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RESOLUTIVE PREDICATES AND THE SYNTACTIC AND SEMANTIC SELECTION OF QUESTIONS*

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1. Preliminaries: Unselected embedded questions

This paper aims to clarify under which conditions questions can be embedded. It concerns the syntactic and semantic selection (so-called c- and s-selection) of verbs of propositional attitude, i.e. verbs denoting mental process towards a class of abstract objects that are propositions. A question is related to an interrogative speech act. It is therefore embeddable under an interrogative performative verb as shown with *ask* in (2), the embedding of (1). Questions are also embedded under interrogative non performative verbs as in (3) with *wonder*. More surprisingly, they also appear with non-interrogative verbs such as *know* in (4)a (though not in all contexts, see (4)b).

(1) Did Peter come?
(2) I ask you if Peter came.
(3) I wonder if Peter came.
(4) a. I don’t know if Peter came.
   b. ?I know if Peter came.

*Know*, cognitive verbs and declarative verbs are not interrogative verbs, they do not denote the search for an answer. With them, the embedded clause denotes rather the answer to the question than the question itself. Note that the DP *the answer* can substitute for the *if*-clause in (4). This dichotomy between question embedders has been noticed for a long time. Non-interrogative question embedders are dubbed responsive predicates by Lahiri 2002 and resolutive predicates by Ginzburg 1995, a class that corresponds to Groenendijk and Stokhof’s 1984 extensional predicates. Resolutive predicates are predicates that otherwise select for *that*-clauses as shown in (5).

(5) I know that Peter came.

According to most theories, a *that*-clause denotes a proposition. *Know* then semantically selects for propositions. On the other hand, a question is taken to denote in the most influential theories either set of propositions *<s, t>, t>* (Hamblin 1973, Karttunen 1977) or a proposition meaning *<s, <s, t>>* (Groenendijk and Stokhof 1984), but not a proposition (type *<s, t>*). This means that we are dealing either with two homonym verbs *know* or with an s-

* I am grateful to the audience of GLOW in Asia IX for the insightful questions that made me rework many points of this paper.
selection mismatch in (4)a. The former option is not desirable, for know in (4)a and (5) intuitively denotes the same mental process. The path of the s-selection mismatch is more appealing. It is the main topic of two articles, Adger and Quer 2001 and Oehl 2007 and is now known as the unselected embedded question (UEQ) issue.

In the present paper, I shall argue that both accounts wrongly propose that the mismatch is solved by an external operation (interrogative raising for Adger and Quer, reconstruction of the main predicate for Oehl), rendering the main clause suitable for yes/no question embedding. They are also weakened by the fact that they are not extendable to Wh-questions, which should be precluded after the same set of verbs but, unexpectedly, are not. In their view (6)a should not be fine since knew is not in a nonveridical context (see below).

(6) a. Peter knew who came at the party yesterday.
b. Peter doesn’t know who came at the party yesterday.

To account for that, they need further machinery. I shall here concentrate on the first issue (yes/no questions) and show that the operation rather takes place in the embedded clause through an operator, syntactically detectable. I shall briefly suggest at the end that it extends to the Wh-question issue, leaving the complete proof for future research.

The article is organized as follows: in section 2, I review the conditions under which UEQs are licensed; section 3 highlights the limitations of the previous studies on the issue; in section 4, I take it up anew from the syntactic side, showing that an operator surmounts UEQ-clauses; section 5 explains what the semantic role of this operator is. Section 6 draws some conclusions from this study and suggests some application to Wh-UEQs.

2. Yes/no question licensing in nonveridical contexts

Both Adger and Quer’s 2001 and Oehl’s 2007 theories rest on the same observation. In English, we notice the contrast in (7)a/b (inspired by Adger and Quer 2001).

(7) a. Peter admitted *if/ok that Julie was sober.
b. Did Peter admit ok if Julie was sober?

A yes/no embedded question is barely acceptable after admit in a positive declarative sentence (7)a, but it is natural when the sentence is a question (7)b. Note that in (4)a, know is negated. All this suggests that special conditions are in order for resolutive verbs to embed questions, contrary to interrogative verbs: both (8)a/b with ask are perfectly acceptable.

(8) a. Peter asked you if Julie was sober.
b. Did Peter ask you if Julie was sober?

The aim of those papers was to clarify the conditions under which resolutive verbs embed questions. They notice that, along with negation (4)a and interrogation (7)b, other contexts improve more or less the acceptability of the sentences (depending on the predicate), like antecedents of conditionals (“If I knew if Peter was coming, I would have been happy”). Adger and Quer point out that these conditions are also conditions for NPI licensing. In (9) through (12) (adapted from Adger and Quer 2001:111), the NPI ever is licensed under the scope of negation and interrogation ((9) and (10)), but not in positive contexts or outside the scope of the negation ((11) and (12)).

(9) You didn’t ever go to London.

(10) Did you ever go to London?
(11) *You ever went to London.

(12) *You ever didn’t go to London.

The list of operators licensing NPIs extends to negative quantifiers, only focus, antecedents of conditionals, adversative predicates, without-clauses for English, and possibly to other environments in other languages, depending on the language sensitivity. There is a long-standing debate on what feature(s) these environments have in common: are they downward-entailing or nonveridical? The first hypothesis faces issues although it has been rescued by von Fintel 1999. But it is not comprehensive enough for all languages as shown by Giannakidou 1998. After a survey of Modern Greek data, she notices that some non-downward-entailing environments such as future tense or imperative license NPIs in this language. That is why she proposes to borrow Zwarts’ 1995 notion of nonveridicality to account for NPI licensing. (13) is her formulation of Zwarts’ definition of nonveridicality.

(13) (Non)veridicality for propositional operators
   i. A propositional operator \( F \) is veridical iff \( Fp \) entails \( p \): \( Fp \rightarrow p \);
       otherwise \( F \) is nonveridical.
   ii. A nonveridical operator \( F \) is antiveridical iff \( Fp \) entails not \( p \): \( Fp \rightarrow \neg p \).

This leaves us with the following list for Modern Greek: Negation; negative quantifiers; questions; downward-entailing operators; future tense; imperatives; habitual/generic sentences; (certain) modal verbs; adversative predicates; directive intensional verbs; protases of conditionals; without-clauses; before-clauses; comparative clauses; only focus; disjunction.

This list mostly overlaps with the list of NPI licensers in English. From now on I will take veridicality to be the condition for yes/no question embedding under resolutive predicates in English. Adger and Quer 2001 and Oehl 2007 show that this is also true of Basque, Catalan, Spanish, German and Persian. This also holds of French ((14) translates (4) and (5)). (15), though somewhat literary, shows that at least negation and interrogation are NPI licensers in French.

(14) a. Je ne sais pas s’il est venu.
   b. ?Je sais s’il est venu.
   c. Je sais qu’il est venu.

(15) a. Pierre n’a jamais été à Londres.
   b. Pierre est-il jamais allé à Londres?
   Pierre Neg has ever been to London
   ‘Pierre has never been to London.’
   Pierre is he ever gone to London
   ‘Has Pierre ever been to London?’

We now know more precisely that resolutive predicates need association with a nonveridical operator to be able to embed questions. This said, we still are not able to explain how the selection mismatch is possible between the embedder and the embeddee. In the next section, we review three proposals concerning this issue.

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1 Be that as it may, the theory of NPI licensing adopted here does not matter. It is sufficient for the proof that NPIs and UEQs have the same distribution.
3. Previous analyses

3.1. Adger and Quer’s 2001 proposal

As said in introduction, Adger and Quer 2001 notice that questions are not expected with resolutive predicates and attempt to provide an explanation for this fact. First of all, they point out that in this very case, in some languages, a morpheme shows up in addition to the interrogative complementizer. For example in Basque, the interrogative complementizer in yes/no embedded question is -(e)n ((16) = their (45)²). But with resolutive predicates in nonveridical contexts, it is -(e)n + ik ((17) = their (47)) is an example of negation, but they also provide examples with question and antecedent of conditional).

(16) [telebistako langileek grebe egingo dute-n]
  television-Gen workers-Erg strike-abs make-Fut Aux-3Pl.Erg.3Sg.Abs=Comp
galdetu diet.
ask-Ptcp Aux-1Sg.Erg.3Sg.Abs.3Pl.Dat
‘I have asked them whether the TV workers will go on strike.’

(17) Jonek ez du esan
Jon-Erg Neg Aux-3Sg.Erg.3Sg.Abs say-Pret
[Bilbora joango d-en-ik]
Bilbao.all go-Fut Aux-3Sg.Abs=Comp=ik
‘Jon didn’t say if he was going to Bilbao.’

They then focus on the morpheme -ik. They analyze it as a specific polar determiner that heads the embedded clause and that is sensitive to the environment provided by the matrix. It enters into a licensing relation with nonveridical operators. That is why, when there is no nonveridical operator in the environment, the clause is not acceptable.

The second step of their proposal is that this explanation carries over to English. In English as well, one can find such polar determiner, but it is covert. Nevertheless, its presence with a matrix resolutive verb in a nonveridical context is shown by an extraction test. It is not possible to extract a *Wh*-phrase out of a DP, especially out of a DP headed by a NPI D, such as (18) (the examples are theirs). This is not true of *if*-clauses after an interrogative verb such as ask in (19)a, but it is true of (19)b after a resolutive verb such as admit.

(18) *Who didn’t you believe [any rumor that John killed t.]?
(19) a. ? What did no one ask [if John had stolen t.]?
   b. *What did no one admit [if John had stolen t.]?

This suggests that *if*-clauses with admit behave as DPs headed by an NPI, i.e. like their equivalent in Basque. Actually, the judgments are rather fuzzy, though most French informants I asked feel the same (slight) contrast between (20)a and (20)b (the French version of (19)a/b).

(20) a. ?? Qu’est-ce que personne n’a demandé [si Jean avait volé t.]?
   b. *Qu’est-ce que personne n’a reconnu [si Jean avait volé t.]?

² I keep the glosses of borrowed examples as in the original version, although I clarify some abbreviations by replacing them with the Leipzig glossing rules.
But there is a worse objection. *If* in English and -(e)n in Basque already have an NPI distribution\(^3\). They appear in nonveridical contexts and with interrogative verbs (i.e. a specific case of nonveridical contexts, for they license NPIs as well as direct questions do, see (21)).

(21) I asked him if he had ever been to Monaco.

What we expect would be something to repair the mismatch between an attitude verb and a question and not between the nonveridical operator and the question. Put otherwise, the features of the nonveridical operator and those of the complementizer already match, another NPI is needless. The use of -\(-ik\) can be explained if we take into account the features that Basque Cs spell out, as I do in section 4.3.

Another problem is that Adger and Quer account for the issue in terms of licensing, while we are dealing with a c- and s-selection issue. This is the gist of Oehl’s criticism, albeit Adger and Quer propose to resolve the s-selection mismatch by the raising of the interrogative to the restrictor of a quantifier (see section 5.1). All these criticisms show that something must be improved in Adger and Quer’s theory. I shall leave it aside for the moment and come back to their data later.

3.2. Oehl 2007

Oehl 2007 points out that it is unexpected that the s-selection of a clause depends on the context and not on the sole meaning of the embedding predicate. If resolutive predicates embed propositions, there is still a mismatch to explain between the embedder and the embedded clauses. Moreover, Adger and Quer’s proposal necessitates that some embedded clauses are CPs and other are DPs, a non-desirable result according to him. He proposes that the phenomenon of UEQ is due to a change in the meaning of the embedding predicates, that become *if*-embedders, and not to the structure of the embedded clause. This change in meaning is made possible by several factors.

First, these predicates are cognitive factive predicates\(^4\) (*admit* being a borderline exception). With such predicates, the presupposition of the complement is weaker than with emotive factive predicates (Karttunen 1971, Faure 2006). Put otherwise, under certain (nonveridical) circumstances, the matrix (cognitive factive) predicate does not trigger the presupposition of its complement and the embedding of *if*-clauses becomes possible\(^5\).

Second, he proposes that *if*-clauses are not interrogative complementizers, but nonveridical operators (Mod\(^6\)) that indicate that the proposition denoted by the clause does not have a truth value\(^6\). If there is a nonveridical operator in the matrix clause, these operators can be employed. The same operators are used in clauses denoting indirect questions. This means that they are underspecified. In other terms, there is no need for a polar D since the C is

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\(^3\) Except in one context for Basque -(e)n, see below section 4.3.

\(^4\) This approximation is sufficient for the purpose of the present paper, but it is actually not true. The relevant notion for question-embedding by resolutive predicates is the veridicality of the predicate and not its factivity, as shown by Égré 2008 on English and French data. Working on French and Classical Greek data, Faure 2010 adds that for a question to be embedded under a veridical predicate, this predicate must also have an assertive feature. Otherwise, I fail to see why emotive factive predicates, which are also veridical (*pace* Égré), cannot embed questions across languages.

\(^5\) Actually, we still need the factivity to be active since resolutive predicates embed clauses that denote the TRUE answer to the question and not merely a possible answer.

\(^6\) In this view, it is not surprising that in many languages (in English, French, Greek etc., but neither in German nor in Basque) these operators are also used as complementizers in antecedent of conditionals.
itself polar (recall the criticism of Adger and Quer’s position in the previous section).

The gist of Oehl’s proposal is his attempt to rescue the notion of s-selection. According to him, the nonveridical operator in the matrix clause attaches to the matrix predicate to form a complex predicate that selects the nonveridical embedded clauses, and not, crucially, that licenses them. On the basis of German data, he draws a parallel with restructuring verbs or internally negative verbs. He appeals to a restructuring that changes the s-selection. For example in (22), two options are a priori available. Either the ob-clause has been licensed by the negation nicht or it has been selected by the complex predicate nicht-gezeigt. This makes different predictions regarding topicalization. In the first case, the verb can move up without carrying along the negation (b), in the second case, it must carry it up to the left-periphery (c). The latter option is more acceptable than the first one, suggesting that the negation is attached to the verb and that they form a whole, with a specific s-selection.

(22) a. Er hat eigentlich nicht gezeigt, ob das stimmt.
   he has actually not shown if this is-true
   shown if this is-true has he actually not
   not shown if this is-true has he instead actually

This proposal bridges the selection gap. Unfortunately, judgments are even more fuzzy about the contrast (22)b/c than about (19)a/b. My informants report that it is more noticeable in Southern Germany than in the North. On the other hand, it does not account for Adger and Quer’s 2001 extraction contrast provided in (19)a/b.

In addition to this, note that for some languages, such as Classical Greek (CG), this proposal is not applicable. The configuration of the clause does not allow for such a restructuring. In sentences like (23)7, when the negation and the predicate would undergo restructuring, the predicate is no longer adjacent to the UEQ. The new predicate and the UEQ do not form a constituent, precluding a German-like topicalization. Worse, at the step where the UEQ is merged, it is not yet properly selected, because it merges with the predicate before the predicate merges with the negation, i.e. before the restructuring of the predicate that should select it. Oehl’s proposal thus leads to important difficulties in the derivation of the clause.

(23) Hósai mè faneròs èn hópōs egígnōsken tì,...(X. Mem. 1.1.17)
   ‘lit. (They did not know) what he (Socrates) is not obvious how he had decided,...’
   ‘(They did not know) opinions of his that were unknown to them.’

This means that, though interesting, this proposal has a narrow explanatory power. That is why we must discard the restructuring idea, while keeping the remark on the complementizer’s polarity.

7 Note that this example could also be an objection to Adger and Quer’s proposal. Their theory forbids extraction out of a clause embedded under a resolutive verb. Still, the Wh-term hósai has been extracted out of the hópōs-clause. Nevertheless, the properties of extraction are poorly understood in CG and this language is very permissive in this respect, allowing structures precluded by the theory like ‘he is clear that t is nice’ (but not allowing extraction out of a complex DP).
3.3. Roussou’s proposal

Roussou 2010 agrees with Oehl that there is no need to postulate an NPI D above the if-clause since the distribution indicates us that if itself plays this role. Her proposal is that if and that are in fact Ds that select for CPs. Thus all completive embedded clauses are in fact DPs and there is no syntactic mismatch. The issue therefore boils down to the semantic mismatch. This latter mismatch is solved by postulating that if returns a proposition (without a truth value) and not a question. In this case, there is no semantic mismatch between, say, know which requires a proposition and the if-clause\(^8\). The if-clause is a kind of NPI that needs licensing by an interrogative verb (in the case of ask) or by a nonveridical operator (in the case of resolutive predicates).

However, this hypothesis faces for some empirical objections. In Roussou’s view, the DP headed by if is then directly selected by the matrix verb. This predicts that there is no intervener between the embedded clause and the matrix verb. But many languages present a second complementizer above the equivalent of if, like Persian or Spanish, discussed in section 4.2 (see already Basque and English according to Adger and Quer 2001).

3.4. Summary

In this section, we challenged three proposals to account for the mismatch issue that UEQs represent:

— [Adger and Quer 2001] UEQs are surmounted by a polar D licensed by a nonveridical operator and the s-mismatch is solved through raising of the interrogative to the restrictor of a quantifier. This proposal does not take into account the nonveridical feature of the UEQ C; it is maybe not suitable for CG (see footnote 8).

— [Oehl 2007] The nonveridical operator and the main verb undergo restructuring and select for an interrogative. This proposal is not suitable for Northern German in the first place and involves flaws in the derivation of the clause.

— [Roussou 2010] The complementizer if is actually a polar D that is licensed by the nonveridical operator and if-clauses denote propositions. This proposal is not suitable for Persian, Basque or Spanish that present functional heads above the interrogative C.

They all face a common issue. As mentioned in introduction, embedded Wh-questions and yes/no questions should have a uniform treatment, which is not taken care of in these approaches\(^9\). Moreover, each proposal applies only to certain languages. Given that the UEQ issue is first of all a semantic problem, it should be able to receive an answer generally applicable across languages. As we shall see in the next two sections, the pattern is common to both the syntax and the semantics of the languages under discussion.

4. A multi-layered complementizer system

Adger and Quer 2001 posited a D above the interrogative C. The split of the left periphery of the clause is reminiscent of the so-called cartographic hypothesis. In this hypothesis, the CP domain hosts several functional projections relative to the pragmatic functions, such as illocutionary force, topic, focus etc. In this section we try to flesh out the division of labor between the different projections of the left-periphery of the clause and what

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\(^8\) Note nevertheless that this idea means that ask also selects for a proposition, and not for a question, which is not an uncontroversial claim.

\(^9\) Oehl suggests that Wh-questions are licensed under conditions different from those of yes/no questions, namely when in the scope of focus. This suggestion is at odds with the data, for a Wh-question can be topicalized, thus scoping over a focus operator.
Adger and Quer’s D could be identified with in order to better understand what its role is.

4.1. The interrogative C in the cartographic hypothesis

In a 2001 paper, L. Rizzi addresses the issue of the interrogative C and Wh-item positions. He attempts to incorporate them into the structure he proposed in his 1997 seminal article. (24) through (26) are the crucial data. Whereas che ‘that’ cannot be surmounted by a topic DP, se ‘if’ can, which means that se is located in a projection below che.

(24) *Maria crede, il tuo libro_{TOP}, che lo potrà leggere.
    ‘Maria believes your book, that (she) will be able to read it.’

(25) Maria crede che, il tuo libro_{TOP}, lo potrà leggere.
    ‘Maria believes that, your book, she will be able to read it.’

(26) Non so, a Gianni_{TOP}, se avrebbero potuto di_{erg}r_{l}la verità.
    ‘I don’t know, to Gianni, if they could have said the truth.’

Rizzi dubs the complementizer che Force° and se Int°. He places them relatively to the other projections:

(27) Rizzi’s 2001 left-periphery of the (embedded) clause
    [FORCE(C1) (TOP*) INT(C2) (TOP*) FOC Wh (TOP*) FIN IP]

As ‘interrogative’ is also an (illocutionary) force, these labels do not sound felicitous to me. For the moment, let us adopt a neutral position by labeling FORCE “C1°” and INT “C2°”.

4.2. Languages with overt C1 complementizers

Both in Adger and Quer’s and in Rizzi’s theory, there is a lower C endowed with the feature /interrogative/. In each theory it is surmounted by another position, filled or not by a functional head: an NPI D for Adger and Quer, Force for Rizzi. A welcome result would be to show that the two functional heads are one and the same since they share the property to be active with a declarative verb and non active with an interrogative verbs (recall the analysis of (19)a/b). Despite these common features, the two proposals are hardly compatible. For Rizzi, C1° is declarative, for Adger and Quer, it is an NPI D. It seems that we need to rework the structure of the left-periphery of the clause to incorporate Adger and Quer’s NPI D.

If we look at other languages, some present several overt complementizers. This is the case for Basque and Spanish (see examples (17) and (30), borrowed by Rizzi 2001 from Margarita Suñer), but also for Persian and Dutch (examples (28) borrowed from Oehl’s 2007 (42)b and footnote 19; (29) borrowed from van Craenenbroeck 2010:30).

(28) a. (man) nemīdānam ke āyā ĕ zabānšenāsī mīxānad.
    I Neg know Subordination Q he/she linguistics studies

10 The stars indicate recursive projections.
11 Rizzi’s data regarding the relative position of Wh-items, contrastively focused material and the interrogative C are disputable and there are clues that these positions might be merged into only one (see López 2009), but this is irrelevant to our topic.
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I do not know if he/she studies linguistics.'

b. man didam ke an pesar zabānšenāsī mīxānad.
I saw Subordination Dem boy linguistics studies
‘I saw that the boy studied linguistics.’ [Persian]

(29) Ik weet niet of dat Jan gaat komen.
I know Neg if that John goes come
‘I don’t know if John will come.’ [Dutch]

Nevertheless, not all these functional heads are candidates that can be identified with Adger and Quer’s 2001 NPI D, mostly because they have a different distribution.

In Spanish, the co-occurrence of *que with an interrogative C hinges on very strict factors as shown by Lahiri 2002. It is not a declarative marker, but a quotation marker, available with and only with speech act verbs. Thus, a cognitive verb like saber ‘know’ or a verb of inquiry like investigar, which are not speech act verbs, do not allow for *que to precede si, as in (31) and (32) (adapted from Lahiri 2002:chapter 6, examples (51)a and (64)d).

(30) Me preguntaron *que si tus amigos ya te visitaron en Granada
me they.asked if your friends already you visited in Granada
‘They asked me if your friends had already visited you in Granada.’

(31) El detective no sabe *que si Pedro la mató.
the detective Neg knows that if P her=killed
‘The detective doesn’t know if Pedro killed her.’

(32) Investigarán *que se puede curar el SIDA.
they.investigate that if Refl=can cure-Inf the AIDS
‘They will investigate if AIDS can be cured.’

(33) Dijo *que a no molestarle.
he.says that P Neg bother-Inf=him
‘He said not to bother him.’

The quotation marker *que is not involved in the insertion of UEQ and is possibly not to be identified with the assertive complementizer *que2. The latter is limited to finite clauses, whereas the former can show up in nonfinite clauses, provided that they report a speech act, as can be seen from (33) (Lahiri 2002:chapter 6, example (68)a), where the infinitive subordinate clause report a speech act of order. Nonetheless, the quotation marker and the assertive C do not show up together as expected, maybe for some reason precluding the sequence *que1 *que2. If we are on the right track, this means that C1P hides in fact several functional heads: a quotation marker and an assertive C. We end up with the following structure:

(34) Structure of the left-periphery of the clause (1) (to be revised)
[C1°(quot) … C°(assert) … C2°(int) … IP]

Persian presents us with a different pattern. Contrary to Spanish *que1, the Persian complementizer ke is not limited to a subset of question-embedding verbs but shows up with

12 Note that it is grammatical when *que is an Wh-item (written qué).
all verbs, including interrogative ones (35) (Oehl’s (42)a).

(35) ū porsīd ke āyā man zabānšenāšī xānde būdam.
     he/she asked Subordination Q I linguistics studied had
     ‘He/she asked if I had studied linguistics.’

As seen in (28)b, ke is also the form that the assertive C takes. A priori, the two ke should not be identified with one another, for they have a different distribution (the assertive ke cannot show up without āyā after interrogative predicates) and then serve different functions. In (28)a and (35), ke1 is a subordination marker since available whenever finite subordination is at stake, in (28)b, ke2 is an assertive C. This means that there could be a position for the subordination marker in the CP domain. As this subordination marker is limited to finite clauses, it could be located in Rizzi’s Finite projection, at the bottom of the CP domain. We thus end up with the following structure:

(36) Structure of the left-periphery of the clause (2) (final)
    [C1°(quot) … C°(assert) … C2°(int) … C’’°(sub) … Mod°(polarity) … IP]

If this proposal is on the right track, āyā would not be in C2°, but below, in a modal polar projection (as argued for by Oehl 2007). In some languages this modal polar particle could be located higher in a complementizer position, namely C2°, devoted to the interrogation. This is arguably what happens in Dutch.

Dutch is at first sight even more puzzling. Like Persian ke, the complementizer dat1 is used with all verbs in embedded questions (including ‘ask’, see (37), adapted from van Craenenbroeck 2010:30) and is homonymous with the assertive C dat2.

(37) Ik wraag me af of dat Jan gaat komen.
     I ask me PRT if that John goes come
     ‘I wonder if John will come.’

On a par with Persian ke1, dat1 is therefore a subordination marker and not a quotation marker. As shown by van Craenenbroeck (2010:Chapter 4), its role is minimal. Its specifier is the place where operator features and variable-dependencies are checked, which basically means that it establishes a relation between the interrogative CP projection above it and the rest of the clause. What is noteworthy is that dat1 comes after the interrogative C. However this is not surprising provided that we assume the results achieved on Persian data. Dat1 is located in the C’’° position and of is in C2° since it does not only mark the sentence as polar (as does Persian āyā), but as interrogative.

In this section, we saw that several projections surround the interrogative C. All these heads can be spelt out as a C. If we superpose Rizzi’s structure with ours, we end up with the following result:

    [C1°(quot) C°(assert) C2°(int) … C’’°(sub) Mod°(pol) IP]
    [FORCE(C1) (TOP*) INT(C2) … FIN IP]

This is beyond the aim of this paper, but we can tentatively suggest that Top° and Foc° can be spelt out as complementizers, as claimed in Ledgeway 2005 or Mascarenhas 2007. In this view, the diversity of complementizers would merely reflect the diversity of topics (frame setting topic, frame topic contrastive topic, continuous topic, see Lambrecht 1994), a frame setting topic being for example associated with the quotation or the force C.

Languages vary with respect to which of these projections they grammaticalize. In Classical Armenian, only one item spells out the different complementizers (including the
interrogative complementizer): (e)t’ê (Ouzounian 1992).

Regarding the UEQ issue, C¹(quot) and C’³(sub) cannot play any role, for their distribution is tangential to that of UEQs. Only Cº(assert) remains as a possible candidate with which Adger and Quer’s D could be identified. Basque provides us with arguments for this identification.

4.3. Basque

In the relevant contexts of Basque, we deal with four items: -(e)la, -(e)n, -ik, -a (see (16), (17), (38)).

-(e)la is a declarative complementizer, apparently restricted to speech act declarative verbs (38) (= Adger and Quer’s (50)). It can be used when the proposition is pragmatically presupposed (the presupposition is not triggered but the proposition already belongs to the common ground).

(38) Jon ek ez du esan [Bilbora joango d-ela].
Jon.Erg Neg Aux.3Sg.Erg.3Sg.Abs said Bilbao.ALL go.Fut Aux.3Sg.Abs=Comp ‘Jon didn’t say that he was going to Bilbao (although he is).’

More interesting is the complementizer -(e)n. It is available with interrogative (16) and resolutive (17) verbs (factive and veridical), but it can appear by itself only with interrogative verbs. With resolutive verbs, it shows up both with -ik (elsewhere used as an NPI D) or -a (elsewhere used as a definite D). With -a, it is equivalent to a presupposed propositions (in a triggering environment, contrary to -(e)la). With -ik, it is equivalent to a UEQ if-clause or to a that-clause that denotes a non-presupposed proposition. Apparently the role of -ik is vacuous since the meaning of the -(e)n-clause is the same as when it is absent. The only difference resides in the main verbs, ‘know’ selecting a proposition and ‘ask’ a question. This means that the sole role of -ik can be to mark the clause as subordinate to an assertive verb and not to an interrogative verb, while -a is responsible for both the clause typing and the truth value of the proposition denoted by the embedded clause. In this case, -ik and -a must be the equivalent of one of the complementizers of the structure in (36). Put otherwise, -ik seems to be the form that -a takes when it does not act on the -(e)n-clause. This resembles an agreement between the determiner and the complementizer, the determiner endorsing the nonveridical feature of the complementizer. According to their distribution, they cannot be C¹(quot), for they appear with non-speech act verbs. They are not subordination markers, since they do not appear in every (finite) subordinate clause. But they are available with assertive predicates, which makes them good candidates for the assertive complementizer. This is in line with the semantic role they play as we shall see.

If we are on the right track, the functional head that Adger and Quer’s tests detected in English (see section 3.1) is also an instance of the assertive complementizer.

4.4. Summary

In this section, we explored more deeply the syntactic side of the UEQs. Following the cartographic hypothesis, we found out that the functional heads of the CP domain can be realized as complementizers or as determiners, depending on what the language grammaticalizes. We singled out a functional head that we dubbed assertive complementizer which is present when UEQs are involved. Thus, we followed Adger and Quer 2001 in postulating a functional head that makes UEQs possible, but recall from section 3 that we differ from them in attributing the necessity of a nonveridical environment to the nature of the interrogative head and not to this functional head (thus following Oehl 2007 and Roussou...
2010). We are then left with the puzzle as to which semantic role this functional head plays. This is the question we address in the next section.

5. A type-shifting operator

In this section, I shall claim that C° is an operator that takes a question (whatever a question is) and returns a proposition, thus satisfying the selection properties of resolutive predicates. To defend this claim, I shall argue against Lahiri’s 2002 and Adger and Quer’s 2001 quantifier raising treatment of interrogatives.

5.1. Against an interrogative raising approach

Going back to the selection issue, there is a mismatch between the selection properties of resolutive predicates (which are, as said in introduction, proposition-selectors, i.e. are of type \(<s, t> <e, t>>\) and questions that are of type \(<s, t> t>\) (in the most influential theories, Hamblin 1973, Karttunen 1977\(^\text{13}\)). To solve this issue, Lahiri 2002 resorts to a process of Interrogative Raising (IR) triggered by Quantifier Raising (QR). This process applies when there is no way to solve the type mismatch such as in UEQs. Let us look at (39) (Lahiri’s (31)a, p. 77).

\[(39)\text{ John knows, for the most part, which students came to the party.}\]

\[(40)\text{(a) [][CP which students came to the party]} (b) [\text{most (c) [IP John knows t.]}].\]

In this operation, the sentence containing a UEQ has a quantifier, possibly overt, like most in the example. Quantifiers are in this theory polymorphic. When they quantify over questions, they are of type \(<<s, t> t> <<<s, t> t> t>>\). The CP denoting a question rises at LF to the specifier of this quantifier adjoined to the IP, thus forming the LF in (40). The IP is in the nuclear scope of the quantifier and the CP( interrogative) in its restrictor. Crucially, the raised CP leaves a trace that is interpreted as the type required for functional application, i.e. \(<s, t>\), by a type-adjusting rule that Lahiri borrows from Bittner 1994 (see p. 83). As the node (b) of the LF contains a free variable of type \(<s, t>\), the node undergoes a \(\lambda\)-abstraction and is of type \(<<s, t>, t>\). By functional application, the quantifier applies first to the IP yielding a node of type \(<<<s, t> t>, t>\), then to the question, yielding something of type \(t\) as expected.

Lahiri grounds his hypothesis in the distribution of the Quantificational Variability Effect (QVE). The QVE was first described in Berman 1991. He points out that in sentences such as (39), the main clause quantifier most unexpectedly binds the \(Wh\)-variable, such that (39) means that the knowledge of John applies only to a subset of the answer propositions. The QVE, notices Lahiri, takes place only with resolutive verbs so that in a sentence displaying an interrogative verb like (41) (Lahiri’s (50)a, p. 88), if it has a meaning at all, most cannot quantify over the embedded clause.

\[(41)\text{ John mostly wonders which students came to the party.}\]

This is in line with the mechanism (IR) he posits for the interpretation of UEQs with resolutive predicates: The QVE applies to \(Wh\)-clauses just when an additional process is needed for the interpretation to be possible. That is why a quantifier is always required, even

\(^{13}\text{ Note that the mismatch also arises in a Groenendijk and Stokhof 1984 model, where questions are of type \(<s, t>>. However, Adger and Quer’s and Lahiri’s theory of interrogative raising would fail to account of the raising of a question of such type, as acknowledged in Adger and Quer (2001: footnote 17).}\)
if not overt. In this very case, it is universal by default (Lahiri 2002:91).

Adger and Quer 2001 resorts independently to the same process for yes/no UEQs. The NPI D they argue for is the quantifier that triggers the Interrogative Raising. Instead of Bittner’s type-adjusting rule, they appeal to Heim and Kratzer’s 1998 claim that the trace of a raised generalized quantifier has a simple atomic type, i.e. t (\(<s, t>\) if intensionalized) in our case. Another apparently unimportant difference is the level to which the quantifier adjoins. Indeed, according to Adger and Quer, the D patterns with the quantifier either since a yes/no question involves a choice between two items. Like either, it scopes below the negation, i.e. over the sole VP. More generally, given that nonveridical operators are VP modifiers, to be in their scope, the D must adjoin to VP and not to IP in Adger and Quer’s view. Ultimately, the selection problem is then solved in the same fashion as Lahiri’s.

However, despite their kinship, there are important differences between the two approaches. First of all, Lahiri deals with Wh-questions while Adger and Quer address yes/no questions. Second, Lahiri does not take into account the veridical nature of the environments where the UEQ phenomenon takes place. Let us then assume that it should be available in veridical as well as in nonveridical contexts. This assumption turns out false, as shown by (42) and (43), two cases of nonveridical environments.

(42) #Does John know, for the most part, which students came to the party?
(43) #John does not know, for the most part, which students came to the party.

The contrast between (39), on one hand, and (42) and (43) on the other hand, shows that Lahiri’s process of IR is only available in veridical contexts. This is a major discrepancy with Adger and Quer’s view according to which yes/no UEQs show up and IR happens only in nonveridical contexts. The two proposals are then not compatible. To accommodate their proposal to Wh-questions, Adger and Quer would have to assume a D heading Wh-UEQs. But once again, that would not explain why Wh-UEQs contrary to yes/no UEQs are also available in veridical contexts (recall the data under (6)). We leave this last question for future research (see however the conclusion) and focus from now on on yes/no UEQs.

Adger and Quer’s proposal to solve the s-selection mismatch is moreover hardly compatible with the results we reached in sections 3. We saw that the semantic properties attributed to the D by Adger and Quer (nonveridicality) were in fact those of the interrogative C, with which the D agrees. The D is rather an assertive operator, sometimes realized as an assertive C. In this case, there is no reason why it should not rise past the VP and adjoin to the IP. But the UEQ would then move past the nonveridical operator to reach the quantifier restrictor and then scope over its licenser. There is another technical objection to Adger and Quer’s proposal. They advocate the configuration [VP [Q Restrictor] Nuclear Scope]]. In this kind of situation, as pointed out by Lahiri (2002:84-85), the quantifier does not c-command its nuclear scope, probably resulting in a scope problem.

However alluring the Interrogative Raising proposal might be, it is not to be retained since it does not provide us with a uniform treatment of UEQs and faces technical problems. The role played by the functional operator heading the UEQ must be explained otherwise in a frame where the UEQ remains in situ.

5.2. UEQs are interpreted in situ

The previous section has cast doubt on the movement of UEQs. This suggests that they are interpreted in situ. In this case they would have to be of type \(<s, t>\). In section 4 I

\[^*\text{14}\] For the necessity to posit several types to account for questions see Groenendijk and Stokhof 1989.
proposed to identify Adger and Quer’s D with an assertive functional head. This head is present with resolutive predicates. Recall that resolutive predicates are factive and veridical predicates\(^\text{15}\), which means that the proposition denoted by the embedded clause is presupposed or is a true proposition\(^\text{16}\) (or a fact in Ginzburg’s 1995 view). For this reason, I argue that the role of the functional head present with such predicates is to turn the embedded question into a true proposition that is the true answer to the question, thus resolving the type mismatch.

This proposal was already made by Chierchia (1993:192-194), but in different circumstances. He discusses the QVE described in the previous section. He adheres to Lahiri’s proposal (which dates back to 1991) of IR, except in the case described after example (41). According to him, in absence of an overt quantifier, there is no covert universal quantifier. In this case, the type-mismatch between the UEQ and the resolutive verb remains. Chierchia proposes to solve it by a type-shifting operated by the “supremum operator” \(\sigma\). This operator selects the set of propositions that constitutes a question and returns a (maximal) sum of propositions (“the most informative relevant answer”), i.e. a proposition, thus satisfying the selection requirement of resolutive predicates. Besides, in (39), as said in introduction, the DP \textit{the answer} can substitute for the \textit{Wh}-clause.

Lahiri (2002:92-94) challenged his view for Hintikka-like existential questions\(^\text{17}\). Still, there remain circumstances where no quantification takes place and where Chierchia’s operator is still required, though not intended for this purpose. These are the cases where no QVE arises, i.e. when a nonveridical operator is present with \textit{Wh}-questions (see the discussion about (42) and (43), where the type \textit{the answer} is still substitutable for the \textit{Wh}-clause). Once again, this is also the context where yes/no UEQs are licensed. In this case the operator \(\sigma\) would select the only proposition that is the correct answer, depending on the context. In (4)a, it would be a member of the set \{Peter came; Peter did not come\}. The factive/veridical requirement of the main verb is satisfied by the fact that \(\sigma\) selects just the correct answers.

This proposal is supported by the parallel with concealed questions such as \textit{I (don’t) know the time}. Concealed questions are definite (Nathan 2005) or specific indefinite DPs (Frana 2006, Faure 2010:chapter 6). Moreover concealed questions, though DPs, denote sets of propositions or propositions. Recall now that UEQ-clauses denote in fact true propositions. This true feature of the proposition denoted by the UEQ is in line with the definite or specific character of the concealed questions. That is why the assertive operator, sometimes identified with a D, as in Basque, and the definite/specific indefinite determiner in concealed questions could play the same role of type-shifter. Note that the extraction impossibility in English (see (19)) ensues as easily from the presence of a definite determiner as that of an NPI D.

Interestingly, Nathan 2005 defends the existence of two types of concealed questions, one of which is limited to resolutive predicates much as UEQs are. According to him, concealed question DPs undergo two type-shifting operations. The first one (44) turns the NP into a question, the second one (45) is operated by the determiner and turns the question into a proposition, much like Chiercha’s operator. Whether the operator is better described as \(\sigma\) or as \(\imath\), little matters here.

\(^{15}\) With the notable and often noted exception of speech act verbs like \textit{tell}, cf. Égré 2008, Faure (2010:chapter 9) for tentative explanations.

\(^{16}\) Even in the case of UEQs, see footnote 5.

\(^{17}\) Like “Peter knows where to buy a book”, where the answer is felicitous even if it mentions only some (and not all) places where Peter can buy a book. Though it is still a topic of research, the Hintikka-like interpretation of questions could merely be a contextual restriction, the maximal sum being in this case reduced to a single element (on this point see Chierchia 1993:footnote 13).
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\[(44) \lambda \mathbf{p}_e : \langle s, t \rangle \rightarrow \lambda \mathbf{p}_r : \langle s, t \rangle . \left[ \exists x_e . \mathbf{p} = \lambda w_x . \mathbf{P} (w) (x) \right] \quad <s <e, t> \rightarrow <<s, t>, t> \]

\[(45) \left[ \left[ \text{the} \right] \right] = \lambda \mathbf{Q}_e : \langle s, t \rangle \rightarrow \lambda \mathbf{p}_r : \langle s, t \rangle . \left[ \mathbf{Q}(p) = 1 \right] \quad \left( \text{cf.} \left[ \left[ \text{the} \right] \right] = \lambda \mathbf{P}_e : \langle s, t \rangle \rightarrow \lambda x_e . \left[ \mathbf{P}(x) = 1 \right] \right) \]

5.3. Summary

In this section I addressed the semantic side of the UEQ issue and tried to clarify the type-mismatch between proposition-selectors and questions. I argued against Adger and Quer’s IR approach to this issue and claimed that the problem is better solved by positing a type-shifting operation. This proposal is strengthened by its kinship with operations that are requested to explain Wh-UEQs in nonveridical contexts and concealed questions.

6. Concluding remarks

In this article, I studied the long-standing question of the distribution of embedded questions and the machinery needed to account for it, especially when there is both a semantic and a syntactic selection mismatch, i.e. in the case of Unselected Embedded Questions with resolutive (proposition-selecting) predicates. These clauses can all be substituted for a DP like the answer. They then denote a proposition, a denotation achieved through a type-shifting operation. The type-shifting operator takes in some languages the overt form of a D or an assertive C. It is covert in other languages, but detectable through extraction tests. At the interface with the selector, the UEQ is then a DP or an assertive CP and no syntactic mismatch arises.

The issue then boils down to the nonveridical character of the UEQ head. It is licensed by the distribution of yes/no UEQs which appear only in nonveridical contexts. As mentioned about examples (6)a/b, this does not seem to apply to Wh-UEQs. I have only sketched an answer to this problem. As seen in section 5.1, Wh-UEQs do not behave in the same way in veridical as in nonveridical contexts. In nonveridical contexts, Wh-UEQs pattern with yes/no UEQs in not allowing for quantification. This is not the case in veridical contexts. This point has to be taken into account and may indicate that we are not dealing with the same type of clauses as in veridical contexts, something that should be detectable through a more thorough examination of their syntactic properties.

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