

VERBS WITH SENTENTIAL COMPLEMENTS AND SELECTION INFORMATION IN THE LEXICON

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요약

1. Introduction

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. While it has sometimes been argued that categorial selection of a verb can be predictable from semantic properties of the verb (Pesetsky 1982), this paper takes the perspective of Grimshaw (1979), Webelhuth (1992), and Odjik (1997) that both categorial and semantic selection is necessary.

The first goal of this paper is to answer how to distinguish semantic types of sentential complements in the lexicon, and in particular how to incorporate the observation that embedded interrogatives are interpreted in two different ways. In contrast to Suñer's (1993) analysis which employs [\pm Qu] distinction of embedded questions, this paper claims that the semantic distinction can be manifested by two different verb relations, *resolutive* and *non-resolutive* in the lexical entries of the verbs within the framework of Head-Driven Phrase Structure Grammar (HPSG).

Second, this paper claims that categorial selection of \bar{S} is not enough for predicting the correct syntactic forms of the sentential complements; in some cases, a particular

complementizer is selected by the matrix verb, which does not always show correspondence with the 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. In the proposed analysis, such complementizer selection is included as part of subcategorization information of verbs in the lexicon by using the MARKING feature and feature underspecification mechanism in HPSG.

2. Selection Information

In this section, I will discuss the syntactic and semantic properties of sentential complements that need be selected by the verbs. I show that while semantic types of the complements is essential with respect to selection information, syntactic characteristics such as presence of a complementizer, use of specific forms of complementizers, and mood distinction must be incorporated as well in the precise theory of complement selection.

2.1. Semantic Types of Sentential Complements

It is well known that verbs with sentential complements exhibit selectional restrictions with respect to the semantic types of sentential complements.

- (1) a. Mary believed that Sandy met John. (proposition)
- b. Mary asked whom Sandy met. (question)
- c. Mary told John what a brave boy he was. (exclamation)

Some verbs take only questions as complements, some verbs take only declaratives, and others take either of these.

- (2) a. Mary believed/thought that Sandy met John.
- b. *Mary believed/thought whom Sandy met.
- c. *Mary believed/thought whether Sandy met John.
- (3) a. Mary asked/wondered whom Sandy met.
- b. Mary asked/wondered whether Sandy met John.
- c. *Mary asked/wondered that Sandy met John.
- (4) a. Mary knew/remembered whom Sandy met.
- b. Mary knew/remembered whether Sandy met John.
- c. Mary knew/remembered that Sandy met John.

For embedded interrogatives in (5), further semantic distinction is possible depending on whether they are interpreted intensionally (as a 'question') or extensionally (as an 'answer to the given question'). (Cf. Groenendijk & Stokhof 1982, Suñer 1993, and Ginzburg 1995a,b).

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

2.2. Syntactic Properties

2.2.1. Occurrence of a Complementizer

Embedded clauses may or may not have a complementizer. In English, for example, a complementizer is optional for bridge verbs with declarative complements, while it is required for indirect polar questions.

- (6) a. Sandy thought that John bought a book.
b. Sandy thought John bought a book.
- (7) Sandy wondered whether/if John bought a book.

Unlike English, Spanish allows the occurrence of a complementizer for *wh*-complements. Since this possibility is limited to a certain class of verbs, this must be explained in terms of selectional properties of verbs.

- (8) Sandy asked *(that) which country John had visited.
- (9) a. Preguntaron (que) quin camina dormino.
'(Lit.) They asked (that) who walks in his sleep.'
b. Susurraron *(que) quin camina dormino.
'(Lit.) They whispered (=asked whispering) that who walks in his sleep.'

2.2.2. Complementizer forms

It should also be noted that verbs may differ in allowing particular forms of complementizers. As shown in (10-11), even for the same semantic type of sentential complements (i.e., propositions), different choices can be made about the complementizers.

- (10) I believe that they serve breakfast.
- (11) I doubt that/whether/if they serve breakfast.
- (12) I wish he could justify whether/*if he actually needed to. (Bolinger 1978)

2.2.3. Mood & mood markers

In English, there is a mood distinction between indicative and subjunctive as in (13):

- (13) a. Mary believes that John exercises regularly.
 b. Mary suggests that John exercise regularly.

Following Ginzburg & Sag (to appear), we assume that such distinction can be specified via the MOOD value whose partitions involves *declarative*, *interrogative*, and *imperative*. Since the type *declarative* is further partitioned into *indicative* and *subjunctive*, the complements in (13a) and (13b) can be specified as [MOOD *indicative*] and [MOOD *subjunctive*], respectively.

In Korean, besides the basic mood distinction, some additional information is needed for the mood marker forms. For example, only some verbs with interrogative complements allow the question marker *-nya*.

- (14) 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. *Na-nun [nwuka ttena-ss-nya-ko] kwungkumha-ta.
 I-TOP who leave-PST-Q-COMP wonder-DC
 'I wonder who left.'

More examples on the distribution of mood markers will be discussed in section 5.

In the next section, I will examine two different ways to manifest sentential complement selection. The first approach is to distinguish sentential complements based on a particular set of features and to classify predicates in terms of the complement types. The other is to recognize the differences in both the complement types and the predicates. I will argue that the latter approach is more appropriate for the manifestation of detailed characterization of sentential complements.

3. Verbs with Sentential Complements

3.1. Selection via Classification of Sentential Complements

Suñer (1993) argues that Spanish embedded clauses can be explained in terms of different semantic types, and that Spanish exhibits strong syntactic evidence for the semantic classification. Following G&S (1989), Suñer notes that there are two different ways to interpret embedded questions, which can be shown by different paraphrases of the questions. For example, (5a) can be paraphrased as 'Mary asked the question how many

countries John had visited,' whereas (5b) can be paraphrased as 'Mary knows the answer to how many countries John visited.' In Suñer, the embedded questions in (5a) and (5b) 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 <s,t> and <s,<s,t>>, which are expressed in terms of [-Qu] and [+Qu] features in her analysis.

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 [±WH(-phrase)] and [±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 (15) holding between syntactic forms and semantic types of complements, the verb classes in Spanish are represented in (16):

- (15) a. [-wh] → [-Qu]
 b. [+Qu] → [+wh]
- (16) 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

The following examples from Suñer illustrate the five classes of predicates and their complement types:

- (17) a. Mara cre a que quedaban diez d as para las vacaciones.
 'Mara believed that there remained ten days for the holidays.'
 b. *Mara cre a cu ntos d as quedaban para las vacaciones.
 '(Lit.) Mara believed how many days remained for the holidays.'
- (18) a. Pepe pregunt (que) cuntos pa ses hab amos recorrido.
 '(Lit.) Pepe asked (that) how many countries we had visited.'
 b. *Pepe pregunt que hab amos recorrido ocho pa ses.
 '(Lit.) Pepe asked that we had visited eight countries.'

- (19) a. Sab an que yo iba a darles una prueba el martes.
'They knew that I was going to give them a test.'
- b. Sab an cu ndo iba a darles una prueba el martes.
'They knew when I was going to give them a test.'
- (20) a. El nio tartamude que se hab a peleado con su mejor amigo.
'The boy stuttered that he had fought with his best friend.'
- b. El nio tartamude que con quin se hab a peleado Luis.
'(Lit.) The boy stuttered (=asked stuttering) that with whom Luis had fought.'
- (21) a. Repitieron no quer an ir.
'They repeated that they didn't want to go.'
- b. Repitieron cu ndo llegaran.
'They repeated when they would arrive.'
- c. Repitieron que a cu ntos hab amos invitado.
'(Lit.) They repeated (=asked repeatedly) that how many we had invited.'

While the verbs in (17-19) show patterns analogous to English verbs *believe*, *ask*, and *know*, respectively, the verbs *tartamudear* 'to stutter' in (20) and *repetir* 'to repeat' in (21) 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 (19b), (21b) are semi-questions of the semantic type $\langle s,t \rangle$, while those in (18a), (20b) and (21c) 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.

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.

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

Suñer explains that *que* is optional in (22a) because *que* can be null C [+Qu, +wh]. However, this still doesn't account for the contrast in (22), since there is no reason why such a null C cannot appear in (22b). 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'.

- (23) 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. 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 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.

Finally, 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.

3.2. Classification of Embedded Complements and Predicates

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 resolutive 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 resolutive 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.

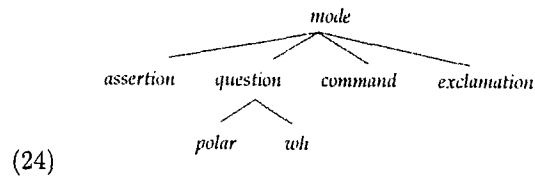
What kinds of semantic objects QI or RI complements denote is a purely semantic issue and beyond the scope of this paper; however, I would like to note that Ginzburg's account is based on recognizing different kinds of predicates, as in G&S's (1982). Moreover, I take Ginzburg's discussion to imply that, 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.

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. Representing Semantic Selection of Sentential Complements in HPSG

In this section, I will propose how to represent semantic 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:



Now we can distinguish three types of predicates in (2-4) 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 *qfpsoa* (*quantifier-free parameterized-state-of-affairs*). Each *qfpsoa* expresses a verb relation such as *love*, *eat*, and *believe*, etc.

Following Barber (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. $R \notin \text{resolutive}$).¹

¹ 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.

On the basis of the discussion so far, the contrast in the interpretation of embedded interrogatives in (5) can be explained by the distinct lexical entries of the verbs, *ask*, and *know*:

$$(25) \text{ ask (for (5a))}$$

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

$$(26) \text{ know (for (5b))}$$

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

In (25), the *ask* relation is not *resolutive*, so the CONT—NUC will be simply interpreted as ‘ $\boxed{1}$ asks $\boxed{2}$.’ On the other hand, in (26), the *know* relation belongs to the *resolutive* type. Accordingly, the CONT|NUC will be interpreted as $\boxed{1}$ ‘knows the answer to the question expressed by $\boxed{2}$.’

5. Syntactic Aspects of Sentential Complement Selection

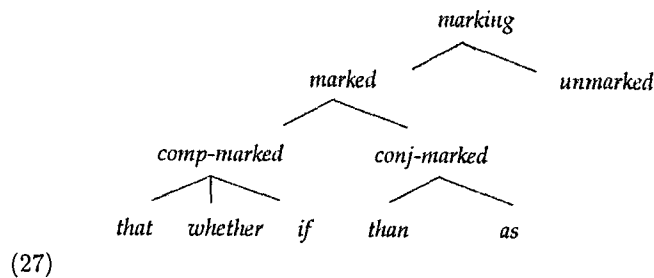
5.1. English Complementizers

In Pollard & Sag (1994), the complementizer *that* is treated as a “marker”, a functional head that selects its sister via the SPEC(IFIED) feature. A phrase with a marker is licensed by the *head-marker-structure*, in which the marker daughter is treated as a non-head. Unlike other lexical heads that are *unmarked*, markers have *marked* as their MARKING value. Since the type *marked* has subsorts of its own such as *that*, the complementizer *that* is [MARKING *that*]. By the Marking Principle, when there is a marker daughter, the MARKING value of a phrase is structure-shared with that of the marker daughter.

On the other hand, Sag (1997) and Ginzburg & Sag (to appear) treat the complementizer *that* as a subtype of *verbal*, which is partitioned into *verb* and *comp*. Accordingly, complementizers, which is [HEAD *comp*], bears the VFORM and AUX features just like verbs. In a tree structure, the complementizer combined with a clause form a

head-complement-phrase where the complementizer is the syntactic head. In contrast to Pollard & Sag, Sag's (1997) analysis does not employ the MARKING feature. A *that*-clause is distinguished from a *that*-less clause, because the former is S[fin], while the latter is CP[fin].

In the present analysis, I make slightly different assumptions from both Pollard & Sag (1994) and Sag (1997). While I take the position that a complementizer is a syntactic head in a phrase, I assume that the MARKING feature is available, so that particular complementizer forms can be specified. For the MARKING value of English, we posit the following sort hierarchy:



I claim that the employment of the MARKING feature is necessary for the specification of complementizer forms, because there are cases in which the occurrence of a particular complementizer cannot be predicted by any other syntactic/semantic characteristics of the complement clauses.

In particular, interrogative complementizers *whether* and *if* exhibit distributional differences. Generally speaking, 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.

(28) His donation depends upon whether/*if he will win the lottery or not.

(29) The question whether/*if he will donate money to us or not is important.

(30) 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.

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):

- (31) I wish he could justify whether/*if he actually needed to.
- (32) 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 (32) take an interrogative complement while the verb *justify* in (31) 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 (31) illustrate, the use of *whether* is not always confined to an indirect question. 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.

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

Examples like (31) and (33) show that complementizer selection is not always dependent upon the semantic selection of the complement. Therefore, we need to specify the MARKING value of the complement in addition to its CONT value.

In the present analysis, the complementizer *that* is analyzed as a syntactically and semantically "vacuous" head, such that its HEAD and CONT values are structure-shared with those of their complements. This is shown in the following lexical entry of *that*:

- (34) *that*
- $$\left[\begin{array}{l} \text{CAT} \left[\begin{array}{l} \text{HEAD } \square \\ \text{COMPS } < \text{S } [\text{unmarked}, \text{HEAD } \square \text{verb}[\text{VFORM } \textit{fin}]] : \square > \end{array} \right] \\ \text{CONT} \square \textit{assertion} \\ \text{MARKING } \textit{that} \end{array} \right]$$

This implies that both *that*-clauses and *that*-less clauses in (6) are specified as S[fin], while they differ in their MARKING values, i.e., *that* and *unmarked*, respectively. On the other hand, *whether* and *if* are of the type *comp* in terms of a part-of-speech (head) hierarchy. I take *whether* and *if* to have the following lexical descriptions:

(35) *whether*

CAT	<table style="border-collapse: collapse;"> <tr> <td style="padding-right: 10px;">HEAD</td> <td><i>comp</i></td> </tr> <tr> <td style="padding-right: 10px;">COMPS</td> <td>< S [<i>unmarked</i>]:$\mathbb{2}$[MODE \neg<i>wh</i>] ></td> </tr> </table>	HEAD	<i>comp</i>	COMPS	< S [<i>unmarked</i>]: $\mathbb{2}$ [MODE \neg <i>wh</i>] >
HEAD	<i>comp</i>				
COMPS	< S [<i>unmarked</i>]: $\mathbb{2}$ [MODE \neg <i>wh</i>] >				
CONT	$\mathbb{2}$				
MARKING	<i>whether</i>				

(36) *if*

CAT	<table style="border-collapse: collapse;"> <tr> <td style="padding-right: 10px;">HEAD</td> <td><i>comp</i></td> </tr> <tr> <td style="padding-right: 10px;">COMPS</td> <td>< S[<i>fn</i>, <i>unmarked</i>]:$\mathbb{2}$[MODE \neg<i>wh</i>] ></td> </tr> </table>	HEAD	<i>comp</i>	COMPS	< S[<i>fn</i> , <i>unmarked</i>]: $\mathbb{2}$ [MODE \neg <i>wh</i>] >
HEAD	<i>comp</i>				
COMPS	< S[<i>fn</i> , <i>unmarked</i>]: $\mathbb{2}$ [MODE \neg <i>wh</i>] >				
CONT	$\mathbb{2}$				
MARKING	<i>if</i>				

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

(37) *believe*

COMPS	< S[<i>fn</i>]: $\mathbb{2}$ [MODE <i>assertion</i>] >					
CONT NUC	<table style="border-collapse: collapse;"> <tr> <td style="padding-right: 10px;"><i>believe</i> \notin <i>resolutive</i></td> </tr> <tr> <td style="padding-right: 10px;">ER</td> <td>$\mathbb{1}$</td> </tr> <tr> <td style="padding-right: 10px;">SOA-ARG</td> <td>$\mathbb{2}$</td> </tr> </table>	<i>believe</i> \notin <i>resolutive</i>	ER	$\mathbb{1}$	SOA-ARG	$\mathbb{2}$
<i>believe</i> \notin <i>resolutive</i>						
ER	$\mathbb{1}$					
SOA-ARG	$\mathbb{2}$					

(38) *ask*

COMPS	< S \vee CP: $\mathbb{2}$ [MODE <i>question</i>] >					
CONT NUC	<table style="border-collapse: collapse;"> <tr> <td style="padding-right: 10px;"><i>ask</i> \notin <i>resolutive</i></td> </tr> <tr> <td style="padding-right: 10px;">ER</td> <td>$\mathbb{1}$</td> </tr> <tr> <td style="padding-right: 10px;">SOA-ARG</td> <td>$\mathbb{2}$</td> </tr> </table>	<i>ask</i> \notin <i>resolutive</i>	ER	$\mathbb{1}$	SOA-ARG	$\mathbb{2}$
<i>ask</i> \notin <i>resolutive</i>						
ER	$\mathbb{1}$					
SOA-ARG	$\mathbb{2}$					

(39) a. *know*

COMPS	< S[<i>fn</i>]: $\mathbb{2}$ [MODE <i>assertion</i>] >					
CONT NUC	<table style="border-collapse: collapse;"> <tr> <td style="padding-right: 10px;"><i>know</i> \notin <i>resolutive</i></td> </tr> <tr> <td style="padding-right: 10px;">ER</td> <td>$\mathbb{1}$</td> </tr> <tr> <td style="padding-right: 10px;">SOA-ARG</td> <td>$\mathbb{2}$</td> </tr> </table>	<i>know</i> \notin <i>resolutive</i>	ER	$\mathbb{1}$	SOA-ARG	$\mathbb{2}$
<i>know</i> \notin <i>resolutive</i>						
ER	$\mathbb{1}$					
SOA-ARG	$\mathbb{2}$					

COMPS	< S \vee CP: $\mathbb{2}$ [MODE <i>question</i>] >					
CONT NUC	<table style="border-collapse: collapse;"> <tr> <td style="padding-right: 10px;"><i>know</i> \in <i>resolutive</i></td> </tr> <tr> <td style="padding-right: 10px;">ER</td> <td>$\mathbb{1}$</td> </tr> <tr> <td style="padding-right: 10px;">SOA-ARG</td> <td>$\mathbb{2}$</td> </tr> </table>	<i>know</i> \in <i>resolutive</i>	ER	$\mathbb{1}$	SOA-ARG	$\mathbb{2}$
<i>know</i> \in <i>resolutive</i>						
ER	$\mathbb{1}$					
SOA-ARG	$\mathbb{2}$					

As for the verb *doubt* in (33), it takes an assertion with either *that* or *whether/if*. So the following COMPS value can be assigned to it:

- (40) *doubt*
[COMPS <S ∨ CP: [MODE *assertion*]>]

Meanwhile, since the verbs in (31-32) do not take *if*-clauses, the MARKING of their complements should be restricted to *whether*:

- (41) *justify*
[COMPS <CP[*whether*]: [MODE *assertion*] >]
- (42) *interpret/investigate/study/weigh*
[COMPS <SV CP[*whether*]: [MODE *question*] >]

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.

The selection properties of Spanish verbs can be explained in a parallel way. The embedded clauses with the complementizer *que* can be specified as [MARKING *que*]. Therefore, the contrast in (9), for example, can be accounted for by distinct selectional constraints expressed in the lexical descriptions of verbs.²

- (43) *preguntar* 'ask'
[COMPS <S: [MODE *question*]>]
- (44) *susurrar* 'whisper'
[COMPS <S [*que*]: [MODE *question*] >]

In the next section, we will examine the corresponding examples in Korean, in which a complementizer element is not an independent word, but part of verbs. I will show that the MARKING feature is also useful in accounting for certain selectional restrictions on Korean embedded clauses.

5.2. Mood Markers and a Complementizer Element in Korean

In Korean mood markers play a central role in determining the semantic type of a clause.

² In (43), the MARKING value for the complement S is underspecified under the assumption that *que* is the only complementizer element in Spanish. If it turns out to be necessary to posit more subtypes for the *marking*, the S in (41) can be simply modified as 'S[*que* ∨ *unmarked*]' in order to prevent other complementizer forms.

- (45) Ne-nun [Minho-ka nwukwu-lul manna-ss-ta-ko] al-ko iss-ni?
 you-TOP Minho-NOM who-ACC meet-PST-DC-COMP know is-Q
 'Who do you know that Minho has met?'
- (46) 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 (45-46) may take either a declarative or interrogative complement, in (45), only the matrix reading of the *wh*-phrase is possible, since the embedded clause cannot be interpreted as a question. By contrast, in (46), only the embedded clause may have a question interpretation due to the presence of the question ending.

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 element *-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*.

- (47) 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
- (48) 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
- (49) a. *Minho-nun [nwuka ttena-ss-nya-ko] a(l)/kiekha-n-ta.
 Minho-TOP who leave-PST-Q-COMP know/remember-NONPST-DC
 Minho asked/inquired who left.'
- b. Minho-nun [nwuka ttena-ss-nunci] a(l)/kiekha-n-ta. Minho-TOP who leave-PST-Q-ACC know/remember-NONPST-DC
- c. Minho-nun [Yenghi-ka ttena-ss-ta-ko] a(l)/kiekha-n-ta.
 Minho-TOP Yenghi-NOM leave-PST-DC-COMP know/remember-NONPST-DC
 'Minho knows/remembers that Yenghi left.'

In the examples that we have seen so far, the mood marker *-ta* is used only for declarative sentences, but not for questions. However, in embedded questions selected by verbs such as *malha-* 'tell', *kopaykha-* 'confess', *silthoha-* 'confess', *pokoha-* 'report' and *palkhi-* 'reveal', which can be characterized as report verbs, the marker *-ta* can be used as in (50c).

- (50) a. Minho-nun [nwuka o-ass-ess-nunci] malhay/palkhi-ess-ta.
Minho-TOP who come-PST-PST-Q tell/reveal-NONPST-DC
'Minho told/revealed who had come.'
- b. *Minho-nun [nwuka o-ass-ess-nya-ko] malhay/palkhi-ess-ta.
Minho-TOP who come-PST-Q-COMP tell/reveal-NONPST-DC
- c. Minho-nun (tutie) [nwuka o-ass-ess-ta-ko] malhay/palkhi-ess-ta.
Minho-TOP at last who come-PST-Q-COMP tell/reveal-NONPST-DC
'Minho (at last) told/revealed who had come.'
- d. Minho-nun [Yenghi-ka o-ass-ess-ta-ko] malhay/palkhi-ess-ta.
Minho-TOP Yenghi-NOM come-PST-DC-COMP tell/reveal-NONPST-DC

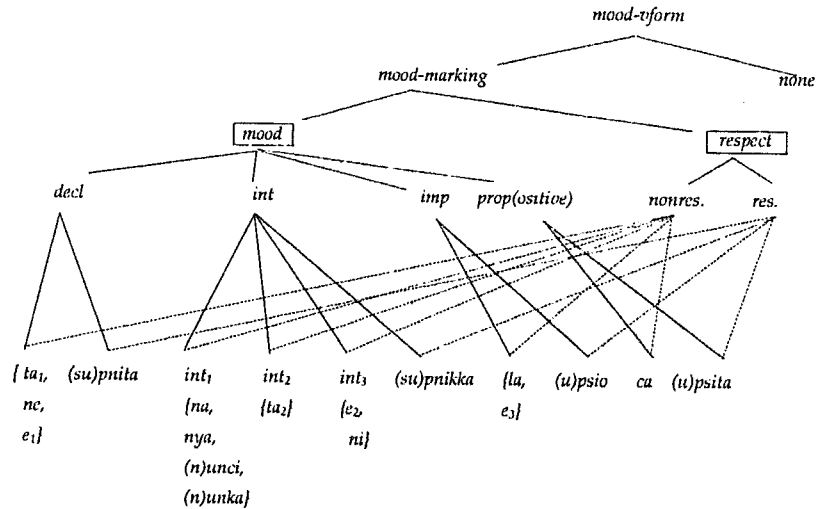
Embedded questions selected by this class of verbs are RI (resolving answer interrogative) complements, which are distinguished from QI (question interrogatives). Thus in (50c), the embedded clause is interpreted as RI. Yet it should be noted that not all RI complements can have the marker *-ta*. RI complements selected by verbs such as *al-* 'know', *kiekha-* 'remember' and *kkaytat-* 'realize' cannot have the marker *-ta*. Thus the contrast should be accounted for by selectional properties of verbs. On the other hand, in QI complements or in matrix questions, *-ta* is never used.

We now consider how to represent the selection of mood markers and/or complementizer elements by Korean verbs. In an approach that treats a mood marker and a complementizer as heads of separate functional categories, examples like (47a) are puzzling with regard to selectional properties of matrix verbs, since the selection is not local in manner. Namely, the verbs have to select an XP headed by the mood marker which is inside the CP headed by the complementizer.

From the morphological point of view, there is no evidence that these elements are clitics that claim a node in the syntactic structure as a head (Chae & No 1996). Rather these elements can be treated as verbal suffixes (Cho & Sells 1995, Kim 1998, among others).³ Based on the assumption that both mood markers and complementizer

³ Chae & No (1996) argue that *-ko* need not be treated as a separate morpheme, and can be better seen as a part of morphemes such as *-nuntako/ntako/tako*, *-nunyako/nyako*, *-ulako/lako* and *-cako*. While this analysis is plausible from the morphological point of view, and can be adopted in the present analysis, I will take the common view that it is a separate morpheme, in order to avoid

elements are verbal suffixes, their presence and specific forms can be specified using the VFORM and the MARKING features, respectively. The VFORM value is of the type *mood-vform* whose subtypes can be represented as in (51):



(51)

In (51), different mood markers are cross-classified with nonres(pect) vs. res(pect) distinction, in order to reflect that the level of respect expressed towards the addressee determines the form of mood markers. although the degree of respect can be graded into several different levels, a simplified distinction between [+Respect] and [-Respect] in Suh (1987) is adopted here.

The generalization that an interrogative clause is licensed by the presence of a question marker in the head verb can be captured by the constraint in (52).

(52) (For Korean)
 [MODE *question*] → [VFORM *int*]

Since the complementizer element *-ko* co-occurs only with particular forms of mood endings, its distribution needs to be constrained by (53).

(53) [MARKING *ko*] → [VFORM *ta1* ∨ *nya* ∨ *ta2* ∨ *la* ∨ *ca*]

Now the selectional restrictions exhibited in (47)-(50) can be represented in the lexical entries of verbs. We assume that the complementizer morpheme is specified via the MARKING value, which is partitioned into *ko* and *unmarked*.

redundant specification of mood forms (e.g. *-nya* and *-nyako*) in the type hierarchy in (51).

(54) *mwut*- 'ask'

COMPS	<S[<i>int</i> ₁]: ^② [MODE <i>question</i>] >			
CONT NUC	<table style="border: none;"> <tr> <td style="border: none;"><i>ask</i> ∉ <i>resolutive</i></td> </tr> <tr> <td style="border: none;">ER ^①</td> </tr> <tr> <td style="border: none;">SOA-ARG ^②</td> </tr> </table>	<i>ask</i> ∉ <i>resolutive</i>	ER ^①	SOA-ARG ^②
<i>ask</i> ∉ <i>resolutive</i>				
ER ^①				
SOA-ARG ^②				

(55) *kwungkumha*- 'wonder'

COMPS	<S[<i>int</i> ₁ , <i>none</i>]: ^② [MODE <i>question</i>] >			
CONT NUC	<table style="border: none;"> <tr> <td style="border: none;"><i>wonder</i> ∉ <i>resolutive</i></td> </tr> <tr> <td style="border: none;">ER ^①</td> </tr> <tr> <td style="border: none;">SOA-ARG ^②</td> </tr> </table>	<i>wonder</i> ∉ <i>resolutive</i>	ER ^①	SOA-ARG ^②
<i>wonder</i> ∉ <i>resolutive</i>				
ER ^①				
SOA-ARG ^②				

(56) a. *kiekha*- 'remember'

COMPS	<S[<i>decl</i> , <i>ko</i>]: ^② [MODE <i>assertion</i>] >			
CONT NUC	<table style="border: none;"> <tr> <td style="border: none;"><i>remember</i> ∉ <i>resolutive</i></td> </tr> <tr> <td style="border: none;">ER ^①</td> </tr> <tr> <td style="border: none;">SOA-ARG ^②</td> </tr> </table>	<i>remember</i> ∉ <i>resolutive</i>	ER ^①	SOA-ARG ^②
<i>remember</i> ∉ <i>resolutive</i>				
ER ^①				
SOA-ARG ^②				

b.

COMPS	<S[<i>int</i> ₁ , <i>none</i>]: ^② [MODE <i>question</i>] >			
CONT NUC	<table style="border: none;"> <tr> <td style="border: none;"><i>remember</i> ∈ <i>resolutive</i></td> </tr> <tr> <td style="border: none;">ER ^①</td> </tr> <tr> <td style="border: none;">SOA-ARG ^②</td> </tr> </table>	<i>remember</i> ∈ <i>resolutive</i>	ER ^①	SOA-ARG ^②
<i>remember</i> ∈ <i>resolutive</i>				
ER ^①				
SOA-ARG ^②				

(57) a. *malha*- 'tell'

COMPS	<S[<i>decl</i> , <i>ko</i>]: ^② [MODE <i>assertion</i>] >			
CONT NUC	<table style="border: none;"> <tr> <td style="border: none;"><i>tell</i> ∉ <i>resolutive</i></td> </tr> <tr> <td style="border: none;">ER ^①</td> </tr> <tr> <td style="border: none;">SOA-ARG ^②</td> </tr> </table>	<i>tell</i> ∉ <i>resolutive</i>	ER ^①	SOA-ARG ^②
<i>tell</i> ∉ <i>resolutive</i>				
ER ^①				
SOA-ARG ^②				

b.

COMPS	<S[<i>int</i> ₁ , <i>none</i>]: ^② [MODE <i>question</i>] >			
CONT NUC	<table style="border: none;"> <tr> <td style="border: none;"><i>tell</i> ∈ <i>resolutive</i></td> </tr> <tr> <td style="border: none;">ER ^①</td> </tr> <tr> <td style="border: none;">SOA-ARG ^②</td> </tr> </table>	<i>tell</i> ∈ <i>resolutive</i>	ER ^①	SOA-ARG ^②
<i>tell</i> ∈ <i>resolutive</i>				
ER ^①				
SOA-ARG ^②				

$$c. \left[\begin{array}{l} \text{COMPS } \langle S[\text{int}_2, ko]: \text{㉔} [\text{MODE } \textit{question}] \rangle \\ \text{CONT|NUC } \left[\begin{array}{l} \textit{tell} \in \textit{resolutive} \\ \text{ER } \text{㉑} \\ \text{SOA-ARG } \text{㉔} \end{array} \right] \end{array} \right]$$

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 indicated. Rather than further dividing questions into two types, the proposed analysis expresses the difference in terms of the classification of *qfsoa* 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.

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