SYNTACTIC AND SEMANTIC INTERFACES FOR LEXICALLY UNREALIZED RELATIONS

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1 Introduction

Studies on unified descriptions of syntactic and semantic interfaces are conducted in HPSG (Head-driven Phrase Structure Grammar), because HPSG specifies composite aspects of these linguistic layers. The SYNSEM attribute of HPSG deals mainly with lexically specified content and context meanings of elements. But further insightful study into Korean pseudo-relative constructions in which there is no gap and the types of head nouns are restricted to some specific elements, reveals that there exist internally implicated, but lexically unrealized, relations. These relations contribute to the distinction among Korean adnominalized constructions, and provide a motivation for dividing Korean adnominalized constructions into relative, appositive, and pseudo-relative constructions. However, the relations cannot be captured in the basic frames of HPSG, on the basis of lexically specified content and context such as 'person', 'number' and so on. With the preservations of typed feature structures, HPSG formalisms instead need to be extended in order to allow implicated, but necessary relations. This work suggests new descriptions that incorporate the relations into the existing HPSG frames, and specify syntactic, semantic, and pragmatic interactions. This allows us to pursue and improve the unified and integrated descriptions of linguistic phenomena previously improperly explained.

2 Data

2.1 Syntax

Traditionally methods treat Korean relative constructions as adnominal constructions. Adnominalization is a process in which nouns or noun phrases are modified by a verb phrase with adnominalized inflections. Unlike English relative clauses, there is no relative pronoun in Korean. Instead, adnominalized verbal inflections identify the constructions, and head nouns (antecedents) appear after the relative clause. These are salient syntactic traits contrasted to the English counterparts.

Korean adnominalized clauses can be reclassified as appositive constructions, relative constructions, and pseudo-relative constructions (Shin 1995:114). There are systematic differences among these constructions. Examples of pseudo-relative constructions are as follows:

(1) a mwul-na hulu-nun soh
    water-nommat1ve flow-relativizer (present) sound
    the sound in which water is flowing (i.e. the sound of water flowing)

b loma-ka pwulta-nun kwangkyeng
    Rome-nommat1ve burn- relativizer (present) view
    the view in which Rome is burning (i.e. the view of Rome burning)

c thayphwung-na cinaka-n huncek
    typhoon-nommat1ve go by-relativizer (past) trace
    the trace that the typhoon went by (i.e. the trace left behind by the typhoon)
A pseudo-relative construction is distinguished from a typical relative clause in that firstly, there is no gap in the clause, and secondly, the types of head nouns are restricted to sensory nouns such as sound, smell, and view with the present relativizer. Those constructions are also different from appositive constructions which have the same syntactic structures, that is, there is no gap in a sentence.

(2) a John-1 tola-o-n sasil
   John-nommative return-relativizer fact
   the fact that John returned

Syntactically pseudo-relative constructions and appositive constructions are identical, but in Korean, stative expression -(ta)ko ha' (say that as in English) can be added to appositive constructions, but not to pseudo-relative constructions.

(3) a *mwul-1 hulu-tako ha-nun sot
   water-nommative flow-that say-relativizer sound
b John-1 tolaw-ass-tako ha-nun sasil
   John-nommative return-past-that say-relativizer fact

In the case of appositive constructions, the head noun can be a content meaning of adnominal constructions, but pseudo-relative constructions do not contribute to the meaning of the relation. Furthermore, a genitive construction is allowed in pseudo-relative constructions, but not in appositive constructions. Nommative case markers can be replaced by genitive markers, and these genitives modify head nouns regardless of the word order.

(4) a mwul-ey hulu-nun sot b hulu-nun mwul-ey sot
   flow-relativizer water-genitive sound
   water-genitive flow-relativizer sound
   the sound of water flowing'
c *John-ey tola-o-n sasil d *tola-o-n John-ey sasil
   John-genitive return-relativizer fact return-relativizer John-genitive fact
   'the fact of John's return'

2.2 Semantics and Pragmatics

According to (1) above, pseudo-relative constructions may be divided into two cases, (1)-a,b and (1)-c,d. The differences result from internally implicated semantic properties with present and past relativizers (1)-a, b can take only present relativizer -nun, meanwhile (1)-c,d can take only past relativizer -n. The followings are examples of the wrong selection of relativizers.

(5) a *mwul-1 hulu-n sot
   water-nommative flow-relativizer(past) sound
   'the sound in which water flowed'

---

1 A typical relative construction is as follows,
   a [nay-ka _____, tta-yi-n ] John,
   l-nommative hit-relativizer John
   John who I hit

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Detailed Analysis of pseudo-relative constructions reveal two kinds of possible types, 'simultaneity(1-a, b)' which shows a simultaneous occurrence of the events, and 'resultative(1-c, d)' which specifies time differences of the events. Simultaneity types can only occur with present relativizer (-nun), whereas resultatives appear with past relativizer (-n). These two classifications are also different in terms of genitive constructions.

(6) a mwul-ey hulu-nun soli
water-genitive flow-relativizer sound
b hulu-nun mwul-ey soli
flow-relativizer water-genitive sound
' the sound of water flowing'

c John-ey kom-ul cwuki-n sichey
John-genitive bear-accusative kill-relativizer dead body
d *Kom-ul cwuki-n John-ey sichey
bear-accusative kill-relativizer John-genitive dead body

As seen in (4), in (6)-a, b, noun phrases with genitive markers are located before the head noun or the relative clause, and show no significant meaning difference. But in the case of (6)-d, the genitive phrase located before the head noun specifies 'sichey(dead body)', not 'kom(bear)', which turns out to be wrong.

Another significant semantic difference between relative constructions and pseudo-relative constructions is that a pseudo-relative clause does not specify or restrict head nouns, while a relative clause does. Rather they express simultaneous incidental situation(simultaneity type with present relativizer) or resultative situation(resultative with past relativizer). The following examples change relative constructions to predicative expressions like 'beautiful girl' to 'the girl is beautiful', and show that there are no direct relations between the head nouns and the relative clauses.

(7) a *ku soli-nun mwul-1 hulunta
the sound-topic/nommative water-nommative flow
*the sound is water flows
b *ku sichey-nun John-1 kom-ul cwukinta
the dead body-topic/nommative John-nommative bear-accusative kill
*the dead body is John Killed the bear

The simultaneity and resultative both mean that there exist pragmatic relations, such as time relations, which should be specified implicitly in order to capture unrealized relations. The event of 'Killing the bear' precedes its byproduct, head noun 'the dead body', meanwhile that of 'water flows' has a simultaneous output, 'sound'.

2.3 Unrealized Relations of Pseudo-relative Constructions

This overview of the Korean pseudo-relative constructions in terms of syntactic and semantic properties classified the structure into two types, 'simultaneity', and 'resultative'. Again, another important linguistic observation is that there exist 'causative' relations between the head noun and the
pseudo-relative construction. This makes pseudo-relative constructions distinguished from normal relative clauses. It argues that pseudo-relative constructions "cause the head noun to come to be", therefore distinguished syntactic and semantic behaviors occur in these constructions. However, this causative is not lexically realized, and this is why Korean pseudo-relative constructions should be separated from a normal relative construction whose main function is to restrict and specify head nouns.

Compare the following two constructions,

(8) a. mwul-t hulu-nun soh
   water-nominalive flow-relativizer (present) sound
   'the sound in which water is flowing (i.e., the sound of water flowing)'

b. kasum-1 senulhay-ci-nun soh
   heart-nominalive scare- passive-relativizer sound
   'the sound that makes the heart scared'

Even though the same head noun appears above, a pseudo-relative construction 'a' can cause the head noun 'soh(sound)' to happen, but that of 'b' just specifies and restricts the head noun

3 Explanations in accordance with HPSG

3.1 Syntactic and Semantic Frames of HPSG

In the present formulation of HPSG theory, all signs at minimum possess the two attributes PHON and SYNSEM. The value of PHON attribute is assumed to be some kind of feature representation of the sign's sound content that serves as the basis for phonological and phonetic interpretation (Pollard and Sag, 1994:15). The syntactic and semantic attitude of HPSG, SYNSEM has its values of LOCAL(LOC), and NONLOCAL(NONLOC). NONLOC information figures centrally in the analysis of unbounded dependency phenomena. LOC is again divided into three attributes, CATEGORY(CAT), CONTENT(CONT), and CONTEXT(CONX). CAT mainly specifies syntactic information such as HEAD, SUBCATEGORIZATION(SUBCAT). The CONTENT value constitutes the word's contribution to (context-independent) aspects of the semantic interpretation of any phrase that contains it. Also, semantic restrictions on the index can be introduced. The value of the RESTRICTION attribute is a set of parametrized states-of-affairs (psoas). A (p)soa is represented by a feature structure that specifies a relation together with values for the argument roles of that relation (Pollard and Sag 1994:25). Each psoa in the RESTRICTION value is interpreted as placing semantic conditions on the entities that the indices appearing in them can be anchored to in a given context. For example, the CONTENT value of the common noun book would be as follows,

(9) INDEX [1]
    index [PER 3rd]
    NUM sing
    GEND neut

npro

According to the RESTRICTION values, when the word book is used referentially, the index [1] introduced by that use must be anchored to a book.

The CONTEXT value contains certain context-dependent linguistic information which is usually discussed under such rubrics as indexicality, presupposition, and conventional implicature. Basically HPSG considers a single context attribute called BACKGROUND, whose value is a set of psoas. Like the psoas in RESTRICTION values, each of these background psoas restricts the possible anchors of indices. Unlike RESTRICTION psoas, however, BACKGROUND psoas are not part of the CONTENT value, but should rather be considered as felicity conditions on the utterance context. That is, CONTEXT values represent contributions to literal (truth-conditional) meaning, while BACKGROUND values represent contributions on anchors that correspond to presuppositions or conventional implicatures (Pollard and Sag 1994:27). The simple example of BACKGROUND value of the proper NP John is as follows, where the atomic value John refers to the name John, not to an individual named John.

\[
\begin{array}{c}
\text{RELATION} \\
\text{BEARER} \\
\text{NAME}
\end{array}
\begin{array}{c}
\text{naming} \\
[1] \\
\text{John}
\end{array}
\]

However, the CONTENT and CONTEXT attributes of HPSG contribute mainly to the lexical information such as ’person’, ’number’ and other ’lexical relations’. The lexically unrealized relations can not be incorporated into the current formalisms of HPSG. HPSG is founded on unification grammar, and attribute-value matrices are unified in accordance with subsumption and inheritance. This work focuses on the description of lexically unrealized relations, which preserves the typed feature structures of HPSG and extends the basic structures.

3.2 Recent Work of Syntax-Semantics Interface within HPSG

Current research on syntactic and semantic interfaces within HPSG domains have yielded useful knowledge, and this section will briefly cover one of such approaches. In order to capture the semantic generalizations concerning the Modern Greek Accusative Experencer-Object Psych Verbs Constructions, Kordoni (1999:8) uses a slightly different version of Wechsler’s (1995) CONCEIVES relation, and he defines CONCEIVES relation as ‘a relation holding between an agent A, and individual x, at times \( t_0 \) and t, just in case A has a notion of x at time \( t_0 \) prior to the time t that x acquires a notion of A’.

\[
S = [s | s \models \langle \text{CONCEIVE}, x, y, t_0, t \rangle]
\]

where \( t_0 < t \)

On the basis of this, Kordoni (1999) suggests the following Notation Rule,

\[
\text{S = [s | s \models \langle \text{CONCEIVE}, x, y, t_0, t \rangle],}
\]

where \( t_0 < t \)

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\( ^2 \) Its argument is that the semantic argument realized in their subject position (animate or inanimate) does not have any notion of the individual denoted by their object NP, since it serves only as the cause (natural, or other) initiating the mental state experienced by the individual denoted by their object NP, while the converse entailment does actually go through (Kordoni 1998)
(11) Notation Rule

\[
\begin{bmatrix}
\text{RELN} & R \\
\text{ROLES} & < r \quad r' > \\
\end{bmatrix}
\]

where

\[
[s][s] = <<R, r' \quad x, r \quad y, r'>> \Rightarrow \{y\}[s][s] = <<\text{CONCEIVE}, x, y, r'>>
\]

The CONCEIVE relation holds between \(x\) and \(y\) at times \(t_0\) and \(t_1\), where \(t_0 < t_1\), if \(x\) has a notion of \(y\) at a time \(t_0\) prior to the time \(t_1\) at which \(y\) acquires a notion of \(x\). In the case of Modern Greek Accusative Experiencer-Object Psych Verbs Constructions, time precedence relation is also required. But this description lacks the unified explanations which HPSG continuously pursues.

3.3 Analysis of Pseudo-relative Constructions

3.3.1 Syntactic Considerations

The following AVM (Attribute-Value Matrix) shows the structure of ‘tayphwung1 cmakan huncek (the trace left behind by the typhoon)’.

(12) AVM

\[
\begin{bmatrix}
\text{PHON} & /tayphwung1 cmakan huncek/ \\
\text{SYNSEM} & \text{LOC} \quad \text{CAT} \quad \text{HEAD} [1] \quad \text{SUBCAT} <> \\
\text{DTR} & \text{H-DTR} \quad \text{PHON} /huncek/ \\
& \text{SYNSEM} [2] \quad \text{LOC} \quad \text{CAT} \quad \text{HEAD} [1] \quad \text{POS n} \quad \text{SUBCAT} <> \\
\text{A-DTR} & \text{PHON} /tayphwung1 cmakan/ \\
& \text{SYNSEM} [3] \quad \text{LOC} \quad \text{CAT} \quad \text{HEAD} [4] \quad \text{MOD} [2] \\
\text{DTR} & \text{H-DTR} \quad \text{PHON} /cmakan/ \\
& \text{SYNSEM} [5] \quad \text{LOC} \quad \text{CAT} \quad \text{HEAD} [4] \quad \text{POS v} \quad \text{ADNZ nun} \quad \text{SUBCAT} <> [6] \\
\text{C-DTR} & \text{PHON} /tayphwung1/ \\
& \text{SYNSEM} [6] \quad \text{LOC} \quad \text{CAT} \quad \text{HEAD} [7] \quad \text{SUBCAT} <>
\end{bmatrix}
\]
This structure consists of head daughter (H-DTR), and adjunct daughter (A-DTR). Since pseudo-relative constructions are treated as modifiers, 'huncek(trace)' is classified as a head daughter indexed with [1], and pseudo-relative construction as an adjunct daughter. In the adjunct daughter phrase, there also exist head daughter and complement daughter (C-DTR). 'cmakan(went by)' is a head of the phrase, and this head requires subject (typhoon) as its complement.

The AVM above may be almost same as that of relative constructions. The main difference is the value of SYNSEM. Since a normal relative construction has a gap, the value of SYNSEM should be NONLOC (nonlocal), not LOC, which can be explained as unbounded dependencies in HPSG. But structurally there is no significant difference between pseudo-relative constructions and appositive constructions with regarding to gaps in the construction.

The structure here shows that only syntactic consideration without proper entailment of semantics and pragmatics does not provide plausible explanations of linguistic phenomena. We need interfaces for capturing those implicated relations.

3.3.2 Syntactic, Semantic and Pragmatic Interfaces for the Structure

In this work, I pointed out that Korean pseudo-relative construction is different from normal relative clause in that the former has a sort of 'causative' relation, and on the contrary, the latter has specification or restriction relations. This study proposes a unified description that captures syntactic and semantic interfaces using indices and restrictions in HPSG. The main focus has been on how to realize implicated relations such as 'cause', 'come-to-be', and time precedence information.

The following partial structure shows that the head noun 'trace([1])' has semantic restrictions by RESTR whose value is a set of parameterized states-of-affairs (psoas), and internally implicated but lexically unrealized relations (RELN) like 'cause', and 'come-to-be' can be introduced to capture the semantic contents of pseudo-relative constructions. The CONTEXT attribute, BKG (background) reveals that the value of ARG (argument) is coindexed with psoa[2], and [2] precedes [1] ('trace'), which results in a 'resultative' type.

(13) Partial structure of interfaces

\[
\begin{align*}
\text{CONTENT} & : \text{IND [1]} \\
\text{RESTR} & : \{ \text{psoa[2]} \\
& \hspace{1cm} \text{RELN go by} \\
& \hspace{2cm} \text{ARG1 typhoon} \}
\end{align*}
\]

\[
\begin{align*}
\text{CONTEXT} & : \text{BKG} \\
\text{RELN} & : \text{precede} \\
& \hspace{1cm} \text{ARG1 [2]} \\
& \hspace{2cm} \text{ARG2 [1]} \\
\end{align*}
\]

\[
\begin{align*}
\text{IND [1]} & : \{ \text{psoa} \\
& \hspace{1cm} \text{RELN cause} \\
& \hspace{2cm} \text{ARG1 [2]} \\
\}
\end{align*}
\]

\[
\begin{align*}
\text{SOA-ARG} & : \{ \text{RELN come-to-be} \\
& \hspace{1cm} \text{ARG1 [1] trace} \}
\end{align*}
\]
The partial structure bears information on the head noun 'trace' indexed with [1] Instead of single psoa of RESTRICTION, I set two psoas The first psoa indexed with [2] reveals the RELATION of go by, and its argument is 'typhoon' The second psoa is an implicated RELATION of 'CAUSE', and its argument is the first psoa[2], which means that pseudo-relative clause CAUSE another SOA-ARG that has a RELATION of COME-TO-BE Pragmatic information of the 'time relation' is realized by BKG that specifies ARG1(pseudo-relative construction) which precedes ARG2(trace)

HPSG is a unification-based grammar, and its attributes and values are combined together, to represent the structural and meaning differences among the constructions In the case of 'simultaneity', only BACKGROUND relation is different and it has a 'COINCIDE' relation which has two arguments of simultaneous occurrences

4 Conclusion

This approach focused on linguistic phenomena which require consideration for syntactic, semantic, and even pragmatic interfaces I argued that Korean adnominalized constructions can be reclassified as relative, pseudo-relative, and appositive constructions There are syntactic and semantic differences among these constructions, where pseudo-relative constructions show implicated, but lexically unrealized relations I suggested new descriptions that incorporate lexically unrealized relations of Korean pseudo-relative constructions into the existing HPSG frames I also showed how they can be grammatically represented in the structures Thus new approach enables us to pursue and improve the unified and integrated descriptions of linguistic phenomena previously incompletely explained

REFERENCES


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