Agree between the antecedent and the relativizer is essentially a weak form of the Matching operation postulated as part of the Matching analysis of HRs (e.g., Sauerland 1998; Citko 2001): it establishes a connection between different elements of the syntactic workspace, though it crucially lacks the further intrinsic requirement that the internal representation of the antecedent be deleted at S-M.

Rather than Agree, then, we might call this general operation connecting elements in a chain ‘FormCopy’ (FC), following Chomsky (2021). FC is a non-structure building operation that applies between two objects in the syntactic workspace; it is subject to locality constraints (c-

¹² As Chomsky (2000:122) states: ‘Matching is a relation that holds of a probe P and a goal G. Not every matching pair induces Agree. To do so, G must (at least) be in the domain D(P) of P and satisfy locality conditions. The simplest assumptions for the probe-goal system are shown in [i]

- (i) a. Matching is feature identity.
 b. D(P) is the sister of P.
 c. Locality reduces to closest c-command.

Thus, D(P) is the c-command domain of P, and a matching feature G is closest to P if there is no G’ in D(P) matching P such that G is in D(G’). Hence no requirements of (un)interpretability/(un)valuation are demanded on the Probe-Goal pair under this formulation of Agree (Manzini & Savoia 2018:9ff.).


command, minimality); and, I assume, it is mapped at both C-I and S-M — i.e., the application of FC can be interpreted at both interfaces. I moreover assume that, as any other operation, FC is optional, applying when it can. As such, it is not strictly limited to conditions of featural identity between the members of the copy-pair. Whether the application of FC can be licensed, i.e., whether elements can indeed be interpreted as part of the same chain is a matter that must ultimately be established at the interfaces (in line with the SMT). I therefore propose that FC between the antecedent and the relativizer (or relativizing phrase, depending on the analysis of HRs one adopts; see below) takes place in the syntactic workspace and is mapped at both C-I — licensing their co-indexation — and at S-M — licensing the +HR-feature on *wh*-elements.

I would moreover like to suggest that the licensing of +HR via FC is compatible both with the more traditional ‘head-external’ class of analyses of HRs (e.g., Chomsky 1977; Boef 2012), as well as with the ‘head-internal’ class of analyses — so called because the relative clause contains a representation of the antecedent NP as a complement of the relativizer that is either further moved to its surface position (as in the Raising analysis; e.g., Kayne 1994; Bianchi 1999) or deleted by the Matching operation with an identical independently merged representation of the antecedent located in its surface position (e.g., Sauerland 1998; Citko 2001).

As Chomsky (2021) discusses, the application of FC is fundamentally blind to previous derivational stages (what he calls the Markovian property of derivations). In other words, the syntactic derivation keeps no record of whether two items are drawn independently from the lexicon, by External Merge (EM) or whether they are related via Internal Merge (IM). The operation FC therefore has no way of distinguishing elements generated via IM or EM, and can potentially apply in both cases. Antecedent and relativizer can thus be connected via FC, irrespective of whether they are copies generated via IM (as in the Raising analysis) or whether they are generated independently via EM (as in the Matching and the head external analyses). The licensing of the +HR feature via FC can then be roughly sketched as in (35) under the head external analysis and as in (36) under the head internal analyses of the HR in (34).

(34) The man *who* John saw.

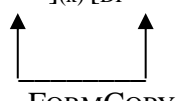
(35) a. $[CP [NP \text{man}] [DP \text{who}]_j C [John [v_P \text{saw} [DP \text{who}]_j]]$



FORMCOPY

b. $\langle \text{man}, \text{who}_{+HR} \rangle \rightarrow$ Copy-pair mapped at S-M, licensing +HR

(36) a. $[CP [NP \text{man}]_{(k)} [DP \text{who} [NP \text{man}]_{(k)}]_j C [John \text{saw } t_j]]$



FORMCOPY

b. $\langle \text{man}, \langle \text{who}_{+HR}, \text{man} \rangle \rangle \rightarrow$ Copy-pair mapped at S-M, licensing +HR

Under the present characterization of FC, we can moreover make sense of the licensing on the +HR feature in the case of appositives like (37) and (38), where there is no strict featural identity between the relativizing phrase and its antecedent.

- (37) a. Ha raggiunto la fama con *Il giardino dei Finzi-Contini*, *il quale romanzo* ha poi anche avuto una riduzione cinematografica.
He became famous with *Il giardino dei Finzi-Contini*, *which novel* was then also made into a film.
(Cinque 2008: 16)
- b. Mark belongs to the Knights of Columbus, *which organization* has been condemned by the Jewish Defense League.
(Cinque 2008: 28, citing McCawley 1981)
- (38) a. Carlo lavora troppo poco. *La qual cosa* verrà certamente
C. works too little. Which thing will certainly
notata.
be noticed
(Cinque 2008: ex. (20a))
- b. Oxygen and fire are related, *which fact* I long ago pointed out.
(Fabb 1990: 75)

Assuming that FC is not subject to conditions on featural identity, nothing in principle prevents its application between non-identical phrases in narrow syntax. Despite the featural/categorial non-identity between the relativizing phrase and its antecedent, then, these can be connected, provided that the connection can be licensed at the interfaces.

5. Conclusion

This paper assumed with proponents of the single-entry hypothesis that *wh*-elements spell out Heimann indefinites, i.e., open variables without intrinsic quantificational force. As noted above, this assumption allows us to capture in a rather straightforward way why the same *wh*-element can appear in different constructions and acquire rather distinct interpretations — an observation that would be rendered obscure if such interpretations arose as a consequence of multiple homophonous lexical entries with intrinsic quantificational force.

At the same time, the lexical entry of *wh*-elements as open variables has been argued to be inadequate in its most minimal form to capture their paradigmatic distribution. Thus, the relevant entries have been enriched with contextual/selection features that are exclusively licensed at the S-M interface (in line with the SMT); they are moreover idiosyncratically associated with each particular *wh*-element, within and across different languages.

I then attempted to formulate the relevant licensing conditions for the contexts of Qs, FRs and HRs, proposing that they can be individuated in the structural presence of a Q-operator, a σ -operator, and an antecedent respectively. These elements have been assumed to be merged in narrow syntax independently of the (sets of features underlying) *wh*-elements, as they can be taken to contribute directly to the semantic interpretation of *wh*-elements in their relevant functions.

However, this paper did not seek to offer a fine-grained analysis of the functioning of the licensing mechanism operating at S-M, nor did it discuss the licensing environments of *wh*-elements in other contexts, such as indefinite and exclamative constructions, universal FRs (of the *wh*+ever type) and correlatives, among others. These and related matters are left open to future inquiry.

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