WH-FEATURES AND THE LEXICON/DISCOURSE INTERFACE

Georgios Ioannou*
Universidad de Essex, Reino Unido

Abstract: This paper explores some consequences of the assumption that the wh-feature of wh-expressions like what and which, traditionally treated in the literature as a positively marked [+wh] specification, may be more felicitously accommodated as an underspecification of a denotational sort. Dispensing with superfluous representations, I argue that the syntactic mechanism of wh-movement actually interfaces between a radically underspecified lexical entry and the universe of discourse. It regulates the 'openness' of this underspecification and its subsequent ability to probe into discourse, bearing on the workings of a referential function. Within the context of an operationally unified interplay between lexicon, syntax and discourse, a homomorphism is detected on all the levels of representation of wh-expressions, with minimal lexical asymmetries projecting into distinct interpretive outputs, like interrogatives and free relatives.

Key words: wh-movement, d-linking, lexical under-specification.

Rasgos de wh- en inglés y la interfaz entre lexicón y discurso

Resumen: Este artículo explora algunas consecuencias del supuesto de que el rasgo wh- de las frases wh- como what y which, tradicionalmente tratado en la literatura como una especificación [+wh] positivamente marcada, sea más adecuadamente tratado como una sub-especificación de un tipo denotativo. Prescindiendo de representaciones superfluas asumidas por la literatura, se argumenta que el mecanismo sintáctico del movimiento wh- en realidad es un interfaz entre una entrada léxica, radicalmente sub-especificada, y el universo del discurso. Este mecanismo regula la 'apertura' de esta sub-especificación y su subsiguiente capacidad para sondear en el discurso, entregando un aporte al funcionamiento de una función referencial. En el contexto de una interacción operativamente unificada entre el lexicón, la sintaxis y el discurso, se detecta un homomorfismo en todos los niveles de representación de frases wh-, con mínimas asimetrías léxicas proyectándose en resultados interpretativos distintivos, como interrogativos y relativos libres.

Palabras clave: movimiento wh-, enlace d-, sub-especificación léxica.

---

* Para correspondencia, dirigirse al correo electrónico: gi_io@yahoo.gr.

1. Introduction

Pesetsky (1987:5.5, 2000:1.3.1) coins the term 'discourse-linking' (d-linking, henceforth) in order to describe interpretive effects induced by the syntax of wh-expressions like *which*, when the latter draw an answer from a set of entities already introduced through discourse. He gives the following semi-formal representation of this class of wh-expressions:

    1. which candies did which kid eat?
    2. *which of the x* (*x* a Discourse-salient set).

A felicitous explanation of the mechanism behind d-linking remains elusive but, in effect, the latter restricts the assignment function of a value to the indefinite part of a wh-expression (Partee et al. 1990: 346), drawing its specification from a determinate set of entities.

    Two important questions arise to this respect: first, how specific to the lexical entry *which* is the d-linked interpretation represented in the above format? In other words, is there some lexical specification pertaining to the interpretation of *which* alone that readily assigns it the relevant interpretation? Or is the mechanics of the specific interpretation more organically embedded in the way that wh-expressions are interpreted? Second, how organically bound in theoretical terms is the process of d-linking with the manner in which the very wh-feature is conceptualised in the literature?

    What I will argue in the subsequent sections is that sole reference to the lexical specification of the item does not suffice to give a comprehensive picture of its behaviour. A more elaborate treatment of the relevant phenomenon is at stake, where a) phonological atomicity is not a sufficient condition for wh-head movement to apply, although the atomicity of the units accommodated in a head position reflects their semantic composition; b) the [wh]-feature for which a wh-expression is lexically specified is more felicitously treated as a denotational deficiency, crucially an underspecification; c) this renders a wh-expression referentially dependent on discourse. Thus lexicon and discourse interface, with syntax being an indispensable mediator between the two; d) a type of analogy is detected at all levels of grammatical generation where wh-constructions are involved, i.e. lexical, phrasal and sentential, whereby the featural architecture of the single wh-word represented in (2) is recursively embedded in the aforementioned levels.

2.1. The relevance of the lexicon

In a set-theoretic approach to sentence generation, Chomsky (2008: 145-7) identifies the interpretation of a clause with the information 'projected' by its label, i.e. the highest head of the clause that carries the information relevant to the interpretation of the grammatical object. He builds then an algorithm that aims at defining the interpretive choice that the system takes every time that Merge between two grammatical objects

takes place. Thus, when a grammatical object is generated by merging a lexical item *LI*, i.e. a word, and another object α, it is LI that projects:

    3. {LI, α}, LI is the label.

A characteristic example of the above operation would be a Verb Phrase VP, with V merging with a phrase XP, generating an object that is interpreted as *verbal*:

    4. {V, XP} $\rightarrow$ VP, with V being the label of VP.

On the other hand, if movement of an element α already merged in a structure β takes place, a process that Chomsky calls Internal Merge, it is *not* α that projects, but the label of β, already projecting over β.

    5. {α, β}, α internally merged to β, it is the label of β that projects.

A characteristic example of (5) would be the wh-movement of a wh-phrase like *which candies* in (6), where *which candies* is dislocated from its initial point of merge at vP-object position, thus being re-merged in the initial position of the embedded clause, namely the grammatical object β:

<div align="center">β</div>

    6. I don't know [<u>which candies</u> the kid ate <u>*which candies*</u>]

In (6), a grammatical α object α already merged has α been merged anew at the edge of the embedded structure β, but crucially does not project. Interpretatively, the structure keeps its 'eventive' articulation, which –broadly speaking– is verbal, with the following Logical Form:

    7. $\exists x$ | the kid ate x
        There is an x, such that the kid ate x

Things get interpretatively ambiguous though, when the two algorithmic choices conflict. This happens when the element that re-merges internally, namely α, is a single LI. In this case both choices (4) and (6) are viable, as α is both a single LI potentially projecting *and* an internally merged object that itself does not project. A characteristic example of this possibility is, according to Chomsky (2008: 145), the case of 'what', when merged internally:

    8. v [what the kid ate]

Here, 'what' is both a single LI and an internally merged element:

    9. v [<u>what</u> the kid ate <u>*what*</u>]

Taking the label of the embedded clause to be the Complementiser C, a standard assumption (e.g. Rizzi 1988, Radford 2009), both C and *what* can project. This gives rise to the possibility of two interpretations, interrogative and free relative, respectively. In the former case, what projects as a label is the Complementiser; in the latter, *what* itself:

10. He does not know [what ***C*** the kid ate *t*]
     ↳ Projects. Interrogative interpretation

11. He does not want [***what*** C the kid ate *t*]
     ↳ Projects. Free relative interpretation

An observation is in order that proves to be instrumental to the analysis that follows. It concerns a refinement of the notion Lexical Item itself. An LI is *atomic* (Chomsky 2007: 6), in the sense of a structured array of features that enter the derivation as a single unit. Traditionally, this has implied that the item that enters a syntactic derivation is manipulated as atomic too (Matushansky 2006: 69-70). Does this atomicity also imply an atomic phonological correspondence? Nonetheless, a lexical item is standardly assumed to be a bundle of phonological features too (Chomsky 1995a: 238). But taking the syntactic containment of a lexical unit to overlap with its phonological atomicity is a careless identification. Furthermore, to take the phonologically overt manifestation of an LI as an indicator of its syntactic behaviour does not yield predictions that are born out. To take a simple example relevant to our discussion, there are wh-expressions that, phonologically, do stand on their own but do not fall into the workings of the binary algorithm given by Chomsky. Concretely, the wh-expression *which*, although phonologically an atomic unit, does not give rise to a double interpretation analogous to that yielded by *what*:

12. Sam wants a car but he does not let us know [which one [C he wants]
13. Sam wants a car but he does not let us know [which [C he wants]

14. *Sam wants [which Mary reads]
15. *Sam wants [which one Mary reads]

Although *which* is a single LI and can phonologically stand on its own, it is entirely banned in a clause intended for a free relative interpretation. Conversely, *what* is also equally a phonetically singular item, but in contrast with *which* it can participate in both interrogative and free relative clauses:

16. Sam wants [what the kid ate]
17. Sam does not know [what the kid ate].

The conclusion to be drawn is that, evidently, there is lack of overlapping between the arrangement of phonological and syntactic arrays in the Lexicon for a given

Lexical Item in accord with recent proposals admitting a non-isomorphic mapping between them (e.g. Jackendoff 2007: chpt.3, 2010). Additionally, as already said, the interpretation of *which* is partially constrained to be resolved through a given discourse context along the lines first explicated by Pesetsky (1987). What we have then is two distinct lexical specifications that, although in both cases surface phonologically as a single unit, regulate the interpretive resolution that a wh-expression can have. Let's then take a closer look at the lexical specifications of *what* and *which*, and the way in which discourse considerations stand in accord with them.

## 2.2. Lexical specification or under-specification?

According to standard assumptions holding in the literature (e.g. Chomsky 1998, 2000, 2001, Harley and Noyer 1999; Adger 2003, Bošković 2007), movement operations within syntax are not optional but triggered. The trigger for movement is not simply an output condition over a representational level that requires the generation of a given representation but properties included in the syntactic derivation itself. These properties are formally represented as features, part of the matrices constituting the featural bundles of the atomic elements entering a derivation. Features fall into two categories: interpretable (*i*-F) and uninterpretable (*u*-F). The former make a contribution to the interpretation of the items carrying them, though the latter do not. Although the existence of uninterpretable features is real (e.g. the Person/Number morphology of verbs, features not pertaining to verbal interpretation; for example, *he leaves*), the reason for their distribution is not clear. As shown schematically in (18) they are supposed to play a role in implementing the licensing of Movement through 'match' between an interpretable and an uninterpretable feature of the same type:

18.
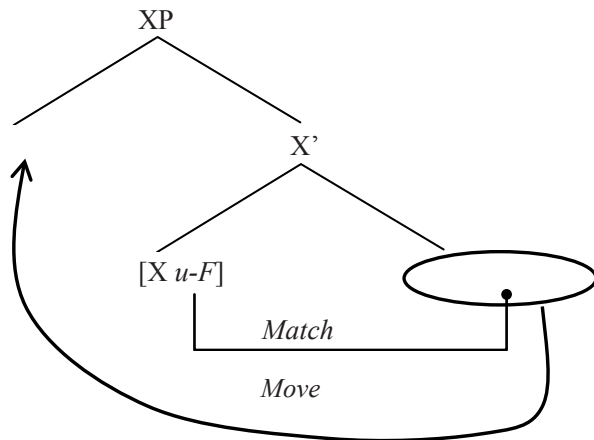
In compliance with Vergnaud's insight into the notion of abstract Case (1977, 2008), this matching or Agree is not necessarily manifested overtly (e.g. Nominative Case in English) but nevertheless is of a *quasi* morphological nature. The substitution of

conditions over output representations by endo-systemic properties or, put differently, conditions *internal* to the syntactic derivation (see Lasnik 2001) gave rise to the formulation of a symmetrical featural correspondence between matching and matched head, what is termed 'probe-goal' relation, in terms of feature type (Chomsky 1995: 308-9) as the operational context of matching and subsequent movement. Consequently, wh-movement must have a *quasi* morphological trigger (e.g. Rizzi 1997: 282) too, with the probe carrying a mirror image of an interpretable *wh*-feature, with the only difference being that it does not carry any value and subsequently does *not* contribute to the semantic interpretation at the Conceptual-Intentional (C-I) Interface. Accordingly, in almost all subsequent work making use of this assumption, wh-movement is analysed as triggered by an uninterpretable *u*-wh feature in C (e.g. Pesetsky and Torrego 2001, 2004, 2007):

19. He does not know [what [C **u-wh** [the kid ate [*what, **i-wh**]]]]

Match
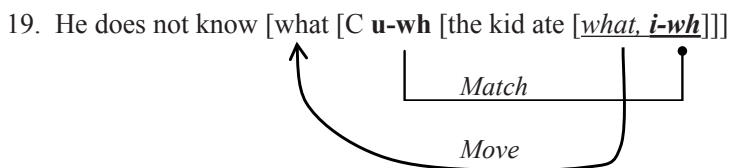
Move

Here, questions arise as to the very nature of the valuation of *u*-wh, which implies a wh-expression *positively specified* for [wh]. Even when no explicit reference is made to *u*-wh hosted by the head of a clause as the trigger of movement, the [wh]-specification is somehow taken for granted (Rizzi 1996, 1997, Rizzi and Shlonsky 2007, etc.). Importantly, an interrogative wh-expression is predestined to render an interrogative interpretation. In other words, it is fully specified for what we would call 'interrogativity.'

But how plausible is such an assumption? As a substantial number of languages demonstrate (e.g. Caponigro 2003), the range of lexical elements that participate in interrogative clauses at least partially overlap with those participating in relative clauses (free and restrictive) too. I argue then that a [wh]-feature on a wh-expression cannot account for interrogativity, with *what*, *who* etc. being found in both types of clause. It is then plausible to assume that the lexical entry itself of a wh-word is not specified for clause-type. It follows that both the interpretation of wh-expressions themselves in English as well as the very *type* of the wh-clause as a whole, i.e. free relative or interrogative, must be given derivationally. In other words, this type must express a) the constant individual properties of the single wh-expression and b) the internal derivative properties of the clause, i.e. its argumental/nominal (free relative) or eventive/verbal (interrogative) character. Such an approach abstracts away both from a strong lexicalist thesis claiming that a lexical entry predicts the totality of the phrasal interpretation (e.g. Sag 2010) as well as from a strongest version of a derivational approach to clause interpretation that dispenses with the constraining power of the lexical entries (e.g. Pesetsky and Torrego 2007). In contrast, what must be located is the point where the featural endowment of a word interacts with a syntactic arrangement, in a relation of non-total isomorphism between syntax and semantics

(cf. Culicover and Jackendoff 2005, Jackendoff 2007). What we want then is to trace the operational line that connects a given degree of lexical underspecification to a fully-specified interpretative outcome:

20. *underspecified lexicon*

   fully specified interpretation
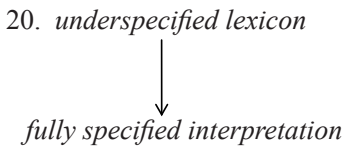
This leads my analysis towards a re-investigation of the isomorphic matching between *u*-wh born by C and *i*-wh born by the wh-expression, sketched in (21). Dispensing with this necessity, someone observes that what a wh-expression like 'what' is endowed with is an inherent need for a *referential value*. It is an expression not fully specified for what it is intended to denote. The definition of [wh]-feature then is given more felicitously *not* as a positively specified property on an expression but as an *underspecification*, in line with early analyses like Katz and Postal (1964: 89-99) where [wh] is interpreted as 'indefinite'. This underspecification can be taken essentially as *denotational* in nature, a key assumption for the remainder of this paper. This underspecification is more felicitously then treated as a kind of deficiency, represented as *quasi* uninterpretability, namely *u*-wh. Subsequently, the valuation of *u*-wh on an expression cannot come from an identical *u*-wh feature in C, which is standardly assumed, but from this structural arrangement that enables it to express what its lexically defined interpretive makeup is: the need to search into discourse for a denotational value.

   Recently, the postulation of an 'Edge Feature' in C (Chomsky 2008: 150) intended to indicate the need for a featural trigger of wh-movement, at the same time leaving the issue of the exact nature of it an open question. The reasons behind this move have to do with a strongest distinction attempted to be drawn between event and discourse semantics as a matter of theoretical necessity that cannot assume a morphological trigger for a discourse-related effect. Although the reasons for such a move have a different starting point from my analysis, it corroborates my contention about the conceptual drawbacks of assuming a *u*-wh in the complementiser system. In accord then with Chomsky (op.cit.), I argue that the right interpretation of an interrogative wh-expression does not come from a quasi morphological mapping of two features, but from the wh-expression occupying "the proper position" (Chomsky 2008: 151). What is this position? This is the matter which my analysis turns to in the next two sections, in an attempt to show that there exists a systematic interdependence between the way lexical arrangements are semantically constrained and the syntactic choices available. Surprisingly, what will be detected is a type of structural analogy between these two, a case of structure-preserving homomorphism.

2.3. Featural arrangements of wh-words as lexically stored syntactic constraints

It has been argued above that no actual valuation of the denotational [wh]-underspecification, coined *u*-wh, takes place throughout a derivation. Instead, its

saturation comes precisely from its ability to express this underspecification, realised as searching into discourse for a denotational value. Typically, if a wh-expression does not get disentangled from the domain of its generation and no other means, like phonological emphasis, is put at work, it remains uninterpretable:

21. *Do you want which car?

Interrogativity in the above sense is contingent on the very ability of a wh-expression to probe for a denotational value *outside* the derivation. Once a *u*-wh feature reaches its interpretable site in a sense parallel to that of Rizzi (1996, 2005), it becomes *valued* and *quasi* interpretable – i.e. *v*-wh – taking on a *proper type*. This analysis takes a representation of wh-expressions to be parallel to Katz and Postal's (1964: 89-99, Koutsoudas 1968) early formulation of them as special types of indefinite expressions roughly equivalent to 'wh+noun', underspecified regarding its reference. The notion should not be confused with indefiniteness or specificity of reference. In Katz and Postal's sense, the wh-NP is not specific or non specific, but under-specified regarding some referential features/properties. But how does a *u*-wh result to two possible derivative types, one free relative and one interrogative? On the one hand, we have a denotational underspecification, a *u*-wh feature, which can in principle result to either an interrogative or a free relative interpretation:

$$u\text{-wh} \rightarrow \textit{denotationally underspecified}$$

v-wh, *v*=inter.   *v*-wh, *v*=free rel.
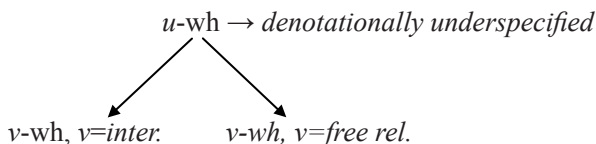
There must be a syntactic mechanism, which in conjunction with the semantic (not phonological) arrangement of the lexical environment wherein *u*-wh is embedded, renders the distinct wh-interpretations.

Let's more closely examine some structural differences between a bare wh-word and a wh-noun expression, projected by differences lying at their featural makeup, already present in their lexically determined arrangements. This will give us a hint about what is at stake regarding the ability to participate in the derivative interpretation of the clauses in which they are merged.

Any interpretive asymmetry between *what* and *which*, lexically predetermined, syntactically is expressed through the first level where the combinatorial properties of these elements are expressed, namely the phrasal level. Compare the contrast between (23) and (24) in terms of contextual appropriateness:

23. -What do you want?

      -A/The cookie
      -A/The blue cookie

? -A/The blue[1].

24. -Which cookie do you want?
    -The blue (one).

Interestingly, *what* displays the behaviour of a *pronominal* in much the same way as free relatives do, in the sense that they both can anaphorically stand for en entity in its denotational entirety, without needing any contextually determined antecedent (see below). In contrast, *which* cannot do so (Radford 1993). The examples suggest that the denotational assignment on *what* can include what syntactically is the compositional result of both a determiner and a nominal head, namely a full DP. A determiner in this sense is taken to be essentially the 'referential anchor' permitting both direct denotation-value assignment and syntactic co-reference (Alexiadou et al. 2007: 144, 200). Following a theory of referential association of nominal expressions like that developed in Longobardi (1994, 1996, 2005), DPs can anchor their denotational value through their d-head (Abney 1987: sec. VI, Radford 2004: 41, Longobardi 2005: 9):

25.   DP

                what
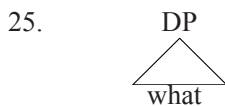
On the other hand, 'which' is lexically constrained to denote something *less* than the set of entities that a DP normally denotes. Thus, it plays a syntactic role resembling more that arising from the merge of a determiner alone:

26.   DP
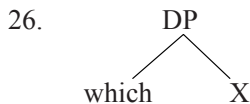
        which   X

See the following contrast supporting this assumption:

27. -The kid ate the cookie…
   -which cookie? /*the which[2]?

At various points in this paper, hints have already been given as to the existence of a parallelism between DPs and CPs, or differently between the nominal and the sentential behaviour of grammatical units including a wh-element. With *which* being restricted to the use of interrogative interpretation, *what* with its raising can transform a *syntactic CP* into a *semantic DP*, as is evident from (28):

---

[1]   If the set is not naturally restricted into cookies through the pragmatic context or through a deictic motion.
[2]   A possible answer also includes the expression 'what cookie?', which again implies no previous knowledge of the existence of a cookie *in its denotational entirety* (Radford p.c.).

28. - I will cook [CP what the kid wants to eat]

     - What?

     - I will cook   [DP pizza]

In accord with Donati (2006: 40) I will assume that in (28) we have indeed an instance of wh-head movement that leads to the projection of the wh-word itself. But, in contrast with Donati's analysis, I will argue that there is no reason for postulating a DP-level over the CP-structure as in (29):

29.
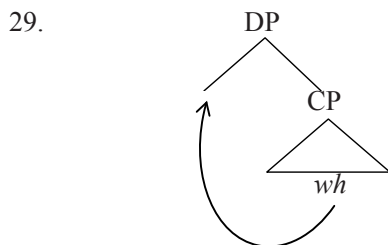
Such a representation crucially nullifies the import of the operation of wh-raising itself, with the interpretive result being predicted by a structural layer that does not serve anything except as a hosting site for the wh-noun. My contention is rooted in a deeply unsatisfactory aspect of transformational grammar based on early ideas on structure preservation (Emonds 1976). As Koster notes (2004: 1-3), representational heads triggering movement essentially undermine the original idea behind transformations, which is a structurally triggered effect. Consequently, I will assume wh-head movement *into C*:

30.
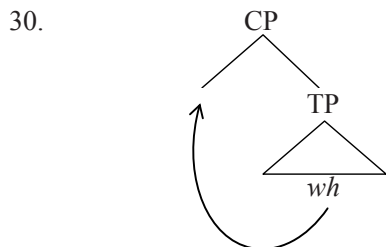
Interpretive differences like this between interrogatives and free relatives are more satisfactorily accounted for by structural effects taking place within an inclusive grammatical space of identical metrics for both cases. This move intends to sharpen the significance of transformations, with no need for postulating a representational categorial level that makes reference to the nominal character of a free relative clause. The DP layer assumed in Donati (op. cit.) and earlier work (e.g. Kayne 1994) in my analysis is crucially a derivative effect, in accord with the theoretical underpinnings of *bare phrase structure* already envisaged in Chomsky in 1995b.

Thus, a CP can *in principle* be transformed into a DP-like element, with 'what' raising into the head-C position. Adopting then (30) as a valid structural schema, we observe that the ability of *what* to project sufficiently as a X°-level Lexical Item, which entails an overlapping between its semantic structure and phonological realisation, enables it to occur both in Spec and Head position:

31. [CP *What* [C did] [TP you give the kids]]?
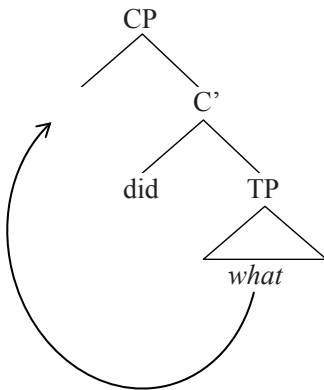
32. I gave them [CP [C *what*] [TP I had in the cellar]].
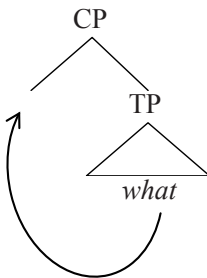
Crucially, the specifier position itself does not pose any requirement on the number of lexical items to be accommodated in it (as a single XP-projection) but solely on the way the item(s) project(s). Consequently, the freedom of *what* figured in (31-32) regards its ability to project either as a minimal or maximal projection and not how many individual lexical items comprise it, contra Chomsky (2008: 43-5, also above §1.1). This is evident from the corresponding inability of *which*, otherwise a single word, to do so:

33. *I will give the kids [CP [C which] [TP I have in my cupboard]] [3]
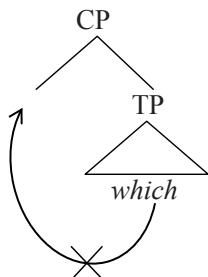
There is then a one-way dependency between the phonological and lexically defined semantic structuring that surfaces as the ability of an item to move into the C-head position in syntax. Concretely, semantic maximality/atomicity of an item qualifies it for both head and specifier position. On the other hand, phonological atomicity does not imply the ability of an item to project as a head in C.

   This denotational need of the wh-expression *which* for an appropriate restrictor in order to project as maximal can be repaired through d-linking, which is exactly the reason that enables it to overtly stand on its own only with a discourse-implicit complement:

34. -Which do you want? (Implicitly: which *ones* do you want? [ones out of the entities previously mentioned]).

The reason then that *which* is excluded from occurring in the C-Head position although it can stand overtly on its own is that its ability to repair its maximality is not only a sufficient condition for its grammatical interpretation but also a necessary one. That means that its ability to be linked with discourse implies a structure that is not compatible with head movement. Let's see the details of this constraint.

2.4. Opening syntactic paths into discourse

The semantic representation of an interrogative in (35) is that in (36) (Chomsky 1981: 324). As argued above, the lexical relevance of its interrogative interpretation is only a *u*-wh unspecification of a wh-word without any positively marked interrogative feature like *Q* interpretatively predetermined (see Rizzi 1990: 2.9). We also saw that a lexical dependency on a restrictor in the case of which is relevant to the ability of an item to occupy head position. But what is the exact syntactic mechanism that disallows a discourse dependent item from occurring in C, thus rendering a free relative clause like (37) with a parallel Logical Form in (38)?
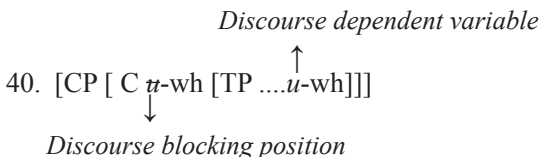
---

[3]   (33) is otherwise grammatical as a restrictive relative clause, whose analysis is not dealt with in this paper.

35. I don't know [which the kids eat] (interrogative)

36.   *there is some x, such that the kid eats x*

37. * I will give [which I have in my cellar] (free relative)

38.   *there is some x │ x an object, such that I have x in my cellar*

The mechanics of d-linking somehow involves the restriction of a possible value into a set already introduced by the discourse, a type of systemic *memory* that enables the expression to restrictively probe for a denotational value. I then want to argue that movement of the phonologically mono-lexical *which* into C blocks precisely what its interpretation is dependent on, namely, its lexically determined ability to be discourse-linked. In contrast, the lexically determined context-independence of *what* makes it eligible for occupying C-head position, a choice that does not clash with the denotational properties of *what*. This hypothesis can then be generalised for wh-elements as follows, stipulated in (39) and schematised in (40):

39. ***D-Linking Blockage Condition***
      Wh-to-C Movement blocks wh-D-linking

                    Discourse dependent variable
                              ↑
40. [CP [C *u*-wh [TP ....*u*-wh]]]
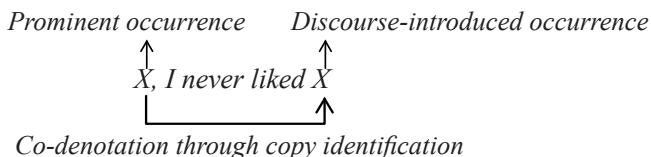   ↓

      Discourse blocking position

The reason for (39) must lie in a process prohibiting the wh-expression from probing into discourse, forcing it to probe *counter-directionally*; in other words, *inwards*, into the clausal set that contains the wh-expression. This process invites parallels but also minimal differences with the process of topicalisation, where the object *candies* is interpreted as an entity already introduced into discourse:

41. Candies, I never liked.

What makes the trick for the d-linking effect felt in (41)? This must be the identity of the two copies of *candies*, at the site of its generation as well as at its extraction site, the site of structural prominence (on the copy theory of movement see Chomsky 1995a, 2001). It is a co-denotation property shared between the two instances of the noun that binds them, based on their denotational identity.

42. Candies, I never liked.

      Prominent occurrence   Discourse-introduced occurrence
                    ↑   ↑
              X, I never liked X
                         ↑
      Co-denotation through copy identification

Somehow, the topicalisation effect felt as a memory of the extracted element requires a process of indentifying its denotational value through its membership in the set denoted by a verb phrase vP, e.g:

43. [vP [v] [VP like candies]]

As mentioned above for the case of wh-movement, no effect of topicalisation is felt if the targeted item stays in-situ and no phonological means as emphatic stress is employed. The object *candies* remains bound within what has given its denotational identification, which is the verb itself:

44.
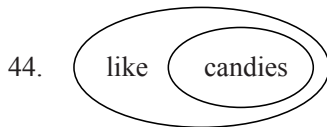
What makes the interpretative difference between a topicalised element and a wh-expression lies in the degree of their lexically determined denotational (under)specification. The latter regulates the (in)ability of the element brought to prominence through raising to 'probe' for a denotational value into the super-set of discourse that characteristically embeds the sentential level. The higher the degree of specification, the narrower the subset of discourse which an element in principle is able to probe into. Analogously, the more underspecified a *u*-wh is, the more unrestricted is its accessibility to discourse. Along this continuum, *what* represents the one extreme, being essentially unrestricted. Interestingly, a *which*-expression as in *which candies do the kids like?* may be taken to stand half-way between *what* and *candies*, narrowing both the subset of discourse that *u*-wh probes into, as well as the *openness* of its underspecification. Topics stand on the other end; the topicalised element carries the derivative memory of the set wherefrom it has been extracted, namely vP. But although this creates what we can call *the illusion* of its d-linking[4], actually its openness to discourse is totally constrained because it is denotationally fully specified. In the case where a wh-expression then is raised, a set like vP does not identify the denotational value of the expression but something less: it *restricts* the possible values for which the underspecified *u*-wh element is probing into discourse. We can thus say that a bound *u*-wh variable *x* is D-linked with the derivative memory of its possible values:

---

[4]   The use of the word 'illusion' here also intends to stress the counter-intuitive observation of creating an effect that in terms of processing must be felt as a top-down process, but requires a systemic memory generated in a bottom-up fashion.

45.
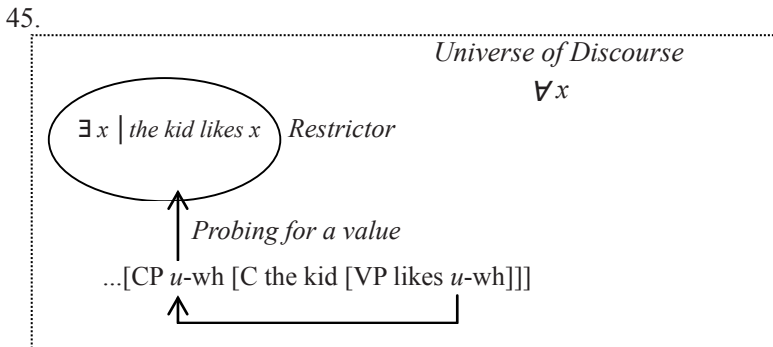
A question arises here as to the exact degree of *specification* of the *u*-wh feature. What are the features of the wh-expression that the latter *is* specified for? These features are the ones that the expression uses as its anchor for getting anaphorically bound. I suggest that these should be constrained to the nominal feature [3rd Person], sufficient for implementing the referential function depicted in (45). The representation of a single wh-word then like *what* should resemble something like (46)[5]:

    46. *u*+[3rd Person]

But note here that [3rd Person] not only serves as a binder of *u*-wh directing its anchoring into discourse but also restricts it at the very word level:

    47. $\exists \, x \, | \, x$ is [3rd Person]

Similarly, a wh-*expression* like *which candies* has a parallel structure, with *which* being the underspecified entity and *candies* the restrictor at a phrasal level:

    48. $\exists \, x \, | \, x$ is candies

Intriguingly, a wh-*sentence* also displays a parallel structure. Thus, a phrase like *I don't know which candies he likes* has *which candies* as its underspecified entity, and *he likes candies* as its restrictor:

    49. $\exists \, x$-candies $|$ he likes x-candies

This observation actually points towards a kind of *homomorphism* that holds at all the subsequent grammatical levels of LF representation for wh-constructions, namely, lexical, phrasal and sentential:

---

[5]   With possible appropriate modifications depending on the item, e.g. [+animate] in the case of *who* or [male], [female] in other languages.

50. **LEVEL COMBINATORIAL UNITS**

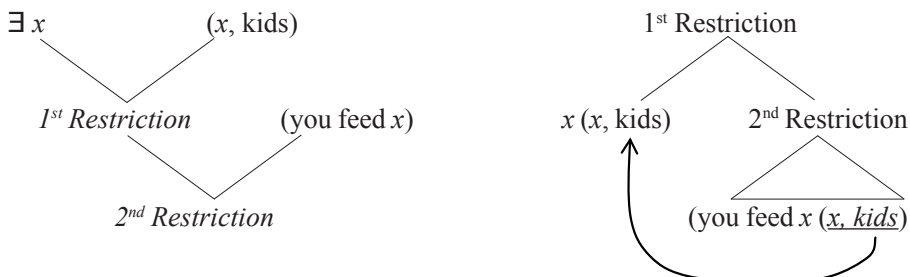|	[u-WH]	Restrictor
LEXICAL	**Wh-** MORPHEME	at
PHRASAL	**Which** WORD	candies
SENTENTIAL	**Which candies** PHRASE	he likes

Concretely, in all cases there is a *u*-wh denotational underspecification and a domain that restricts the possible values over which *u*-wh can range. On the lexical level, the construction is *u*-wh+[3rd Person], with a morphemic restrictor incorporated in a single lexical item. On the phrasal level, the restrictor becomes *lexical-substantial*, with its own denotational value, and with *u*-wh not incorporated into the lexical restrictor. On the syntactic level, the restrictor is *phrasal* with a compositionally built denotation, and with *u*-wh projecting a specifier. Interestingly, in the last case, two subsequent semantic restrictions apply to *which*, one lexical and one phrasal.

We see that what Pesetsky defines as "discourse-linking" is just a specific case of a composite functional output of a derivation, where what is extracted is an already lexically restricted phrase, i.e. 'which *x*'. Conclusively, it can be said that the mechanics of d-linking constitutes a much wider property than this represented by the case of *which* + noun. It reduces to the implementation of a denotational restriction over an element due to its syntactic context, from which it has been extracted. This extraction somehow creates a systemic memory of its identity with its lower copy in vP. Summarising, the composite function of d-linking consists of the following components:

    a. an element's prominence
    b. the memory of its restrictive interpretation.

In this sense, Pesetsky's d-linking is the operation where two layers of denotational restriction are set on a prominent expression, with the first layer raised in a Spec-position:

51. Which kids did you feed?

$\exists x$ (x, kids)   1st Restriction

     1st Restriction   (you feed x)   x (x, kids)   2nd Restriction

         2nd Restriction   (you feed x (*x, kids*))

On the other hand, at a lexical level, *what* is unable to predict a d-linking process analogous to that depicted in (51). The morphological incorporation of its restrictor with the underspecified *u*-wh feature by default limits its function to a direct referential anchoring, rendering it what Chomsky calls an *R*-expression (see Chomsky 1981: 78-83). We will see immediately below the parallels that this analysis evoke regarding the inability of CPs headed by *what* to be d-linked, as incorporation of *u*-wh into C generates a word-like element that resembles an argument. The wh-Restrictor in the case of free relatives comprises exclusively what the complement of the C-head compositionally denotes.

2.5. Sentential words and the mechanics of inward probing

In the context of the assumed homomorphism between all levels where wh-expressions appear, I pose the question: can we get a word-like non d-linked element on the sentential level, namely, at CP level? I argue that this case is represented by free relative clauses.

As we have seen, free relatives plausibly involve wh-head movement. Movement of the wh-element into C fuses the *u*-wh specification carried by *what* with the label of CP. The ability of labels to define the semantic characteristics of their complement has been attributed to their concomitant ability to probe within it (e.g. Chomsky 2008: 146). This process can be formalised as being due to the transitive nature of Merge itself, in compliance with transitivity of Agree employed in Narita (2009: 223). Identifying Merge with an elementary Agree relation mediated by an elementary selectional Edge-Feature (Chomsky 2008:38), he formalises Agree as a transitive relation: (also Adger and Ramchand 2001, Legate 2005):

52. Agree is transitive

> *For any feature F and any three LIs X, Y and Z, if $Agree_F(X, Y)$ and $Agree_F(Y, Z)$ hold, then $Agree_F(X, Z)$ holds.*

In a theory without labels as a representational element weakly violating *Inclusiveness* (see also above p.12), the transitivity of Merge renders the higher selecting head the carrier of what Collins calls "the memory" of a merging set. Collins (2002: 48) considers this move essential if the representational notion of label is to be substituted for that of *locus* as a derivative element identified with the highest Probe. Replacing the notion of $Agree_{EF}$ with that of *Probe*, we get the following derivational notion of a Label for a Syntactic Object Σ (Narita 2009: 221):

53. The Definition of Labels

> For any Σ, a Lexical Item H is the label of $\Sigma =_{def}$ H Probes within the set of the rest of the LIs in Σ.

Adjusting this assumption to the analysis at hand, I argue that fusion of the *u*-wh underspecification with the C-label of the CP incorporates into *u*-wh the ability to probe into the CP-complement, taking the latter to constitute the exclusive range of the values that *u*-wh will be assigned. In the same sense that a label cannot look-ahead but restricts its search within its 'c-command' domain (Chomsky 1981: 165), roughly the domain that lies under its scope, equivalently *u*-wh restricts its denotation within the only domain available to it, namely its sister-set.

This can neatly derive the notion of restrictor itself. Taking the *u*-wh-complement to compositionally define the only function/relation that maps *u*-wh with a value, we can trace some effects of this unary dependence, expressed by a semantic *self sufficiency*, a necessary property for the interpretation of an argument as such. That gives to the free-relative CP the status of what has been defined as a "maximal entity" (Jacobson 1995: 3.1) or "atomic" (Link 1983). In a *which*-phrase like *which kid* paraphrasable as *which x, x a kid* (Pesetsky 2000: 16), there is a *part-of relation* that constrains the *u*-wh specification as a portion of a maximal set, e.g. a set of kids. It has been observed that in free relatives this maximal set on which a wh-head draws its value-assignment is the free relative itself (Caponigro 2003: chp.2). Evidence comes from examples like (54a-c), where the interpretation of the free relative is more compatible with (b) than (a):
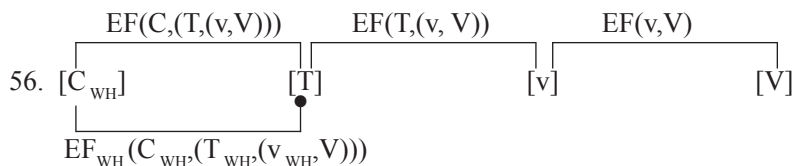
54. *Presupposition*: I haven't seen elephants, giraffes and lions.
    a. In the zoo, I saw some animals I had never seen before!
    b. In the zoo, I saw all the animals I had never seen before!
    c. In the zoo, I saw what I had never seen before!

In (c) *what* picks the maximal set of entities denoted by its complement, namely $[_{TP}$ I had never seen before]. I argue that this maximality results from the position *u*-wh occupies, namely C. The *u*-wh restrictor in the case of free relatives overlaps with the CP-domain. This is the very reason that wh-head movement blocks d-linking, thus disallowing *which* from occupying C-head position. We can now understand the details of the mechanism that renders the representation of Donati (op.cit.: 40, also p.11 above) redundant. With a wh-word like *what* incorporated into C, what we get is a *u*-wh feature identified with the CP-complement, and a [3rd Person] feature projecting over the whole CP, functioning as its discourse-anchor. These alone derive a DP-like R-expression, albeit representationally a CP:

55. [CP [C 3rd Person ...]]

This process of inward-mapping generates the CP self-sufficiency. I take the *u*-wh feature to represent a search procedure of value-assignment. This is the discourse-related dimension of the operation, what Rizzi has called for the case of interrogatives "facing the outside" (Rizzi 1997: 283) of a structure. Wh-movement itself constitutes the inside dimension of the phenomenon. But it seems as if part of the outside process sometimes turns its operational directionality inwards, with *u*-wh value assignment

using the transitivity of probing as the carrier of its own search. An elementary, primitive and possibly underspecified Agree relation between two lexical items *X* and *Y* mediated by the Edge Feature EF (the relation is represented as EF(X, Y)) becomes the carrier of an otherwise discourse-related property like the *u*-wh value probing. C/wh incorporation turns the wh-probing inwards into the structure and transitivity propagates the probe-goal relation first initiated between C_{WH} and T to the rest of the TP:

56.
$$EF(C,(T,(v,V)))\quad EF(T,(v, V))\quad EF(v,V)$$
$$[C_{WH}]\qquad\qquad [T]\qquad\qquad\qquad [v]\qquad\qquad\qquad [V]$$
$$EF_{WH}(C_{WH},(T_{WH},(v_{WH},V)))$$

This process in effect results to the CP being an argument interpreted as such. Even in constructions where raising of *be* is in principle compatible with interrogative interpretation (for reasons explicated in Pollock 1989) as in (57), free-relative interpretation of embedded clauses is impossible when the verb *be* has raised into the CP-system:

57. I don't know [what (is) this person is].

58. This kid will become [what (*is) a real scientist is].

The examples above indicate that indeed the higher occurrence of *what* in free relatives is the result of *what*-to-C Movement, as well as that there is an interpretive competition between *what* and *be* that makes the former able to render the embedded CP interpreted as a maximally interpreted grammatical unit. This argumental unity can also be manifested in its Agree pattern in its interaction with the verb, which always surfaces as [3rd Person] [Singular]. If what gives the CP its argumental character is the assumed propagation of the *u*-wh assignment function that compositionally encompasses the whole TP, then the maximality of the set must be reflected on the number features of *u*-wh that as we have seen is pronominally underspecified too. *u*-wh then picks as its own interpretable nominal features what it has already interpreted as a maximal grammatical unit. It seems that denotational values have a *monadic* character tolerating only specific quantised structural chunks, what we can call a *monadicity-to-maximality match*. This implies that the feature *u*-wh does not probe into discourse directly, but only through the denotational limitations that its structural complement defines. Even if the entities that are denotationally targeted in the world are ontologically many, like in the example (54) above, they will be interpreted as one because *u*-wh has probed first into the CP as a whole. We have a case where the distributed interpretation of the contextually given objects fails. The DP-effect of free relatives follows as a natural consequence. Look at the agreement pattern displayed in free relative raising and the relevant function depicted in (59):

59. The most amazing thing was [what the kids saw yesterday in the zoo]**!**

elephants, giraffes, lions

2. monadically denotes

[u-wh [the kids saw yesterday in the zoo]

1. maximally probes
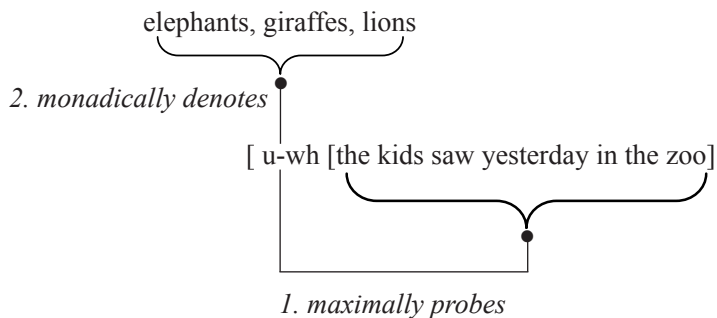
If now the interpretation of *which* is dependent on d-linking that can recover part of its denotation, then the argumental self-sufficiency of a DP-like CP blocks the ability of *which* to partly draw its interpretation from discourse, in other words to be fully interpretable. It follows that the difference between wh-free relatives and wh-interrogatives is essentially a matter of *quantificational gradation*. The CP-Complement in the case of wh-interrogatives does not fully denote but only restricts the interpretation of a wh-expression. The parallel drawn between *which* + noun as a case where a restrictive interpretation of *which* takes place and *which* + CP where once again a wh-expression's denotation is restricted through the CP-Complement is worth pursuing in the context of wh-homomorphism that was envisaged above. It essentially takes wh-free relatives and wh-interrogatives as the projected clausal analogues of *what* and *which* + NP. In this light, the difference between *which* and *what* as far as the property of d-linking is concerned lies only in the number of restriction-layers over the wh-expression. The difference found in wh-interrogative CPs lies in the assumption that the wh-expression takes its specification from information found only partially in the CP. Consequently, an interrogative is restrictive in the sense that it restricts the specification that a *wh*-phrase picks up from discourse, linked with it.

CONCLUSIÓN

This paper argued for an alternative and conceptually appealing view of the mechanics underlying the interpretive difference between wh-interrogative and free relative clauses, as stemming from a lexically determined denotational underspecification characterised as *u*-wh. This underspecification, essentially not lexically determined as [+interrogative] or [+free relative], derivationally builds up a fully specified outcome that has either eventive or argument-like properties.

This outcome results from the convergence of two factors: the way in which *u*-wh projects within a lexical item's featural arrangement and the way that the syntactic derivation accommodates the interpretive pressures exercised by lexicon and discourse. Interestingly, syntax is not unconstrained in its application. In contrast, upon looking

into the details of some syntactically impossible structures, like *I will cook which the kid wants to eat*, my analysis detected a special type of wh-homomorphism at all the subsequent levels of grammatical generation: lexical, phrasal and sentential. Concretely, the eventive articulation of a clause like an interrogative actually mirrors the way in which a wh-phrase like *which* projects as a non-maximally denoting unit, lexically narrowed in its interpretation. Conversely, the ungrammaticality of constructions like the one aforementioned is located in the mismatch between the restricted interpretation of 'which' and the syntactic choice to generate a maximally interpreted clause.

This mirroring between the lexical, phrasal and syntactic levels led my analysis to admit a much wider conceptualisation of the term 'd-linking'. The latter was embedded into a more general schema where an expression takes prominence over its extracted copy, raised in a structural site that embeds it into the domain of discourse. Minimal differences between operations such as topicalisation and wh-movement were examined and it was concluded that there were two factors constraining the accessibility to discourse: one is the lexically determined denotational openness of the extracted element and the other is the structural position that this is raised into. I then postulated a blockage condition, to the effect that wh-to-C Movement blocks wh-d-linking. The interpretation of free relatives derives precisely from that effect, with *u*-wh being incorporated in the label of a clause. The propagation of transitive probing into the complement of C generates an overlapping between the restrictor and the clause itself. The maximality follows as a consequence, with no need for postulating a representational DP-level above CP. The interpretive asymmetries then are plausibly deemed to be a matter of quantificational gradation, with the syntactic mechanism generating various part-of relations within a self-organising syntactic workspace.

REFERENCES

ABNEY, S. 1987. *The English noun phrase in its sentential aspect*. Doctoral Thesis. MIT [on line]. http://dspace.mit.edu/handle/1721.1/14638 [17/11/2012]

ADGER, D. 2003. *Core Syntax. A minimalist approach*. Oxford: Oxford University Press.

ADGER, D. AND G. RAMCHAND. 2001. Phases and Interpretability. *WCCFL* 20: 1-14.

ALEXIADOU, A., L. HAEGEMAN AND M. STAVROU. 2007. *Noun phrase in the generative perspective*. Berlin: Mouton de Gruyter.

BOŠKOVIĆ, Ž. 2007. On the locality and motivation of Move and Agree: An even more minimal theory. *Linguistic Inquiry* 38: 589-644.

CAPONIGRO, I. 2003. *Free not to ask: On the semantics of free relatives and wh-words cross-linguistically*. Doctoral Thesis. University of California. [on line] http://idiom.ucsd.edu/~ivano/Papers/2003_dissertation_revised_7-13-05.pdf [16/11/2012].

CHOMSKY, N. 1981. *Lectures on Government and Binding: The Pisa Lectures*. Dordrecht: Foris.

CHOMSKY, N. 1995a. *The Minimalist Program*. Cambridge, Mass.: MIT Press.

CHOMSKY, N. 1995b. Bare Phrase Structure. In H. Campos and P. Kempchinsky (Eds.), *Evolution and revolution in linguistic theory*. Pp. 51-109. Washington, D.C: Georgetown University Press.

CHOMSKY, N. 2000. Minimalist inquiries: The framework. In R. Martin, D. Michaels, and J. Uriagereka (Eds.), *Step by step: Essays in syntax in honor of Howard Lasnik*. Pp. 89-155. Cambridge, Mass.: MIT Press.

CHOMSKY, N. 2001. Derivation by Phase. In M. Kenstowicz (Ed.), *Ken Hale, a life in language*. Pp. 1-52. Cambridge, Mass.: MIT Press.

CHOMSKY, N. 2007. Approaching UG from Below. In U. Sauerland and H-M Gärtner (Eds.), *Interfaces + Recursion = Language?*. Pp. 1-29.Berlin: Mouton de Gruyter.

CHOMSKY, N. 2008. On Phases. In R. Freidin, C. Otero and M. L. Zubizarreta (Eds.), *Foundational issues in linguistic theory: Essays in honor of Jean-Roger Vergnaud*. Pp. 133-166. Cambridge, Mass.: M.I.T Press.

COLLINS, C. 2002. Eliminating Labels. In S. D. Epstein and T. D. Seely (Eds.), *Derivation and explanation in the Minimalist Program*. Pp. 42-64. Oxford: Blackwell Publishing.

CULICOVER, P.W. AND R. JACKENDOFF. 2005. *Simpler Syntax*. New York: Oxford University Press.

DONATI, C. 2006. On Wh-Head movement In L. L.-S. Cheng and N. Corver (Eds.), *Wh-Movement, moving on*. Pp. 21-46. Cambridge, Mass.: MIT Press.

EMONDS, J. E. 1976. *A transformational approach to English syntax. Root, structure-preserving, and local transformations*. New York: Academic Press.

HARLEY, H. AND R. NOYER. 1999. Distributed morphology. *Glot International* 4: 3-9.

JACKENDOFF, R. 2007. *Language, Consciousness, Culture*. Cambridge, Mass.: MIT Press.

JACKENDOFF, R. 2010. *Meaning and the Lexicon: The Parallel Architecture 1975–2010*. Oxford: Oxford University Press.

JACOBSON, P. 1995. On the quantificational force of English free relatives. In E. Bach, E. Jelinek, A. Kratzer, and B.H. Partee (Eds.), *Quantification in natural languages*. Pp. 451-486. Dordrecht: Kluwer.

KATZ, J. J. AND P. M. POSTAL. 1964. *An Integrated Theory of Linguistic Descriptions*. Cambridge, Mass.: MIT Press.

KAYNE, R. S. 1994. *The antisymmetry of syntax*. Cambridge, Mass.: MIT Press.

KOSTER, J. 2004. *Structure preservingness, internal merge, and the strict locality of triads*. University of Groningen [on line]. http://odur.let.rug.nl/~koster/papers /internal%20mergeA4. pdf [16/11/2012].

KOUTSOUDAS, A. 1968. On Wh-words in English. *Journal of Linguistics* 4: 153-312.

LASNIK, H. 2001. Derivation and representation in modern transformational grammar. In M. Baltin and C. Collins (Eds.), *The Handbook of contemporary syntactic theory*. Pp. 62-88. Oxford: Blackwell Publishing.

LEGATE, J. A. 2005. Phases and cyclic agreement. In M. McGinnis and N. Richards (Eds.), *Perspectives on Phases*. Pp. 147-156. Cambridge, Mass.: MIT Working Papers in Linguistics.

LINK, G. 1983. The logical analysis of plural and mass terms: A lattice-theoretical approach. In R. Bauerle, C. Schwarze, A. von Stechow (Eds.), *Meaning, use and interpretation of language*. Pp. 302-323. Berlin: de Gruyter.

LONGOBARDI, G. 1994. Reference and proper names: A theory of N-Movement in syntax and logical form. *Linguistic Inquiry* 25: 609–665.

LONGOBARDI, G. 1996. The syntax of N-raising: A minimalist theory. Pp. 1-55. Utrecht: *OTS Working Papers* 5.

LONGOBARDI, G. 2005. Toward a unified grammar of reference. *Zeitschrift für Sprachwissenschaft* 24: 5-44.

MATUSHANSKY, O. 2006. Head movement in linguistic theory. *Linguistic Inquiry* 37: 69-109.

NARITA, H. 2009. Full interpretation of optimal labelling *Biolinguistics* 3: 213-254.

PARTEE, B. H., A. TER MEULEN AND R. E. WALL. 1990. *Mathematical methods in linguistics*. Dordrecht/ Boston/London: Kluwer Academic Publishers.

Pesetsky, D. 1987. Wh-in-situ: Movement and unselective binding. In E. Reuland and A. G. B. ter Meulen (Eds.), *The Representation of (in)definiteness*. Pp. 98-129. Cambridge, Mass.: MIT Press.

Pesetsky, D. 2000. *Phrasal movement and its kin*. Cambridge, Mass.: MIT Press.

Pesetsky, D. and E. Torrego. 2001. T-to-C movement: Causes and consequences. In M. Kenstowicz (Ed.), *Ken Hale: a life in language*. Pp. 355-426. Cambridge, Mass.: MIT Press.

Pesetsky, D. and E. Torrego. 2004. Tense, Case and the nature of syntactic categories. In J. Guéron and J. Lecarme (Eds.), *The Syntax of Time*. Pp. 495-538. Cambridge, Mass.: MIT Press.

Pesetsky, D. and E. Torrego. 2006. Probes, goals and syntactic categories. In Y. Otsu (Ed.), *Proceedings of the 7th Tokyo Conference in Psycholinguistics*. Pp. 25-60. Tokyo.

Pesetsky, D. and E. Torrego. 2007. The syntax of valuation and the interpretability of features. In S. Karimi, V. Samiian, and W. Wilkins (Eds.), *Phrasal and clausal architecture: Syntactic derivation and interpretation*. pp. 262-294. Amsterdam: Benjamins.

Pollock, J.-Y. 1989. Verb movement, Universal Grammar, and the structure of IP. *Linguistic Inquiry* 20: 365-424.

Radford, A. 1993. Head hunting: On the trail of the nominal Janus. In G. Corbett, N. M. Fraser and S. McGlashan (Eds.), *Heads in Grammatical Theory*. Pp. 73- 114. Cambridge: Cambridge University Press.

Radford, A. 2004. *Minimalist Syntax. Exploring the structure of English*. Cambridge: Cambridge University Press.

Radford, A. 2009. *An introduction to English sentence structure*. Cambridge: Cambridge University Press.

Rizzi, L. 1988. On the structural uniformity of syntactic categories. In V. Gasteiz (Ed.), *Congrès de la langue Basque*. Pp. 89-101. Vitoria-Gasteiz: Servio Central de Publicationes del Gobernio Vasco.

Rizzi, L. 1990. *Relativized Minimality*. Cambridge, Mass.: MIT Press.

Rizzi, L. 1996. Residual Verb Second and the *Wh*-Criterion. In A. Belletti and L. Rizzi (Eds.), *Parameters and Functional Heads*. Pp. 63-90. Oxford: Oxford University Press.

Rizzi, L. 1997. The Fine Structure of the Left Periphery. In L. Haegeman (Ed.), *Elements of Grammar*. Pp. 281-338. Netherlands: Kluwer Academic Publishers.

Rizzi, L. 2005. On some properties of subjects and topics. In L. Brugé, G. Giusti, N. Munaro, W. Schweikert, and G. Turano (Eds.), *Proceedings of the XXX Incontro di Grammatica Generativa*. Pp. 203-224. Venezia, Cafoscarina.

Rizzi, L. and U. Shlonsky. 2006. Strategies of subject extraction. In H. M. Gärtner and U. Sauerland (Eds.), *Interfaces + Recursion =Language?*. Pp. 115-260. Berlin: Mouton de Gruyter.

Sag, I. A. 2010. English filler-gap constructions. *Language* 86, v.3: 486-545.