

Embedded Interrogatives and Selection of Sentential Complements in the Lexicon*

Eun-Jung Yoo

1. Introduction

Grimshaw (1979) argues that the lexicon must contain selection for both syntactic categories and semantic types of the complement in order to explain the combination properties of predicates and their complements. She provides evidence for a theory in which syntactic subcategorization is independent of semantic type selection, by demonstrating cases where syntactic forms and semantic types of complements do not match one-to-one. Semantic selection is necessary since the same syntactic category can be associated with different semantic types. For example, although the predicates *believe*, *ask*, and *know* all take a sentence (\bar{S}) as their complements, those complements are semantically distinct: *believe* selects a proposition, *ask*, a question, and *know*, both of them. The following (1)~(3) exemplify this:

- (1) a. Mary believed/thought that Sandy met John.
b. *Mary believed/thought whom Sandy met.
c. *Mary believed/thought whether Sandy met John.

- (2) a. Mary asked/wondered whom Sandy met.
b. Mary asked/wondered whether Sandy met John.
c. *Mary asked/wondered that Sandy met John.

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- (3) a. Mary knew/remembered whom Sandy met.
 b. Mary knew/remembered whether Sandy met John.
 c. Mary knew/remembered that Sandy met John.

More crucially, the same semantic type may take different syntactic categories. Though both *wonder* and *ask* select a question, *wonder* takes only \bar{S} as its complement, while *ask* takes both NP and \bar{S} .

- (4) a. John asked what height the tower was.
 b. John asked the height of the tower.
- (5) a. John wonders what answer she gave.
 b. *John wonders the answer she gave.

There has been subsequent work that addresses whether categorial selection can be reduced to semantic selection or not. Pesetsky (1982) claims that categorial selection of a verb can be predictable from semantic properties of the verb. However, this view is criticized by Webelhuth (1992) and Odijk (1997). Odijk argues that categorial selection must be stipulated independently as a property of lexical items.

While this paper takes the perspective of Grimshaw, Webelhuth, and Odijk's that both categorial and semantic selection is necessary, it is not intended to give any further evidence to support the necessity of category selection. Instead this work focuses on the cases wherein predicates take a sentential complement, i.e. S or \bar{S} , examining what kind of information should be specified in the lexicon to explain selectional properties of verbs.

The first goal of this paper is an attempt to answer how to distinguish semantic types of sentential complements, and in particular, how to incorporate the observation that embedded interrogatives are interpreted in two different ways, depending on the predicates that subcategorize for them. While it is well established that verbs' subcategorization frames include the semantic distinction between propositions and questions (cf. (1a) vs. (2a, b)), there has not been much discussion on how the lexicon deals with the claim that question-embedding verbs need to be further divided into two classes (cf. (2a, b) vs. (3a, b)). This paper investigates how such a distinction can be made in verbs' lexical entries within the framework of Head-Driven Phrase Structure Grammar (HPSG).

Second, this paper examines the cases in which a particular complemen-

tizer is selected by the matrix verb for the same semantic type of sentential complements. The basic data come from Spanish, but I will argue that English and Korean also exhibit the same kind of complementizer selection in certain cases. The proposed analysis also provides a way of specifying complementizer selection in the lexicon.

In the following section, I briefly review some syntactic approaches to sentential complement selection that employ the $[\pm wh]$ distinction. Section 3 discusses the semantic classification between “indirect questions” in (2a, b) and “semi-questions” in (3a, b), and points out problems with Suñer’s (1993) proposal that introduces an additional feature $[\pm Qu]$ to account for the semantic difference among sentential complements. In section 4 is the proposed analysis presented. I will provide partial lexical entries of the verbs in (1-3) containing semantic selection. Arguing classification of Spanish verbs should take into account another factor, complementizer selection, I show that the MARKING feature in HPSG is useful in their lexical representations. Section 5 argues that complementizer selection is also found in English and Korean, and should be included as part of the subcategorization information of verbs. In particular, the distribution of English *whether* and *if*, and Korean *-ko* in embedded interrogatives is examined to support the claim. Finally, conclusions and the summary of arguments are given in section 6.

2. Syntactic Treatment of Question Selection

Within transformational grammar, the semantic type of sentential complements has been commonly expressed in terms of the $[\pm Wh]$ feature. In this approach, semantic interpretation is built into syntax structure, so that questions are marked with $[+Wh]$, and propositions, with $[-Wh]$. In order to require movement of a *wh*-phrase whenever there is a $[+Wh]$ COMP, the following principle is imposed:¹

(6) The *Wh*-Criterion (Rizzi 1991)

- a. A *wh*-operator must be in a Spec-head configuration with an $X^0[+Wh]$.

¹ The *Wh*-Criterion is first proposed in May(1985). This is a modified version that is made compatible with Chomsky’s(1986) *Barriers* framework.

- b. An $X^0[+Wh]$ must be in a Spec-head configuration with a *wh*-operator.

As Lasnik & Saito (1984, 1992) argue, (6b) must be fulfilled at S-Structure in syntactic *wh*-movement languages like English and satisfied at LF in other languages, while (6a) universally holds at LF.

In this analysis, polar questions are often assimilated to *wh*-questions under the assumption that *whether* is a [+Wh] phrase in the Spec of CP and obeys the *Wh*-Criterion (Lasnik & Saito 1992). A potential problem with this analysis is that it cannot explain the differences between polar questions and *wh*-questions. For example, a polar question, unlike a *wh*-question, does not allow a *wh*-phrase within it.

- (7) a. Susan asked where John bought what.
 b. *Susan asked whether John bought what.

Under the uniform treatment of *wh*- and polar questions as [+Wh] CP, the ungrammaticality of (7b) is unexpected. Moreover, such an analysis does not hold in languages which do not employ elements that correspond to *whether* and occupy the Spec of CP position (e.g. Korean).²

Although the distinction between *wh*-questions and polar questions is not directly relevant to verbs' selectional property, there is another dimension that should be taken into account in the selection of embedded questions. Consider the following examples:

- (8) a. Mary asked how many countries John visited.
 b. Mary knows how many countries John visited.

It has been pointed out that, unlike the embedded interrogative in (8a) that denotes the question itself, the one in (8b) is interpreted as 'the answer to the question expressed by the interrogative.' This kind of difference cannot be captured in a syntactic approach that simply makes a distinction between [+Wh] and [-Wh] complement in the subcategorization frame of verbs. In

² Alternatively, it is possible to assume that *wh*-questions are CP [+Wh, +Q] while polar questions are CP[-Wh, +Q] (Aoun & Li 1993), and that the *Wh*-Criterion applies only to *wh*-question, but in this case, the obligatory presence of *whether* or *if* in embedded context requires explanation.

the next section, I will discuss the difference between interrogative complements in (8) in detail.

3. Selection and Interpretation of Embedded Interrogatives

In this section, I will briefly review some semantic approaches to the classification of embedded interrogatives to provide the background for the main discussion. There are largely two different perspectives on the semantics of the interrogative complements in (8). One view assumes that the embedded interrogatives in (8a) and (8b) are basically of one semantic type, but interpreted differently depending on the class of verbs. The other approach takes the embedded interrogatives (8a) and (8b) to belong to distinct semantic types. Groenendijk & Stokhof (G&S hereafter; 1982) and Ginzburg (1992, 1995a, b) take the former view, and G&S (1989) and Suñer (1993), the latter one. After briefly reviewing these approaches, I will argue in section 3.2 that Suñer's proposal, which is based on G&S's (1989) "type lifting" analysis, has many problems. Accordingly, this section will conclude that it is more advantageous to assume that different interpretations of embedded interrogatives are triggered by matrix verbs.

3.1. Semantic Approaches to Interrogative Complements

G&S (1982) argue that there is an important difference between the two groups of verbs that take interrogative complements. According to them, verbs like *ask* and *wonder* are intensional complement embedding verbs that pay attention to the intension of the *wh*-complement, namely, to the question itself. On the other hand, verbs like *know* and *tell* are extensional in the sense that they care only for the extension of the interrogative complement, namely, the answer of the question. In their analysis, when *wh*-complements are embedded under a verb, the *sense* of the complement, i.e. a *propositional concept* is applied to the verbs. However, by the meaning postulate imposed on 'know' type verbs, these verbs are made to operate on the denotation of their complements, i.e. on *propositions*. Therefore, while the semantic types of *wh*-complements are identical for both 'know' type and 'ask' type predicates, their actual semantic interpretations are different depending on whether or not the verb is associated with the meaning postulate.

In G&S (1989), a slightly modified approach is adopted, and the

distinction between these two groups of verbs is encoded in the different semantic types to which their embedded interrogatives belong. In this approach, *wh*-complements are divided into two types: basic type of proposition, $\langle s,t \rangle$, and a variant type of propositional concept, $\langle s, \langle s,t \rangle \rangle$, which is arrived at by means of a “type-lifting” rule.

While G&S (1982, 1989) deal with *wh*-complements in terms of a purely semantic distinction, Suñer (1993) adopts the distinction in the theory of selection. Following G&S, Suñer notes that there are two different ways to interpret embedded questions, which can be shown by different paraphrases of the questions. For example, (8a) can be paraphrased as ‘Mary asked the question how many countries John had visited,’ whereas (8b) can be paraphrased as ‘Mary knows the answer to how many countries John visited.’ Therefore, if (8b) is stated in a situation where John has visited seven countries, then it entails that Mary knows that John visited seven countries. In Suñer, the embedded questions in (8a) and (8b) are called an *indirect question* and a *semi-question*, respectively.

In order to account for the semantic difference of Spanish embedded interrogatives, Suñer, following G&S (1989), posits two distinct semantic types $\langle s,t \rangle$ and $\langle s, \langle s,t \rangle \rangle$, which are expressed in terms of [-Qu] and [+Qu] features in her analysis. For the examination of Suñer’s proposal, see 3.2.

Ginzburg (1992) discusses the distinction between question interrogatives (QI) and resolving answer interrogatives (RI), which corresponds to Suñer’s notion of indirect questions and semi-questions, respectively. In Ginzburg (1995a, b), which present a more refined semantic theory for embedded complements, he proposes that embedded interrogative and declarative sentences be classified in terms of propositions, questions, and facts. Contrary to earlier approaches that treat interrogative complements of ‘know’ type predicates as either propositions or questions, Ginzburg (1995a, b) claims that such RI complements denote neither of them, but rather a family of entities that include “facts”. Predicates are classified as question predicates (e.g. *ask*, *wonder*) and resolute predicates (e.g. *know*, *tell*) on the one hand, and TF (true/falsity) predicates (e.g. *believe*, *claim*) and factive predicates (e.g. *know*, *regret*), on the other hand. Both resolute and factive predicates are related to facts, in the sense that facts “resolve” questions for the former, and “proves” propositions for the latter. In order to enable both a declarative D and an interrogative I to denote facts, Ginzburg proposes a coercion-based account in which declarative coercion yields a fact that proves the truth of the proposition denoted by D, and interrogative

coercion yields a fact that resolves the question denoted by I.

What kinds of semantic objects QI or RI complements denote is a purely semantic issue and beyond the scope of this paper; however, I would like to note that Ginzburg's account is based on recognizing different kinds of predicates, as in G&S's (1982). Moreover, I take Ginzburg's discussion to imply that, in the subcategorization frame, verbs, when they select their sentential complements, only specify whether they take propositions or questions. In my analysis, predicates taking RI complements bear a certain indication, so that their complements receive appropriate (fact-related) interpretation.

3.2. Complement Selection and Spanish Embedded Interrogatives

Suñer (1993) argues that Spanish embedded interrogatives can be explained in terms of different semantic types, and that Spanish exhibits strong syntactic evidence for the semantic classification. According to Suñer (1993), Spanish verbs can be divided into five classes depending on the complement types that they combine with. Consider the following examples from Suñer:

- (9) a. Mara creía que quedaban diez días para las vacaciones.
 'Mara believed that there remained ten days for the holidays.'
 b.*Mara creía cuántos días quedaban para las vacaciones.
 '(Lit.) Mara believed how many days remained for the holidays.'
- (10) a. Pepeguntó (que) cuántos países habíamos recorrido.
 '(Lit.) Pepe asked (that) how many countries we had visited.'
 b.*Pepeguntó que habíamos recorrido ocho países.
 '(Lit.) Pepe asked that we had visited eight countries.'
- (11) a. Sabían que yo iba a darles una prueba el martes.
 'They knew that I was going to give them a test.'
 b. Sabían cuándo iba a darles una prueba el martes.
 'They knew when I was going to give them a test.'
- (12) a. El niño tartamudeó que se había peleado con su mejor amigo.
 'The boy stuttered that he had fought with his best friend.'
 b. El niño tartamudeó que con quién se había peleado Luis.
 '(Lit.) The boy stuttered (=asked stuttering) that with whom Luis had fought.'

- (13) a. Repitieron no querían ir.
 'They repeated that they didn't want to go.'
- b. Repitieron cuándo llegarían.
 'They repeated when they would arrive.'
- c. Repitieron que a cuántos habíamos invitado.
 '(Lit.) They repeated (=asked repeatedly) that how many we had invited.'

While the verbs in (9-11) show patterns analogous to English verbs *believe*, *ask*, and *know*, respectively, the verbs *tartamudear* 'to stutter' in (12) and *repetir* 'to repeat' in (13) are different from their English counterparts in that they can take a genuine indirect question as a complement as well.

Suñer claims that the distinction between indirect questions and semi-questions is marked syntactically in Spanish, based on her observation that only indirect questions are correlated with the *que + wh* construction. According to her, *que* signals intensionality, indicating that the following *wh*-complement is a genuine question. In the examples above, the embedded interrogatives in (11b), (13b) are semi-questions of the semantic type $\langle s,t \rangle$, while those in (10a), (12b) and (13c) are indirect questions of the type $\langle s, \langle s,t \rangle \rangle$. She further contends that a language like English that lacks an overt marker for intensionality employs a covert "type lifting" for the *wh*-complements selected by 'ask' type predicates.

With respect to the theory of subcategorization/selection, Suñer argues that it is not enough to rely on the different meanings of the verbs (i.e. extensional/intensional dichotomy as in G&S), but that it is necessary to take into account the syntactic complement(s) the verb in question combines with. In order to explain different classes of Spanish verbs, two features $[\pm WH(-phrase)]$ and $[\pm QU]$ are employed. The former concerns syntactic co-occurrences, that is, whether the complement at issue contains a *wh*-phrase at the beginning or not, while the latter expresses semantic characteristics, i.e. the intension/extension distinction. Postulating the implication rules in (14) holding between syntactic forms and semantic types of complements, the verb classes in Spanish are represented in (15):

- (14) a. $[-wh] \rightarrow [-Qu]$
 b. $[+Qu] \rightarrow [+wh]$

- (15) a. [-wh] specifies the *creer/dudar* 'believe/doubt' class
 b. [+Qu] specifies the *preguntar(se)* 'ask/wonder' class
 c. [-Qu] specifies the *saber/decidir/explicar* 'know/decide/explain' class
 d. [+Qu] or [-wh] specifies the *tartarmudear/susurrar/gritar* 'stutter/whisper/shout' class (manner of speaking verbs)
 e. [+Qu] or [-Qu] specifies the *repetir/decir* 'repeat/say' class

While it is plausible that syntactic co-occurrences as well as semantic selection should be considered, there are problems with Suñer's proposal. First of all, Suñer's claim that indirect questions, [+Qu], are signalled by the complementizer *que* is problematic. Her analysis does not explain why *que* is only optional in the complement of *preguntar(se)* 'ask/wonder,' while it is obligatory for manner of speaking verbs (e.g. *tartarmudear* 'stutter') and *repetir* 'repeat' type verbs.

- (16) a. Preguntaron (**que**) quién camina dormino.
 '(Lit.) They asked (that) who walks in his sleep.'
 b. Susurraron *(que) quién camina dormino.
 '(Lit.) They whispered that who walks in his sleep.'

Suñer explains that *que* is optional in (16a) because *que* can be null C[+Qu, +wh]. However, this still doesn't account for the contrast in (16), since there is no reason why such a null C cannot appear in (16b). Moreover, as pointed out in Rivero (1994), there are some predicates that semantically select indirect questions, i.e. [+Qu], but still do not take *que* in front of the *wh*-complement. These verbs include *investigar* 'investigate', *examinar* 'examine', *inspeccionar* 'inspect'.³

- (17) a. Investigaron cómo se puede curar el SIDA.
 'They investigated how AIDS can be cured.'
 b.*Investigaron que cómo se puede curar el SIDA.

Second, Suñer's claim that languages like English, which does not mark intensionality overtly, resort to a 'covert' type lifting rule is problematic.

³ Example (17) is from Rivero(1994:549), who attributes the finding to Lahiri (1991).

This implies that in many languages that do not distinguish indirect questions from semi-questions in their syntactic forms, the unmotivated covert type lifting operation should occur to distinguish [+Qu] complement from [-Qu].

Third, this analysis introduces a dual lexical entry for *que* which only differs by the Qu and Wh feature values. That is, *que* preceding an interrogative complement is [+Qu, +wh], whereas *que* that precedes a declarative complement is [-Qu, -wh]. Such a dual entry lacks an independent motivation, and can be avoided if *que* is simply treated as a functional word that does not head a phrase. This alternative analysis will be discussed in section 4.

Fourth, Suñer's classification of CP complements is problematic. Above all, it does not explain why an interrogative CP can be only [+Qu] when it is a matrix clause, while it can be either [+Qu] or [-Qu] when embedded. Since CP itself is classified in this approach, it is unexplained why a certain combination of features (viz. [-Qu, +wh]) is available only in embedded contexts. Moreover, if *que* before a *wh*-clause indicates a question interpretation (i.e. [+Qu]), as argued in Suñer, it is mysterious why a matrix question, which is presumably [+Qu], is never introduced by *que* in Spanish.

Finally, Suñer's theory of selection has a problem, when we consider data from a different type of *wh*-movement languages. As shown earlier, Suñer employs [+Qu] vs. [-Qu] distinction in order to distinguish indirect questions from semi-questions and propositions. Thus another feature [\pm wh] is needed to distinguish propositions from indirect or semi-questions. This [wh] feature is a "syntactic" feature whose value is determined by the presence/absence of a *wh*-phrase in the SPEC of CP. This diverges from the common usage of [Wh] feature (e.g. Lasnik & Saito 1984, May 1985) within transformational approaches, in which the feature is employed for the proposition/question distinction. A theory of selection that (at least partially) depends on the syntactic appearance of *wh*-phrase is problematic, since there are cases where clauses that are semantically non-questions have a *wh*-form in syntax. One such instance is observed in a language that permits "partial *wh*-movement". Consider the following example from Kathol 1995: 4

⁴ The phenomenon of partial *wh*-movement is first dealt with in McDaniel(1989).

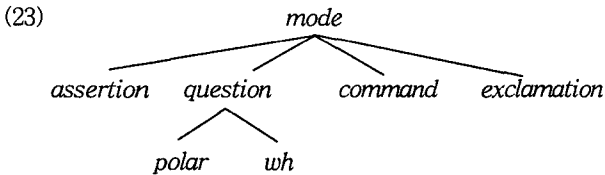
- (18) *Lisa glaubt/denkt [wer gekommen ist].
 Lisa believes/thinks who come is
- (19) a. Was glaubst du [wen Lisa gesehen hat]?
 WHAT believe you whom Lisa seen has
 'Who do you think Lisa saw?'
- b. Lisa möchte wissen [was du glaubst [wen Lisa gesehen hat]].
 Lisa would like know WHAT you believe who Lisa seen has
 'Lisa wants to know who you think Lisa saw.'

German bridge verbs such as *glauben* and *denken* never permit interrogative complements. However, in (19), where *wh*-scope is marked by the expletive scope marker *Was*, not by a 'partially' fronted *wh*-phrase, these verbs are followed by a clause bearing the pattern of a syntactic interrogative. If we follow Suñer's theory, these verbs must select [-*wh*] in the lexicon. Consequently, the examples in (19) cannot be explained, since the embedded clause with a *wh*-phrase is [+*wh*] contrary to Suñer's prediction. This suggests that the syntactic presence of the *wh*-phrase itself should not be taken to be a major criterion in stating a theory of sentential complement selection.

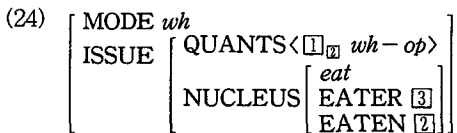
So far I have shown that Suñer's approach that encodes the difference between semi-question (RI) interpretation and indirect question (QI) interpretation in the syntactic feature [\pm Qu] is problematic. In the proposed analysis presented in the following section, I assume that the RI vs. QI distinction is *not* represented as that of sentential complement itself. Instead it presumes that the distinction between semi-question interpretation and indirect question interpretation is triggered by the verb that selects it as a complement. This view essentially follows G&S (1982), in that the semantic object that both 'know' type predicates and 'ask' type predicates take is a question. On the other hand, since the proposed theory of selection can express various syntactic, semantic, and morphological characteristics of sentential complement, it accounts for such syntactic characteristics as the occurrence of *que*, which cannot be explained in the semantic theory of G&S.

4. A Proposed Analysis

In this section, I will propose how to represent selection of sentential complements in the lexicon within the framework of HPSG. In HPSG, when a lexical head subcategorizes for its complements via the COMPS feature, it may specify semantic as well as syntactic information of the complement(s), since the COMPS feature has a list of *synsem* (*syntax-semantics*) objects as its value. The semantic information is expressed by the CONT(ENT) feature, and I assume that the CONT value of interrogatives is [MODE *question*], while that of declaratives is [MODE *assertion*]. The type hierarchy for the MODE values is as follows:



The following illustrates the CONT value of the *wh*-question *What did you eat?*:



A phrase of the type *prop-obj* can be [MODE *wh*] only when there is a *wh*-operator in the QUANTS list; moreover, with a *wh*-operator in the QUANTS, a phrase must be [MODE *wh*]. This is because we need to prohibit a clause from being marked as *wh*-question without a *wh*-operator in its semantic interpretation. The following constraint ensures this:

(25) [MODE *wh*] ↔ [QUANTS <..*wh-op*..>]

Now we can distinguish three types of predicates in (1-3) in terms of the MODE value of the complement S; [MODE *assertion*], [MODE *question*], or both.

When a complement S is [MODE *question*], the RI vs. QI complement distinction must be made as well. In the previous section, I have argued that the choice between QI and RI uses of a propositional complement is determined by the embedding predicate. Thus I will simply mark whether the embedding predicate is the one eliciting RI complement interpretation or not.

The question now is where we can add this kind of information in the lexical entry. Since the different interpretations of embedding question come from different kinds of verb relation denoted by the embedding predicate, the locus can be the CONT|NUC(LEUS) whose value is various types of *afpsoa* (*quantifier-free parameterized-state-of-affairs*). Each *afpsoa* expresses a verb relation such as *love*, *eat*, and *believe*, etc.

Following Barberà (1994) in vein, I posit two kinds of verb relation for the CONT|NUC of a verb; a relation that simply takes as an argument the CONT value of its sentential complement Q, and another kind of relation that interprets its complement Q as ‘the answer to the question expressed by Q.’ I will distinguish these two kinds of relations by specifying the relation R at issue as either *resolutive* (i.e. $R \in \text{resolutive}$) or *non-resolutive* (i.e. $R \notin \text{resolutive}$).⁵

On the basis of the discussion so far, the lexical entries of the verbs, *believe*, *ask*, and *know* can be described as follows:

(26) *believe* (preliminary)

$$\left[\begin{array}{l} \text{COMPS} \langle \text{S:} \boxed{2} [\text{MODE } \textit{assertion}] \rangle \\ \text{CONT|ISSUE|NUC} \left[\begin{array}{l} \textit{believe} \notin \textit{resolutive} \\ \text{ER } \boxed{1} \\ \text{SOA} - \text{ARG } \boxed{2} \end{array} \right] \end{array} \right]$$

(27) *ask*

$$\left[\begin{array}{l} \text{COMPS} \langle \text{S:} \boxed{2} [\text{MODE } \textit{question}] \rangle \\ \text{CONT|ISSUE|NUC} \left[\begin{array}{l} \textit{ask} \notin \textit{resolutive} \\ \text{ER } \boxed{1} \\ \text{SOA} - \text{ARG } \boxed{2} \end{array} \right] \end{array} \right]$$

⁵ While I only introduce the resolutive vs. non-resolutive distinction here, it is still possible to divide the nonresolutive relation into *factive* and *non-factive* relation, by incorporating Ginzburg’s (1995) distinction between factive vs. true-false predicates. In this case, the nonfactive relation will amount to normal cases where predicates do not “coerce” their complements to be interpreted as “facts”. Since RI vs. QI distinction is our main concern, we do not explore the semantic distinction of declarative complements here.

(28) *know* (preliminary)

- a. $\left[\begin{array}{l} \text{COMPS} \langle \text{S:} \textcircled{2} [\text{MODE } \textit{assertion}] \rangle \\ \text{CONT|ISSUE|NUC} \left[\begin{array}{l} \textit{know} \notin \textit{resolutive} \\ \text{ER } \textcircled{1} \\ \text{SOA} - \text{ARG } \textcircled{2} \end{array} \right] \end{array} \right]$
- b. $\left[\begin{array}{l} \text{COMPS} \langle \text{S:} \textcircled{2} [\text{MODE } \textit{question}] \rangle \\ \text{CONT|ISSUE|NUC} \left[\begin{array}{l} \textit{know} \in \textit{resolutive} \\ \text{ER } \textcircled{1} \\ \text{SOA} - \text{ARG } \textcircled{2} \end{array} \right] \end{array} \right]$

In (27), the *ask* relation is not *resolutive*, so the CONT|NUC will be simply interpreted as ‘ $\textcircled{1}$ asks $\textcircled{2}$.’ On the other hand, in (28b), the *know* relation belongs to the *resolutive* type. Accordingly, the CONT|NUC will be interpreted as ‘ $\textcircled{1}$ knows the answer to the question expressed by $\textcircled{2}$.’

Now let us consider how lexical entries of Spanish verbs can be described. In Spanish, some embedded interrogatives are introduced by *que*, and I have shown that, contrary to Suñer (1993), its presence is not always determined by the semantic type of the interrogatives. Therefore, like Barberà (1994), I will treat *que* as a complementizer that does not have any semantic function in the interpretation of embedded clauses. In terms of HPSG, Spanish *que* can be treated as a “marker”, in parallel to the English complementizer *that*. A marker is a functional head that selects its sister SPEC(IFIED) feature. For instance, *that* selects an S via the SPEC. Unlike other lexical heads that are *unmarked*, markers have *marked* as their MARKING value. The sort *marked* has subsorts of its own such as *that* or *que*. For a phrase with a marker, the MARKING value is inherited from the marker daughter. Accordingly, *that*-clauses and *que*-clauses are [MARKING *that*] and [MARKING *que*], respectively.

Among the five classes of verbs classified by Suñer, the *preguntar* ‘ask’ class in (10) has the same lexical entries as the corresponding English verbs, i.e. the one in (27). Although *preguntar* ‘ask’ may have *que* at the beginning of embedded interrogative as in (16a), this need not be specified in the subcategorization of the verb, since *que* appear only optionally. By underspecifying the MARKING value of its complement clause, both [MARKING *unmarked*] and [MARKING *que*] become possible for the complement S. Consequently, by treating *que* as a purely functional element only relevant to the syntactic form of a phrase, the proposed analysis accounts for the optional presence of *que* for the *preguntar* class, which was pointed out as one of the problems with Suñer.

As for the *saber* ‘know’ class, *que* does not appear when it takes an

embedded question, while it does with a declarative complement. Accordingly, the lexical entry of *saber* should look like the following:

(29) *saber* 'know'

- a. $\left[\begin{array}{l} \text{COMPS} \langle \text{S}[\textit{que}]:\boxed{2}[\textit{MODE assertion}] \rangle \\ \text{CONT|ISSUE|NUC} \left[\begin{array}{l} \textit{know} \notin \textit{resolutive} \\ \text{ER } \boxed{1} \\ \text{SOA} - \text{ARG } \boxed{2} \end{array} \right] \end{array} \right]$
- b. $\left[\begin{array}{l} \text{COMPS} \langle \text{S}[\textit{unmarked}]:\boxed{2}[\textit{MODE question}] \rangle \\ \text{CONT|ISSUE|NUC} \left[\begin{array}{l} \textit{know} \in \textit{resolutive} \\ \text{ER } \boxed{1} \\ \text{SOA} - \text{ARG } \boxed{2} \end{array} \right] \end{array} \right]$

Next, the lexical entries of the other two classes of verbs taking an interrogative complement can be described as follows:

(30) *tartarmudear* 'stutter'

- $\left[\begin{array}{l} \text{COMPS} \langle \text{S}[\textit{que}]:\boxed{2}[\textit{MODE assertion} \vee \textit{question}] \rangle \\ \text{CONT|ISSUE|NUC} \left[\begin{array}{l} \textit{stutter} \notin \textit{resolutive} \\ \text{ER } \boxed{1} \\ \text{SOA} - \text{ARG } \boxed{2} \end{array} \right] \end{array} \right]$

(31) *repetir* 'repeat'

- a. $\left[\begin{array}{l} \text{COMPS} \langle \text{S}[\textit{que}]:\boxed{2}[\textit{MODE assertion} \vee \textit{question}] \rangle \\ \text{CONT|ISSUE|NUC} \left[\begin{array}{l} \textit{repeat}_1 \notin \textit{resolutive} \\ \text{ER } \boxed{1} \\ \text{SOA} - \text{ARG } \boxed{2} \end{array} \right] \end{array} \right]$
- b. $\left[\begin{array}{l} \text{COMPS} \langle \text{S}[\textit{unmarked}]:\boxed{2}[\textit{MODE question}] \rangle \\ \text{CONT|ISSUE|NUC} \left[\begin{array}{l} \textit{repeat}_2 \in \textit{resolutive} \\ \text{ER } \boxed{1} \\ \text{SOA} - \text{ARG } \boxed{2} \end{array} \right] \end{array} \right]$

For the *repetir* class verbs that may take either QI or RI as complements, two separate entries should be posited as in (31), so that they respectively involve resolutive and non-resolutive relations.

5. Complementizer Selection

In the previous sections, I have shown that Spanish verbs taking sentential complements are required to specify the occurrence of a particular complementizer in addition to the semantic type of the complement clauses. This conclusion is based on the observation that the use of a particular

complementizer is not always dependent upon the semantic interpretation of the embedded clause. In this section, I will argue that this kind of complementizer selection by matrix verbs is not confined to Spanish. Examination of English and Korean data also reveals that there are cases in which the occurrence of a particular complementizer cannot be predicted by any other syntactic/semantic characteristics of the complement clauses and thus must be specified in the lexical entries of verbs.

5.1. English *whether* and *if*

It has been noted that *whether* and *if* in English embedded interrogatives exhibit distributional differences. In general, the appearance of *if* is more restricted than *whether*. While there has been some effort to explain the difference between the *whether*-clause and *if*-clause in terms of semantic/pragmatic difference (Bolinger 1978), no clear distinction has been made. On the other hand, Nakajima (1996, 1998) points out a syntactic factor with respect to the distributional asymmetry. He observes that *whether* can occur after the heads P, N, and V, while *if* can appear only after V.

- (32) His donation depends upon whether/*if he will win the lottery or not.
- (33) The question whether/*if he will donate money to us or not is important.
- (34) I don't know whether/if he will donate money to us or not.

These kinds of examples imply that a complementizer is selected by a lexical head.⁶

More strong evidence for complementizer selection comes from the fact that, even among verbs, there exists a distributional difference. The following examples are from Bolinger (1978):

- (35) I wish he could justify whether/*if he actually needed to.

⁶ Nakajima (1998) argues that the same pattern of complementizer selection is also exhibited in concessive expressions *irrespective of*, *no matter*, and *never mind*, which involve a P, N, and V head, respectively. While a *whether*-clause may appear after all of these expressions, an *if*-clause is allowed only after the V head in *never mind*.

- (36) a. They are investigating whether/*if it is true.
 b. I was unable to interpret whether/*if it meant right of left.
 c. I'm studying whether/*if I should take that line of action.
 d. I'm weighing whether/*if I should take that line of action.

The matrix verbs in (36) take an interrogative complement while the verb *justify* in (35) does not. In both cases, only *whether* is possible in the embedded yes-no interrogatives. In these examples, it is not predictable what class of verbs take *whether*-clauses, but not *if*-clauses. Therefore, the most straightforward way to describe the asymmetry is to specify the form of a complementizer in the lexical entry of a head that selects it.

Another point to be noted is that, as examples like (35) illustrate, the use of *whether* is not always confined to an indirect question. As discussed in Yoo (2000), a handful of other predicates such as *doubt*, *deny*, *question*, *suspicious*, *dubious*, *doubtful*, and *questionable* also take *whether* or *if* for their embedded clauses that are semantically not a question. Thus verbs like *doubt* allow *whether*-, *if*-, and *that*- clauses as their declarative complements.

- (37) I doubt that/whether/if they serve breakfast.

Examples like (35) and (37) show that complementizer selection is not always dependent upon the semantic selection of the complement. Therefore, as in the Spanish cases, we need to specify the MARKING value of the complement in addition to its CONT value. I take *whether* and *if* to be markers that have the following CATEGORY value:⁷

- (38) *whether/if*
 [HEAD *marker* [SPEC S [MODE \neg *wh*]]]
 [MARKING *whether/if*]

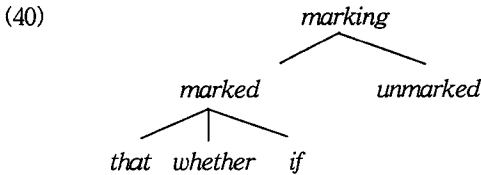
The markers *whether* and *if* cannot combine with a *wh*-question, so the MODE value of the following S must not be *wh*. On the other hand, (38) does not prevent *whether/it* from preceding a clause of [MODE *assertion*]. Likewise, the marker *that* cannot combine with a question, but only with an

⁷In (38), the MAKING value *whether/if* should be interpreted as the respective values *whether* and *if* for the markers *whether* and *if*.

S whose MODE is of the sort *assertion*. This is guaranteed via the following description:

- (39) *that*
 [HEAD *marker* [SPEC S[MODE *assertion*]]]
 [MARKING *that*]

For the MARKING value of English, we posit the following sort hierarchy:⁸



In the previous section, lexical entries of the verbs *believe*, *ask*, and *know* are provided in (26)~(28). We now need a slight revision of the entries of *believe* and *know*, so that the declarative complements of these verbs are optionally marked with *that*, but not with *whether* or *if*.

- (41) *believe* (revised)
- | |
|--|
| [COMPS < S: [2] [<i>that</i> ∨ <i>unmarked</i> , [MODE <i>assertion</i>]] >] |
| [CONT ISSUE NUC [<i>believe</i> ≠ <i>resolutive</i>]] |
| [ER [1]] |
| [SOA – ARG [2]]] |

- (42) *ask* (= (27))
- | |
|---|
| [COMPS < S: [2] [MODE <i>question</i>] >] |
| [CONT ISSUE NUC [<i>ask</i> ≠ <i>resolutive</i>]] |
| [ER [1]] |
| [SOA – ARG [2]]] |

⁸ This hierarchy is somewhat simplified in that an infinitival complementizer *for* and conjunctions such as *than* and *as* (if they are truly markers) are not included. Since the distribution of these complementizers is far more restricted and only occurs with a declarative clause, discussion of their distribution is not directly relevant here. For the account of a handful of verbs that take a *for*-marked infinitival clause (e.g. *prefer*, *want*, *like*, and *intend*), two subsorts *s(entential)-comp* and *i(nfinitival)-comp* can be posited for the sort *marked*, where *for* is *i-comp* and the others belong to *s-comp*. With such a distinction, verbs taking declarative complements can be specified with appropriate MARKING values.

(43) *know* (with (a) revised)

- a. $\left[\begin{array}{l} \text{COMPS } \langle \text{S:} \boxed{2} [\textit{that} \vee \textit{unmarked}, [\text{MODE } \textit{assertion}]] \rangle \\ \text{CONT|ISSUE|NUC } \left[\begin{array}{l} \textit{know} \notin \textit{resolutive} \\ \text{ER } \boxed{1} \\ \text{SOA} - \text{ARG } \boxed{2} \end{array} \right] \end{array} \right]$
- b. $\left[\begin{array}{l} \text{COMPS } \langle \text{S:} \boxed{2} [\text{MODE } \textit{question}] \rangle \\ \text{CONT|ISSUE|NUC } \left[\begin{array}{l} \textit{know} \in \textit{resolutive} \\ \text{ER } \boxed{1} \\ \text{SOA} - \text{ARG } \boxed{2} \end{array} \right] \end{array} \right]$

On the other hand, the entries of the verbs taking an embedded question (i.e. *ask* and *know*), remain unchanged, as in (42) and (43b). Since the MARKING values of the complement S are underspecified, in principle, they can be any of the values in (40). However, when used in sentences, the marker *that* does not appear with a question, due to (39). The MARKING value is *unmarked* when the complement S is a *wh*-question.⁹

As for the verb *doubt* in (37), it takes an assertion with any of the three markers, so the MARKING value of its complement can be simply specified as *marked*.

(44) *doubt*

[COMPS <S[*marked*, [MODE *assertion*]]>]

Meanwhile, since the verbs in (35)-(36) do not take *if*-clauses, the MARKING of their complements should be restricted to *whether*:

(45) *justify*

[COMPS <S[*whether*, [MODE *assertion*]]>]

(46) *interpret/investigate/study/weigh*

[COMPS <S[*whether* ∨ *unmarked*, [MODE *question*]]>]

⁹ We still need to block the possibility that the complement S is both *unmarked* and [MODE *polar*]. While we do not introduce a type hierarchy of clause, and its subtypes such as *wh-int(errogatives)*, *inv(erted)-yes/no-int(errogatives)*, and *subord(inate)-yes/no-int(errogatives)* in this paper, it is necessary in explaining syntactic properties of questions such as inversion (Ginzburg & Sag (to appear), Yoo (1997)). For an embedded yes/no interrogatives, the following constraint (i) is proposed for the type *subord-yes/no-int* in Yoo (1997, 2000), and this independently needed constraint can account for why embedded polar questions can't be unmarked:

(i) *subord-yes/no-int*. → [INV-, *whether* ∨ *if*]

Again, the *unmarked* value in (46) is needed for the case of embedded *wh*-questions.

So far I have argued that selection of a particular complementizer in English can be explained by the lexical specification of the MARKING value. I have also shown that such specification is also necessary in accounting for the “unusual” combination of the complementizers *whether/if* and a declarative clause.

5.2. A Sentential Complementizer in Korean

It is well known that question endings play a central role in determining *wh*-scope in Korean. In transformational approaches, such question endings are typically analyzed as the head of a functional category (IP, CP, or M(ood)P, depending on analyses). Within traditional grammar or nonderivational frameworks, by contrast, they are usually treated as verbal suffixes. Consider the following:¹⁰

- (47) Ne-nun [Minho-ka nwukwu-lul manna-ss-ta-ko]
 you-TOP Minho-NOM who-ACC meet-PST-DC-COMP
 al-ko iss-ni?
 know is-Q
 ‘(Lit.) Who do you know that Minho has met?’

- (48) Ku-nun [nwuka ttena-ss-nunci] al-ko iss-ta.
 he-TOP who leave-PST-Q know is-DC
 ‘He knows who left.’

Although the verb *al-ko iss* ‘know’ in (47-48) may take either a declarative or interrogative complement, in (47), only the matrix reading of the *wh*-phrase is possible, while in (48), only the embedded reading is available. Thus scoping of *wh*-operators is possible only at a clause with a question ending Q.

¹⁰ As an anonymous reviewer points out to me, the English translations in (47) and (51c) are merely close translations of the Korean examples, and do not reflect the semantic difference between *know* and *al*-‘know’ with respect to the factivity of their complements. However, this does not affect our discussion of complementizer selection. See Lee (1988) for the discussion of the Korean verb *al*-‘know’ and its factive/non-factive status.

In embedded questions, the ending *-(n)unci* is most common, although *-(n)unka*, *-na*, or *-nya* can be used in its place. However, when the complementizer *-ko* is used in an embedded clause, only *-nya* is possible as a question marker. Moreover, only a subset of verbs taking interrogative complements can combine with an embedded question with the complementizer *-ko*.

- (49) a. Minho-nun [nwuka ttena-ss-nya]-ko mwul/ttaci-ess-ta.
 Minho-TOP who leave-PST-Q-COMP ask/inquire-PST-DC
 'Minho asked/inquired who left.'
- b. Minho-nun [nwuka ttena-ss-nunci] mwul/ttaci-ess-ta.
 Minho-TOP who leave-PST-Q-ACC ask/inquire-PST-DC
- (50) a. *Na-nun [nwuka ttena-ss-nya]-ko kwungkumha-ta.
 I-TOP who leave-PST-Q-COMP wonder-DC
 'I wonder who left.'
- b. Na-nun [nwuka ttena-ss-nunci] kwungkumha-ta.
 I-TOP who leave-PST-Q-NOM wonder-DC
- (51) a. *Minho-nun [nwuka ttena-ss-nya]-ko
 Minho-TOP who leave-PST-Q-COMP
 a(l)/kiekha-n-ta.
 know/remember-NONPST-DC
 'Minho knows/remembers who left.'
- b. Minho-nun [nwuka ttena-ss-nunci]
 Minho-TOP who leave-PST-Q-ACC
 a(l)/kiekha-n-ta.
 know/remember-NONPST-DC
- c. Minho-nun [Yenghi-ka ttena-ss-ta]-ko
 Minho-TOP Yenghi-NOM leave-PST-DC-COMP
 a(l)/kiekha-n-ta.
 know/remember-NONPST-DC
 '(Lit.) Minho knows/remembers that Yenghi left.'

One might suspect that the foregoing contrast arises from a requirement that embedded clauses followed by *-ko* be quoted sentences, the matrix verbs being reportorial. However, there is evidence that *-ko* in (49a) is not a quotation ending. As shown in (52b, c), there is a difference between an

indirect question marked by *-ko* and a quoted question which is typically marked by *-lako* or *-hako*:

- (52) a. Na-nun sensayng-nim-kkey [Minho-ka ttena-ss-nya]-ko
 I-TOP teacher-HON-to Minho-NOM leave-PST-Q-COMP
 yeccwue po-ass-ta.
 ask(hon.) try-PST-DC
 'I asked the teacher whether Minho left.'
- b. #Na-nun sensayng-nim-kkey [Minho-ka ttena-ss-nya]-lako
 I-TOP teacher-HON-to Minho-NOM leave-PST-Q-QUOT
 yeccwue po-ass-ta.
 ask(hon.) try-PST-DC
- c. Na-nun sensayng-nim-kkey [Minho-ka
 I-TOP teacher-HON-to Minho-NOM
 ttena-ss-upnikka]-lako yeccwue po-ass-ta.
 leave-PST-Q(hon.)-QUOT ask(hon.) try-PST-DC
 'I asked the teacher whether Minho left.'

Example (52b) is not appropriate because of the wrong selection of the question ending in the quoted question.¹¹ Since the question is asked to a teacher, a respected (honored) person, the question ending should be an honorific form *-upnikka* as in (52c). On the other hand, in the embedded question in (52a), such an anomaly does not occur.

Another reason why *-ko* should not be analyzed as a quotation marker in (49) comes from the distributional difference between *-lako* and *-ko*. Unlike quotational *-lako*, which is used with any question ending, the element *-ko* appears only after a particular form of a question ending, i.e. *-nya*. Based on the foregoing observations, I conclude that *-ko* in (49a) as well as in other examples is a complementizer rather than a quotation ending.

Given that *-ko* is a complementizer, we need to find a way to describe the contrast in (49)-(51). Since only some verbs taking an interrogative complement introduce a complementizer, we have to specify this in the lexical entries. Like English *that* or Spanish *que*, the complementizer *-ko* can be analyzed as a marker in HPSG. Assuming the MARKING value can be partitioned into *ko* and *unmarked*, then the COMPS value of the verbs

¹¹ The symbol '# ' in (52b) indicates that the example is pragmatically anomalous, although not ungrammatical.

in (49–51) can be described as follows:¹²

- (53) *mwut-* ‘ask’
 [COMPS<S[MODE *question*]>]
- (54) *kwungkumha-* ‘wonder’
 [COMPS<S[*unmarked*, [MODE *question*]]>]
- (55) *kiekha-* ‘remember’
 a. [COMPS<S[*unmarked*, [MODE *question*]]>]
 b. [COMPS<S[*ko*, [MODE *assertion*]] >]

In (53), the MARKING value of the complement S is underspecified, which means it can be either *ko* or *unmarked*. With the lexical information in (53–55), we can account for the syntactic and semantic form of sentential complements.

6. Conclusion

In this paper, I have discussed what information the lexicon must contain to account for selection of sentential complements. First of all, specification of the semantic type of complements is required. Besides the well-known distinction between propositions and questions, I have argued that the QI vs. RI difference in the interpretation of embedded questions should be

¹² It is also possible to analyze the complementizer *-ko* as a verbal suffix in Korean (Cho & Sells 1995, Kim 1998). On the other hand, treating *-ko* as a marker has potential advantage in that it may explain why *-ko* marked clauses cannot have a case marker:

- (i) *Minho-nun [nwuka ttena-ss-nya]-ko-lul mwul-ess-ta.
 Minho-TOP who leave-PST-Q-COMP-ACC ask-PST-DC
 ‘Minho asked who left.’

Under the assumption that Korean case endings are markers in HPSG, the ungrammaticality of (i) can be accounted for by the property of the case marker *-lul* which combines with only unmarked phrases. While morphological status of complementizer *-ko* and case markers in Korean is an interesting issue, we will not pursue this issue here. Whether *-ko* is treated as a complementizer or a verbal suffix, we have a way to specify the presence of *-ko* in embedded questions.

indicated. Rather than further dividing questions into two types, the proposed analysis expresses the difference in terms of the classification of *qfpsoa* into resolutive and non-resolutive relations. Therefore, although 'ask' and 'know' type verbs select questions semantically, their question complements are interpreted as one of QI and RI, depending on the type of the relation the verb belongs to. Moreover, based on Spanish, English, and Korean data, I have claimed that selection of a particular complementizer must also be specified in the lexical entries of verbs. It has been shown that complementizer selection can be explained neatly by making use of the MARKING feature in HPSG and the mechanism of feature underspecification.

This paper focuses on the selection of embedded questions and propositions, and the cases of embedded exclamations and commands still need to be investigated. The issues of NP concealed questions should be addressed as well for a richer theory of embedded question selection. Although examination of a wider range of verb complements might require some modification/addition in the lexical entries of verbs, the proposed account manifests that the theory has capacity to contain various kinds of morphological, syntactic, and semantic selection in the lexicon. It remains to be investigated how the proposed account can be connected to suitable semantic interpretations using a semantic theory, and what other kinds of lexical selection exist in the subcategorization frames of verbs.

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ABSTRACT

Embedded Interrogatives and Selection of Sentential Complements in the Lexicon

Eun-Jung Yoo

Combination properties of predicates and their complements have been long-standing issues for a theory of selection and/or subcategorization. This paper deals with verbs taking sentential complements, especially those occurring with embedded questions, and discusses what syntactic/semantic characteristics need to be specified in the lexicon to explain selectional properties of those verbs. Depending on the classes of embedding verbs, interrogatives are interpreted as either genuine questions or (resolving) answers to questions, which Suñer(1993) accounts for by $[\pm\text{Qu}]$ distinction of embedded questions, indicated in the subcategorization frames of verbs.

This paper points out problems with Suñer's proposal, and provides lexical entries of verbs in which such distinction is manifested by two different verb relations, resolute and non-resolute. With the MARKING feature in HPSG, the proposed analysis also accounts for the distribution of the complementizer *que* in Spanish, which remains problematic in Suñer. Further investigation of English and Korean data shows that complementizer selection needs to be specified lexically in these languages as well, by the account based on the MARKING feature and feature underspecification.

Department of English Language and Literature
Seoul National University
San 56-1 Sillim-dong, Kwanak-ku
Seoul 151-742, Korea
E-mail : ejyoo@snu.ac.kr