Thematic Structure and Argument Structure: An Application of Lexical Mapping Theory for Korean

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1. A Brief Description of LMT

In the early LFG it was a main task to reduce the surface syntactic structures of various languages into the language independent universal f-structure which is composed of GFs such as SUBJ, OBJ, OBLθ etc. as a primitive linguistic unit. This f-structure serves as an intermediate structure both for the c-structure on the one hand and for the argument structure of the sentence meaning on the other. In the recent development of LFG it has been argued that the GFs are not primitive units, but they can be decomposed into the cluster of syntactic features [±r, ±o]. Moreover, it has also been argued that the f-structure may not be needed if we can connect the argument structure directly with the c-structure. The LMT has developed a method of deriving some of the GFs in the c-structure directly from the so-called thematic structure, which corresponds to the argument structure of sentences. The principles of LMT, which we make use of for our treatment of Korean are abbreviated as follows:

(1) Principles of LMT:

i ) A hierarchical structure of thematic roles: ag > ben > rec/exp > ins > pt/th > loc

ii ) An intrinsic classification (=IC) of thematic roles with the feature combination [±r, ±o].

iii ) Morphological operations which can alter the argument structures by adding, suppressing or binding thematic roles.

iv ) Default Syntactic Specifications (=Def) by which the highest thematic role is unrestricted and the other lower thematic roles are restricted.
v) Finally the Well-formedness Conditions (= W. F.) such as the subject\(^1\) and the function-argument biuniqueness condition.

These are the main principles by which we describe the case system, passivization, causativization and control phenomena in Korean.

2. Thematic Structure and the Derivation of GFs

2.1. Application of the LMT Principles for Simple Sentences

In order to describe the thematic structure and the derivation of GFs from it by the Principles of LMT in (1), we begin with the following sentences which belong to the representative examples for the Korean case system.\(^2\)

(2) a. Yonghi-ka nol-ko-iss-ta.
   \(-\text{SUBJ} \quad \text{play-CON-PRESENT PROG-DEC} \)
   (Yonghi is playing.)

   b. mul-i ch’a-\(\text{	extsuperscript{a}}\)-ta.
   \(\text{water-\text{SUBJ}} \quad \text{cold-DEC} \)
   (Water is cold.)

   c. Ch’ŏlsa-ka hakkyo-e ka-n-ta.
   \(-\text{SUBJ} \quad \text{school-DIR go-PRESENT-DEC} \)
   (Ch’ŏlsa goes to school.)

   d. Yonghi-ka ch’ek-\(\text{	extsuperscript{a}}\)l irk-nun-ta.
   \(-\text{SUBJ} \quad \text{book-OBJ read-PRESENT-DEC} \)
   (Yonghi reads a book.)

\(^1\) The subject condition is from Bresnan & Kanerva (1989). The generalization of the subject condition presents, however, some unsolved problem, because there are a lot of languages which do not have subject. Thus we do not know if we have to handle the subject condition as one of language specific phenomena or if we just put some illogical empty category for the invisible subject.

\(^2\) We assume that the Korean verbal construction is composed of stem\((s) (= \text{Vst})\) and Afix. More specifically the Afixs are divided as follows: Afhon\(\text{(orific)}\), Aften\(\text{(se)}\), Afmod\(\text{(al)}\) and Afdec\(\text{(larative)/Afcon\text{(nective)}\). Thus the \(\text{VC}(=$\text{verbal construction})\) is described by the rule: \(\text{VC} \rightarrow \text{Vst (Afhon) (Aften) (Afmod) (Afdec/con).} \)
e. Ch'olsu-ka Yonghi-eke kong-ŭl chu-ŏss-ta.
   -SUBJ -OBJ ball-OBJ give-PAST-DEC
   (Ch'olsu gave Yonghi a ball.)

According to the early LFG the GF SUBJ, OBJ, OBJθ etc. are assigned to nominals in Korean, which have the morphological case particles such as 'ka/-i, -(l)ŭl, -e/-eke' etc. Then we construct from these GFs a universal f-structure in accordance with the information of the subcategorization frame of lexical predicates. This f-structure serves to construct the thematic structure, which corresponds to the argument structure of sentences. Quite in the opposite way and with good reason the LMT presents the thematic structure of the sentential predicate first and then derives the GFs according to the LMT Principles in (1). First we try to drive the GFs from the thematic structure for (2a) as follows:

(2) a. Yonghi-ka nol-ko-iss-ta.
   -SUBJ play-CON-PRESENT PROG-DEC
   (Yonghi is playing.)

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<table>
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<tr>
<td>nol-ta</td>
<td>&lt; Ag &gt;</td>
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<tr>
<td>IC</td>
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<td>Def</td>
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The result of the above derivation is mapped into the following c-structure according to the syntactic information of the case particle 'ka'.

(2) a'. S → NP VC
   (↑ (↓ GR)) = ↓ ↑ = ↓
Next, the example (2b) has the adjective predicate, and its thematic structure and the derivation of GFs from it are the same as that of (2a). Thus, we skip it and go to the thematic structure of the example (2c).

(2) c. Ch'olsu-ka hakkyo-e ka-n-ta.

-Ch'oIsu goes to school.)

We can map the result of the above derivation into the c-structure in accordance with the information of the case particles `-ka' and `-e'.
Next we see the thematic structure and the derivation of GFs for the sentence (2d).

(2) d. Yonghi-ka ch’ek-ūl irk-nūn-ta.
    -SUBJ book-OBJ read-PRESENT-DEC
    (Yonghi reads a book.)

    irk-ta < Ag Th >
    IC -o -r
    Def -r +r

    S S/O

    W. F. irk-ta (S O)

We map the result of the above derivation into the following c-structure according to the morphological information of the case particles ‘-ka’ and ‘-ūl’.

(2) d’. S → NP NP VC
    (↑ (↓ GR))=↓ (↑ (↓ GR))=↓ ↑=↓
Finally we present the thematic structure and the derivation of GFs for the sentence (2e).

(2) e. Ch'olsu-ka Yonghi-eke kong-ül chu-öss-ta.
   -SUBJ -OBJ ball-OBJ give-PAST-DEC

(Ch'olsu gave Yonghi a ball.)

\[
\begin{array}{c}
\text{chu-ta} < \text{Ag} \quad \text{Go} \quad \text{Th} > \\
\text{IC} \quad -o \quad +o \quad -r \\
\text{Def} \quad -r \quad +r \quad +r \\
\hline
\text{S} & \text{OBJ} & \text{S/O} \\
\end{array}
\]

W. F. chu-ta (S OBJ O)

Now the result of the above derivation is mapped into the following c-structure according to the syntactic information of the case particles '-ka, -eke,' and '-ül' for the sentence (2e).
Thematic Structure and Argument Structure: An Application of Lexical Mapping Theory for Korean

(2) e'. S → NP NP NP VC

(↑(↓GR)) = ↓ (↑(↓GR)) = ↓ (↑(↓GR)) = ↓ ↑ = ↓

Up to now we have shown that the GFs can be derived from the thematic structures in accordance with the combination of syntactic features such as [±r, ±o] assigned by the LMT principles such as IC, Default Syntactic Classification and the Well-formedness Conditions. The mapping of the derivation’s results into the c-structure can be achieved in accordance with the morphological information of the various case particles. We now turn to the description of Korean passivization with the LMT Principles.

2.2. Passivization

The passivization in Korean can be roughly divided into the lexical one, derived by attaching the suffix ‘-i, -hi, -ri, -ki’ etc. to the transitive verbs, and the syntactic one which is derived by combining the transitive verbs with the auxiliary verb ‘-ो-ji-ta/-a-ji-ta’ (the connective affix ‘-ो-/a’ + auxiliary verb ‘ji-ta’) as shown in the following sentences.

(3) a. koyangi-ka Ch’olsu-lul mul-оss-ta.
    cat-SUBJ Ch’olsu-obl bite-PAST-DEC
    (The cat bit Ch’olsu.)
    → Ch’olsu-ka koyangi-eke mul-i-оss-ta.
    -SUBJ cat-OBL bite-PASS-PAST-DEC
    (Ch’olsu was bitten by the cat.)
   -SUBJ the problem-OBJ solve-PAST-DEC
   (Yongsu solved the problem.)

   -OBLθ the problem-SUBJ solve-PASS-PAST-DEC
   (The problem was solved by Yongsu.)

b. Ch'olsu-ka kū mun-ül iö̃l-öss-ta.
   -SUBJ the door-OBJ open-PAST-DEC
   (Ch'olsu opened the door.)

   →Ch'olsu-e-uihe kū mun-i iö̃l-iö̃-ji-öss-ta.
   -OBLθ the door-SUBJ open-PASS-PAST-DEC
   (The door was opened by Ch'olsu.)

The lexical passivization is restrictively derived, whereas the syntactic derivation of passivization is almost unrestrictive and thus very productive. We first treat the derivation of GFs from the thematic structure of the lexical passivization. First we look at the thematic structure and the derivation of GFs for (3a).

(3) a. koyangi-ka Ch'olsu-lül mul-öss-ta.
   cat-SUBJ -OBJ bite-PAST-DEC

   →Ch'olsu-ka koyangi-eke mul-i-öss-ta.
   -SUBJ cat-OBLθ bite-PASS-PAST-DEC

   μ̃l-ta < Ag Th >
   IC -o -r
   Def -r -
   S S/O

   W. F. mul-ta (S 0)
The application of the lexical rule for passivization in (3a) indicates that the syntactically restricted feature \([+r]\) is assigned to the thematic role \([Ag]\). This assignment of the \([+r]\) should be, however, preceded to the Default Syntactic Specification. Now the result of the derivation from the thematic structure to the GFs can be mapped into the following c-structure in accordance with the morphological information of the case particles.

(3) a’ S → NP NP VC
   \(\uparrow(\downarrow GR)\) = \downarrow \quad \uparrow = \downarrow

\[
\begin{array}{c}
S \\
| \quad \uparrow = \downarrow \\
NP \quad NP \\
| \quad \uparrow = \downarrow \\
N \quad P \quad N \quad P \\
\uparrow = \downarrow \quad \uparrow = \downarrow \quad \uparrow = \downarrow \quad \uparrow = \downarrow \\
Ch'olsu-ka \\
\quad \uparrow (GR) = SUBJ \\
\text{koyangi-eke} \\
\quad \uparrow (GR) = OBL(\text{ag}) \\
\quad \text{Vst} \\
\quad \text{Wf} \\
\quad \text{Afpast} \\
\quad \text{Aftdec} \\
\quad \text{mul-} \\
\quad \text{i-} \\
\quad \text{ọss-} \\
\quad \text{-ta}
\end{array}
\]

Next the example (3b) has the same thematic structure and the same derivation of GFs as those of (3a). Thus we skip it and turn to the treatment of the derivation of GFs from the thematic structure for (4a).

   -SUBJ the problem-OBJ solve-PAST-DEC
   -OBLθ the problem-SUBJ solve-PASS-PAST-DEC

\[
\begin{array}{c|c}
p'ul-ta & <\text{Ag Th}> \\
\hline
\text{IC} & -o \quad -r \\
\text{Def} & -r \quad - \\
\end{array}
\quad \begin{array}{c|c}
p'ul-ta & <\text{Ag Th}> \\
\hline
\text{IC} & -o \quad -r \\
\text{Passive-ọ-ji-ta} & +r \quad - \\
\text{Def} & - \quad - \\
\text{OBL} & \text{S/O}
\end{array}
\]

W. F. p'ul-ta (S O) \quad W. F. p'ul-ọ-ji-ta (OBLθ S)
Now we map the GFs of the derivation's results into the following c-structure:

\[(4)\ a': S \rightarrow NP \rightarrow NP \rightarrow VC \]

\[
\begin{array}{c}
S \\
(\uparrow (\Downarrow GR)) = \downarrow (\uparrow (\Downarrow GR)) = \downarrow \uparrow = \downarrow \\
NP \quad NP \quad VC \\
\text{N} \quad \text{P} \quad \text{N} \quad \text{P} \quad \uparrow = \downarrow \quad \uparrow = \downarrow \\
\text{munje} \quad \text{ka} \quad \text{Yŏngsu} \quad -e-\tīhe \\
(\uparrow GR) = \text{SUBJ} \quad (\uparrow GR) = \text{OBL}(ag) \\
\text{Vst} \quad \text{Afcon} \quad \text{V} \quad \text{Af} \quad \text{Af} \\
p'ul- \quad -ō \quad -ji- \quad -ŏss- \quad -ta
\end{array}
\]

We have shown in this section that the passivization process is achieved lexically by attaching the word formation suffix ‘-i, -hi, -ri, -ki’ etc. or the auxiliary verb ‘-ŏ-/a-ji-ta’ to the verbal (or adjective) stem. Thereby we need not have an intermediate functional structure. Thus, the grammatical description of passivization becomes simpler because the thematic structure can now be simultaneously connected with both structures namely the c-structure and the argument structure, i.e. the semantic structure. We turn now to the treatment of Korean causativization with the LMT principles.

### 2.3. Causativization

Usually the Korean causativization is divided into two sorts: The one is the causativization that is derived by adding the causative suffix ‘-i, -hi, -ri, -ki, -u, -ku,’ and ‘-ch’u’ to the verbal or adjective stem. The other is the causativization derived by adding the ‘-ke ha-ta’ (the connective affix ‘-ke’ + auxiliary verb ‘ha-ta’) to the verbal or adjectival stem. We may call the former “the derivation with a lexical operation”, the latter “the derivation with a syntactic operation”. Now we treat the following sentences as the representative examples of Korean causativization.
(5) a. koyangi-ka  chuk-ŏss-ta.
cat-SUBJ  die-PAST-DEC
(The cat died.)

→ Ch'ŏlsu-ka  koyangi-lŭl  chuk-i-ŏss-ta.
-SUBJ  cat-OBJ  die-CAUSE-PAST-DEC
(Ch'ŏlsu made the cat die.)

b. ai-ka  os-ŭl  ip-nŭn-ta.
child-SUBJ  clothes-OBJ  wear-PRESENT-DEC
(The child wears clothes.)

→ ōmŏni-ka  ai-eke  os-ŭl  ip-hi-n-ta.
mother-SUBJ  child-OBJ  clothes-OBJ  wear-CAUSE-PRESENT-DEC
(The mother made the child put on his clothes.)

c. kŏri-ka  nŏlb-ta.
street-SUBJ  broad-DEC.
(The street is broad.)

→ saramdŭl-i  kŭ  kŏri-lŭl  nŏlb-hi-ŏss-ta.
people-SUBJ  the street-OBJ  broad-CAUSE-PAST-DEC
(people made the street broad.)

(6) a. Sunhi-ka  (puŏk-eso)  no(l)-n-ta.
-SUBJ  (kitchen-OBLθ)  play-PRESENT-DEC
(Sunhi is playing (in the kitchen).)

→ ōmŏni-ka  Sunhi-lŭl  (puŏk-eso)  nol-ke-ha-n-ta.
mother-SUBJ  the street-OBJ  play-CAUSE-PRESENT-DEC
(The mother made the child play (in the kitchen).)

b. koyangi-ka  pap-ŭl  mŏk-ŏss-ta.
cat-SUBJ  rice-OBJ  eat-PAST-DEC
(The cat ate rice.)

→ Ch'ŏlsu-ka  koyangi-eke  pap-ŭl  mŏk-ke-ha-iŏss-ta.
-SUBJ  cat-OBJ  rice-OBJ  eat-CAUSE-PAST-DEC
(Ch'ŏlsu made the cat eat rice.)
c. pang-i ḏup-ta.
   room-SUBJ dark-DEC
   (The room is dark.)

→ Ch'ŏlsu-ka pang-ŭl ḏup-ke-ha-iŏss-ta.
   -SUBJ room-OBJ dark-CAUSE-PAST-DEC
   (Ch'ŏlsu made the room dark.)

In the above examples the causative suffixes can be attached, through
the lexical operation, not only to the intransitive and transitive verbs but
also to the adjective predicate (5a-c). The causativization by the syntactic
operation, i.e. with ‘-ke ha-ta’ is also possible both for intransitive- and
transitive verbs and for adjective predicates (6a-c). Let us now treat the
derivation of the GFs from the thematic structure for (5a) first.

(5) a. koyangi-ka chuk-ŏss-ta.
    cat-SUBJ die-PAST-DEC

→ Ch'ŏlsu-ka koyangi-lŭl chuk-i-ŏss-ta.
    SUBJ cat-OBJ die-CAUSE-PAST-DEC

chuk-ta <Th>          chuk-ta <Th>
IC -r  IC -r
Def -   causat. -i  <Ag Th chuk-ta <Th>
θ-incorp.  <Ag Th - <ϕ>
        (Th)
IC -o -r  (-r)
Def -r -
S/O S S/O
(VCOMP S)
W. F. chuk-ta (S)    W. F. chuk-i-ta (S O)
                  (VCOMP) (VCOMP S)
The causativization in (5a) is derived by adding the suffix ‘-i’ to the intransitive verb ‘chuk-’. During the derivation, the thematic role [Th] which corresponds to the first argument of the subordinated proposition is incorporated to the thematic role [Th] of the main proposition according to the hidden syntactic feature in the brace. To this thematic role will then the abstract GF VCOMP-SUBJ be assigned. The causative suffix ‘i’ is attached to the predicate of the subordinated proposition, which now lack the first argument. Thus, the causative verb ‘chuk-i-ta’ is derived, whereas the predicate ‘chuk-’ will later be mapped into the GF VCOMP. Now we apply the Intrinsic Classification and Default Syntactic Specification, which results the subcategorization frame of GFs of the sentential predicate. Finally the GFs derived from the above thematic structure are mapped in accordance with the morphological information of the case particles into the following c-structure.

\[
(5) \text{a': } S \rightarrow \text{NP} \quad \text{NP} \quad \text{VC} \\
(↑ (\downarrow \text{GR})) = \downarrow \quad (↑ (\downarrow \text{GR})) = \downarrow \quad ↑ = \downarrow \\
(↑ \text{VCOMP-SUBJ}) = \downarrow
\]

3 The thematic incorporation is based on the fusion of thematic role of A. Alsina (1991). In this paper the thematic incorporation means, however, that the incorporated thematic role of the subordinated proposition has its own syntactic features, by which the incorporated thematic role is able to be mapped into the abstract GF XCOMP-SUBJ.

4 The GF VCOMP is a grammatical function which represents a subjectless subordinate clause like an infinitive clause in English. From this GF VCOMP together with the VCOMP-SUBJ, we can reconstruct the thematic structure of the sentence.
Now we treat the causativization of (5b). We first look at the thematic structure and the derivation of GFs described as follows.

(5) b. ai-ka 
child-SUBJ

os-ül 
clothes-OBJ

ip-nun-ta. 
wear-PRESENT-DEC

→ ōmōni-ka
mother-SUBJ

ai-eke
child-OBJ

os-ül

clothes-OBJ

ip-hi-ta.
wear-CAUSE-PRESENT-DEC

\[
\begin{array}{c}
\text{ip-ta} < \text{Ag Th} > \\
\text{IC} - o - r \\
\text{Def} - r - \text{causat.-hi} < \text{Ag Go} \text{ ip-ta} < \text{Ag Th} > \\
\text{θ-incorp.} < \text{Ag Go} - < \text{∅ Th} > \\
\text{IC} - o + o - r \\
\text{(-o)} \\
\text{Def} - r + r \\
\text{(-r)} \\
\end{array}
\]

\[
\begin{array}{c}
\text{S} \text{ S/O} \quad \text{S} \text{ OBLθ} \\
\text{VCOMP S) (VCOMP-S)} \\
\hline
\text{W. F. ip-ta} (S O) \quad \text{W. F. ip-hi-ta} (S OBLθ (VCOMP) (VCOMP-S)) \quad \text{O}
\end{array}
\]
The process of causativization in (5b) also is explained by deriving the causative verb from the transitive verb 'ip-', attached with the suffix '-hi'. The thematic role \([Ag]\) corresponding to the first argument of the subordinated proposition is incorporated to the thematic role \([Go]\) of the main proposition. Then it will be mapped into the VCOMP-SUBJ as an abstract GF. The causative verb itself is now composed of the predicate of the subordinated proposition to which the GF VCOMP will be assigned: the causative suffix '-hi' and the affix '-ta' (=a declarative sentence marker). After the complex predicate composition and the thematic incorporation the Intrinsic Classification and Default Syntactic Specification are applied, and we obtain the subcategorization frame GFs of the sentential predicate. The GFs of the above derivation are then mapped into the following c-structure according to the morphological information of the case particles.

\[
(5) \text{b': } S \rightarrow \text{NP NP NP VC} \\
(\uparrow (\downarrow \text{GR})) = \downarrow (\uparrow (\downarrow \text{GR})) = \downarrow (\uparrow (\downarrow \text{GR})) = \downarrow \uparrow = \downarrow \\
(\uparrow \text{VCOMP-SUBJ}) = \downarrow
\]

Next we turn to the treatment of the causativization of adjective predicate for (5c). The thematic structure and the derivation of GFs look like the following:

\[
(5) \text{c. } \text{kori-ka} \quad \text{nolb-ta.} \\
\text{street-SUBJ} \quad \text{broad-DEC.}
\]
The causative suffix '-hi' is attached to the predicate of the subordinated proposition 'nŏlb-'ta'. This results in the causative verb 'nŏlb-hi-ta'. The predicate of the subordinated proposition 'nŏlb-'ta' will later be mapped into the abstract GF ACOMP. At the same time the thematic role [Th] of the subordinated proposition is connected to the thematic role [Th] of the main proposition. It will be later assigned an abstract GF ACOMP-SUBJ. Now the Intrinsic Classification and Default Syntactic Specification are applied by the LMT principles of (1), and we obtain the subcategorization frame of GFs of the sentential predicate for (5c). Finally the GFs in the above derivation are mapped into the following c-structure.
We turn to the treatment of the other kind of causativization in Korean, namely the causativization with ‘-ke-ha-ta’ (the connective affix ‘-ke’ + the auxiliary verb ‘-ha-ta’). We look at the thematic structure and the derivation of GFs for (6a) first.

\[(6)\]  
a. Sunhi-ka (puok-eso) no(l)-n-ta.  
   -SUBJ (kitchen-OBLθ) play-PRESENT-DEC  
   →ðmøni-ka Sunhi-lül (puok-eso) nol-ke-ha-n-ta.  
   mother-SUBJ -OBJ play-CAUSE-PRESENT-DEC

\[
\begin{align*}
\text{nol-ta} & \quad \text{<Th>} \\
\text{IC} & \quad -r \\
\text{Def} & \quad \text{causat. -ke-ha-ta} \quad \text{<Ag Th nol-ta<Th>}} \\
\text{θ-incorp.} & \quad \text{<Ag Th} \quad \text{<φ>}} \\
\text{IC} & \quad -o \quad -r \\
\text{(-r)} & \quad \text{Def} \quad -r \quad - \\
\text{S/O} & \quad \text{S} \quad \text{S/O} \\
\text{(VCOMP S)} & \quad \text{(VCOMP S)}
\end{align*}
\]
The predicate of the subordinated proposition ‘nol-ta’ is connected to the causative auxiliary verb ‘ke-ha-ta’ during the causativization. Then the predicate ‘nol-ta’ will be mapped into the GF VCOMP. On the other hand the thematic role [Th] corresponding to the first argument in the subordinated proposition is incorporated to the thematic role [Th] of the main proposition, and it will be mapped into the abstract GF VCOMP-SUBJ. After the complex predicate composition and the thematic incorporation Intrinsic Classification and Default Syntactic Specification are applied. Finally we obtain the subcategorization frame of GFs of the sentential predicate. The GFs in the above derivation is now mapped into the following c-structure in accordance to the syntactic information of the case particles the following:

\[
\begin{align*}
(6) \text{a} &: S \rightarrow \text{NP} \quad \text{NP} \quad \text{VC} \\
& \quad (\uparrow (\downarrow \text{GR})) = \downarrow \quad (\uparrow (\downarrow \text{GR})) = \downarrow \quad \uparrow = \downarrow \\
& \quad (\uparrow \text{VCOMP-SUBJ}) = \downarrow
\end{align*}
\]

The causativization described up to now is concerned with the case of the intransitive verb. Now we turn to the causativization of the transitive verb for (6b). The thematic structure and the derivation of GFs look like the following:
In (6b) follows the connection of the predicate of the subordinated proposition with the causative auxiliary verb ‘-ke ha-ta’ in exactly the same process as that of (6a). The thematic role [Ag] corresponding to the first argument of the subordinated proposition is incorporated with the thematic role [Go] of the main proposition. The applications of the Intrinsic Classification and Default Syntactic Specification follow the LMT principles of (1) and the mapping of the above GFs into the c-structure will not be basically different from the case of (6a).

Finally we also skip the treatment of the example (6c) with an adjective predicate, because the thematic structure and the derivation of GFs are the same as those of (6a). (6a) and (6c) show the only difference in having the intransitive verb for the former, and the adjective for the latter.

In this section we have described the causativization in Korean with the LMT Principles. We have shown that the causativization with the suffix ‘-i, -hi, -ri, -ki, -u, -ku, and -ch’u’ behaves as a kind of the rule of word for-
mation, whereas the causativization with an auxiliary verb ‘-ke ha-ta’ could be treated with a syntactic operation, because it can be applied almost to every intransitive and transitive verbs, and adjectives with few exceptions. But both of them are handled lexically by driving the GFs from the thematic structure of a predicate, i.e. a lexical item. On the other hand, we have introduced a thematic incorporation of the various thematic roles between the subordinated and the main proposition, an act that makes it possible to connect some GF with the abstract XCOMP-SUBJ by way of the functional equation in the surface syntactic structure, i.e. $c$-structure.

2.4. Control Phenomena

The control phenomena in Korean concern the relations between some GF in the main clause and the invisible SUBJ of the subordinated clause which are thus assumed to be syntactic phenomena. On the other hand they should be lexically described because identifying the unvisible SUBJ with some GF in the main clause is dependent on the lexical meaning of the main clause predicate. In order to describe the control phenomena in Korean with the LMT principles in (1) we take the following examples.

    -SUBJ -OBJ school-OBL go-DEC-CON promise-PAST-DEC
    (Ch'olsu promised Yonghi to go to school.)

       -SUBJ -OBJ school-OBJ leave-CON persuade-PAST-DEC
       (Ch'olsu persuaded Yonghi to leave school.)

First we treat the thematic structure and the derivation of GFs for (7a) which is known as a subject-control sentence.

We assume that the Intrinsic Classification should be applied first of all to the thematic structure of (7a), because we handle the two separate independent propositions that do not go into the composing of one complex predicate as shown in the causative construction. Now the thematic incorporation occurs between the thematic role [Ag] of the subordinated proposition and the thematic role [Ag] of the main proposition.

Next we apply the Intrinsic Classification and Default Syntactic Specification according to the LMT principles of (1), and finally derive the subcategorization frames of the GFs of predicates for (7a). However, we are confronted with some difficulty in mapping the result of the above derivation because the GFs do not fit the surface word orders of Korean. For instance, we map the result of the subcategorization frame <VCOMP ka-ta (OBLθ)> of the subordinated clause into the false word order 'ka-ta hakkyo-e'. Thus we assume the following precedence condition among the GFs in the c-structure.

(8) Functional Precedence Condition (=FPC):
GF1, GF2, ⋯, GFn <f PRED,
(PRED)='X<(GF1), (GF2), ⋯, (GFn)>'

FPC in (8) says that the predicate should not be preceded by its grammatical functions. 'F' indicates a precedence relation among the GFs. X is the lexical item of the predicate and <(GF1), (GF2), ⋯, (GFn)> are
grammatical functions in the subcategorization frame of the predicate.\(^5\) These GFs are syntactically restricted to stay within the domain of their predicate. Thus the sentences of the following scrambling phenomena are somehow unacceptable or awkward.

(9) a. \(?\)hakkyo-e Ch’olsu-ka Yonghi-eke ka-n-<go-ta> <yaksokha-ess-ta>.
  school-OBL -SUBJ -OBJ go-DEC-CON promise-PAST-DEC

b. \(?\)Ch’olsu-ka hakkyo-e Yonghi-eke ka-n-<go-ta> <yaksokha-ess-ta>.
  -SUBJ school-OBL -OBJ go-DEC-CON promise-PAST-DEC

c. \(?\)Yonghi-eke hakkyo-e Ch’olsu-ka ka-n-<go-ta> <yaksokha-ess-ta>.
  -OBJ school-OBL -SUBJ go-DEC-CON promise-PAST-DEC

d. \(*\)ka-n-<go-ta> Ch’olsu-ka Yonghi-eke hakkyo-e <yaksokha-ess-ta>.
  go-DEC-CON -SUBJ -OBJ school-OBL promise-PAST-DEC

e. \(*\)Ch’olsu-ka ka-n-<go-ta> Yonghi-eke hakkyo-e <yaksokha-ess-ta>.
  -SUBJ go-DEC-CON -OBJ school-OBL promise-PAST-DEC

f. \(*\)Ch’olsu-ka Yonghi-eke ka-n-<go-ta> hakkyo-e <yaksokha-ess-ta>.
  -SUBJ -OBJ go-DEC-CON school-OBL promise-PAST-DEC

Thus, in order to derive the correct word order in the c-structure we now apply the FPC to the result of the derivation of (7a) in two steps as shown below.

(10) yaksokha-ta (SUBJ-OBJ\(\theta\)-<VCOMP ka-ta (OBL\(\theta\)>))
  (VCOMP-SUBJ)

i ) (SUBJ-OBJ\(\theta\)-<VCOMP ka-ta (OBL\(\theta\)>)-yaksokha-ta
    (VCOMP-SUBJ)

ii ) (SUBJ-OBJ\(\theta\)-<(OBL\(\theta\)-VCOMP ka-ta>)-yaksokha-ta
    (VCOMP-SUBJ)

(10i) shows that the predicate of the main clause is located at the end of the sentence by applying the FPC. (10ii) shows that the predicate VCOMP ‘ka-ta’ is again preceded by its subcategorized GF OBL.dir because of the

\(^5\) In the early LFG the predicate subcategorizes the GFs directly in lexicon. The GFs in FPC, however, are derived from the thematic structure.
application of the FPC. Now we are able to map (10ii) into the correct c-structure as follows.

\[(7) \begin{align*}
a. S & \rightarrow \quad NP \quad NP \quad NP \quad VC \\
& (\uparrow (\downarrow GR)) = \downarrow (\uparrow (\downarrow GR)) = \downarrow (\uparrow (\downarrow GR)) = \downarrow \\
& (\uparrow VCOMP-SUBJ) = \downarrow \\
\end{align*}\]

The next example (7b) of our treatment is known as an object control sentence. The thematic structure and the derivation of GFs are as follows.

\[(7) \begin{align*}
b. \text{Ch'olsu-ka Yonghi-geke hakkyo-e ka-n-ta-go yaksok-ha} \\
& (\uparrow GR) = \text{SUBJ} (\uparrow GR) = \text{OBJ8} (\uparrow GR) = \text{OBL8} \\
& \text{-ess-ta} \\
\end{align*}\]
Since the result of the above derivation does not fit the surface word order, the FPC is applied in the following two steps:

(11) söldŭkıha-ta (SUBJ-OBJθ-<VCOMP ttŏna-ta (OBJ)>)
(VCOMP SUBJ)

i ) (SUBJ-OBJθ-<VCOMP ttŏna-ta (OBJ)>)-sŏldŭkıha-ta
(XCOMP SUBJ)

ii) (SUBJ-OBJθ-<(OBJ)-VCOMP-ttŏna-ta>)-sŏldŭkıha-ta
(VCOMP SUBJ)

Now we are able to map the result of (11 ii) into the following c-structure.

In this Chapter we have described the Korean passivization, causativization, and control phenomena. The passivization and the causativization are treated as a kind of word formation rule. We have shown that the thematic structures and the derivation of GFs from them follow the LMT principles. Since we have derived the GFs from the thematic structure, it is always possible to reconstruct the thematic structure from the GFs by applying the LMT principles in the opposite direction. On the other hand, the control phenomena in Korean are described syntactically as a relation between some GFs in the main clause and the invisible XCOMP-
Thematic Structure and Argument Structure: An Application of Lexical Mapping Theory for Korean

SUBJ which is, however, controlled by the lexical meaning of the predicate of the main clause. The GF in the main clause is derived from some thematic role of the main proposition, whereas the XCOMP–SUBJ is derived from the thematic role corresponding to the first argument of the subordinated proposition. Since the surface order of GFs derived from the thematic structure does not fit the c-structures of control sentences in Korean, we have proposed an FPC which arranges the ordering of the GFs for the correct surface word order. In the case of control phenomena it is also possible to reconstruct the thematic structure from the GFs by applying the LMT principles in the opposite direction.

3. Argument Structure and Its Semantic Interpretation

LMT does not need the intermediate f-structure, because it derives the GFs in the c-structure directly from the thematic structure which corresponds to a function-argument structure. Thus, the semantic theory of LMT becomes much simpler. In this chapter we will try to change the thematic structure into an argument structure. It will then be translated into the language of intensional logic from which the correct theoretic model interpretation can begin for the meaning of sentences.

3.1. Argument Structure of Simple Sentences

First we will try to give the thematic structure and its corresponding argument structure for the sentences (2a) and (2b) in Chapter 2. Then we will translate the argument structure into the language of intensional logic.

    -SUBJ play–CON–PRESENT PROG–DEC
    (Yŏnghi is playing.)

    b. mul-i ch’a-ta.
    water–SUBJ cold–DEC
    (Water is cold.)
The thematic structure in (12) corresponds directly to the argument structure, and this argument structure is to be translated into the language of intensional logic according to the following translation principle (=T-Principle).

(13) T-Principle 1: If $a$ is the value of one place predicate, and $\delta$ is the value of the argument corresponding the thematic role, then the argument structure is translated into $a'$ ($\delta$) of intensional logic.

We now translate (12a) and (12b) into the language of intensional logic by T-Principle 1 as follows.

(12) a': nol-ta: play'
  Yonghi: λPP(yo)
  Yonghi-ka nol-ko-iss-ta: play' (λPP(yo))

b': ch'a-ta: cold'
  mul: λPP(w)
  mul-i ch'a-ta: cold' (λPP(w))

The results of the translation of (12a') and (12b') show that the predicates 'nol-ta' and 'ch'a-ta' take as their arguments the intension of the set
of properties that an individual has. This is certainly against our intuition, because they are extensional predicates and thus we need the following meaning postulate:

\[ \text{MP1: } \forall x \forall \mathcal{P} [\delta'(\mathcal{P}) \leftrightarrow \mathcal{P}[\mathcal{P}_x[\delta'(x)]]] \]

If we apply MP1 to the result of the translation in (12a') and (b'), we get a correct translation for the sentences (12a) and (12b).

\[(12) \ a': \lambda \text{PP}(y)\langle \lambda x[\text{play'}(x)] \rangle \]
\[\rightarrow \text{play'}(y) \]

\[b': \lambda \text{PP}(w)\langle \lambda x[\text{cold'}(x)] \rangle \]
\[\rightarrow \text{cold'}(w) \]

We have assumed that the meaning of 'mul' (=water) in (12b) is a kind of name, and it is represented as a proper noun as a set of properties that an entity has (\(\lambda \text{PP}(w)\)). However, if it indicates a special type of water as expressed in a quantifier phrase such as 'the water' or 'this water', then it must have the following argument structure.

\[(12) \ b'. \]

\[
\begin{array}{c}
\text{QP} \\
\text{PREDICATE} \end{array}
\begin{array}{c}
\langle i \rangle \\
\text{cold'} \end{array}
\]

\[
\begin{array}{c}
\text{ARG} \\
\text{CM} \\
\text{PREDICATE} \end{array}
\begin{array}{c}
\langle m(\lambda x \text{P}(x)) \rangle \\
\text{ARG1} \end{array}
\begin{array}{c}
\lambda x \text{Q} \exists x [\text{P}(x) \land \text{Q}(x)] \\
\text{ARG2} \end{array}
\begin{array}{c}
\text{water'} \\
\text{PM} \end{array}
\]

\[
\begin{array}{c}
\text{MODE} \\
\text{PM} \\
\text{PM} \end{array}
\begin{array}{c}
\lambda \text{PP}(\text{x}) \end{array}
\]

* \(m\) belongs to the type \(\langle s, f(\text{Det}) \rangle\)

---

\[6 \text{ We assume that the meaning of a common noun in Korean is normally context dependent if we do not especially mention a special object with a demonstrative descriptor '-i, -jō, -kū'. Thus the common noun 'ke' (=dog) has a syntactic function of noun phrases, which sometimes indicates 'a dog' or 'the dog'. It sometimes, however, indicates the concept of 'dog'. In the last case we follow the treatment of kind name by G. Carlson (1977).} \]
The QPi in the above argument structure binds the variable xi, and we introduce the following Quantification Rule.

\[(15)\text{ Quantification Rule (} = QR) : \delta' (\forall xi [a'(xi)])(\cdots)\cdots\]\n
The argument structure (12'b') can now be translated into the language of intensional logic by QR as follows.

\[(12'b')\text{ water: } \forall x [\text{water}'(x) \land Q\{x\}]\]
\[\text{ch' a-ta: cold'}\]
\[\text{xi-ka ch' a-ta: colds'}(\forallPP\{xi\})\]
\[\rightarrow \text{cold'}(xi) \text{ (MP1 applied.)}\]
\[\text{mul-i ch' a-ta: } \forall x [\text{water}'(x) \land Q\{x\}]\]
\[\forall xi [\text{cold'}(xi)]\]
\[\rightarrow \exists x [\text{water}'(x) \land \text{cold'}(x)]\]

The result of the translation says that there exists some water that is cold. Thus it differs from the translation of (12b'). Let us turn to the translation of the two place predicate into the language of intensional logic.

\[(16)\text{ T-Principle 2: } \alpha \text{ is the value of the two place predicate, and } \delta, \gamma \text{ the values of ARGi corresponding to the thematic roles each, then the argument structure is translated into } \alpha' (\delta') (\gamma') \text{ of intensional logic.}\]

According to the T-Principle 2 we present the thematic structure and its corresponding argument structure for the sentence (2c) as follows.

\[(17)\text{ Ch'olsu-ka hakkyo-e ka-n-ta.} \text{ (Ch'olsu goes to school.)}\]
\[a.\text{ Thematic Structure: ka-ta}<Ag\Loc>\]
\[b.\text{ Argument Structure: PREDICATE}<ARG1\ARG2>\]

\[
\begin{align*}
\text{ARG1-} & \text{ag} \\
\text{ARG2-loc} & \text{go'} \\
\text{CM} & \text{APP}\{\text{ch}\} \\
\text{MODE} & \text{CM} \\
\text{PM} & \text{APP}\{\text{xi}\} \\
\text{CM} & \text{APP}\{\text{s}\} \\
\text{MODE} & \text{CM} \\
\text{PM} & \text{APP}\{\text{xj}\}
\end{align*}
\]
Now we try to translate this argument structure into the language of intensional logic.

(17) c. ka-ta: go’
    Ch’ol-su: APP{ch}
    hakkyo: APP{s}

    Ch’olsu-ka hakkyo-e ka-n-ta: go’ (APP{s}) (APP{ch})

The predicate ‘go’ in (17c) takes the higher types of individuals, namely the set of properties of those individuals. The translation of (17c) is also against our intuition because ‘go’ is a predicate that takes the extensions of individuals. Thus we need the following meaning postulate.

(4) MP2: \( \forall x \forall y \forall \theta \forall \alpha \in [\delta'(\theta,\alpha) \rightarrow \theta(\lambda y(\lambda x[\delta'(x, y)]))] \)

Now we apply MP2 to the result of the translation of (17c), and thus we have a correct translation of the language of intensional logic for sentence (17).

(17) d. \( (\lambda y(\lambda x[ka-ta.(x, y)])) \rightarrow go'(ch, s) \)

In the argument structure of (17b), we have assumed that the ‘hakkyo’ (=school) does not indicate some special school, but that it just indicates an abstract concept like a kind name. If it indicates, however, some special school, then the argument structure should be presented as follows:

(17’) b’.

\[
\begin{align*}
\text{QP} & \quad <i> \\
\text{PREDICATE} & \quad \text{go’} \\
\text{ARG2} & \quad \text{CM} \\
\text{ARG1-ag} & \quad \text{CM APP{ch}} \\
\text{ARG1-ag} & \quad \text{MODE CM} \\
\text{ARG1-ag} & \quad \text{PM APP{xi}} \\
\end{align*}
\]
This argument structure can be translated by applying QR into the language of intensional logic as follows.

\[
(17') \quad c'. \text{ka-ta: go'} \\
C'h'olsu: \lambda \text{PP}(ch) \\
C'h'olsu-ka xi-e ka-ta: go'(\lambda \text{PP}(xi))(\lambda \text{PP}(ch)) \\
\rightarrow go'(xi)(ch) \quad (\text{MP2 applied}) \\
\rightarrow go'(ch, xi) \quad (\text{RN applied}) \\
\]

hakkyo: \lambda Q \exists x[\text{school'}(x) \land Q(x)] \\
C'h'olsu-ka hakkyo-e kan-ta: \lambda Q \exists x[\text{school'}(x) \land Q(x)] \\
\quad \wedge [go'(xi)(ch)] \\
\rightarrow \exists x [\text{school'}(x) \land go'(x)(ch)] \\
\rightarrow \exists x [\text{school'}(x) \land go'(ch, x)] \\
\quad (QR, \text{RN applied.})

During the translation process we have applied a convention of relational notation (=RN) which arranges the ordering of arguments. We may treat all the other simple sentences in the same manner. Thus we skip them and go to the treatment of the argument structure and its semantic translation of passive sentences.

3.2. Argument Structure of Passive Sentences

We have seen in Chapter 2.2. that there are two kinds of passivization in Korean, namely the lexical one, derived by attaching the suffix ‘-i, -hi, -ri, -ki’ etc. to the transitive verbs, and the syntactic one derived by combining transitive verbs with the auxiliary verb ‘-ô-ji-ta/-a-ji-ta’. They both have the same thematic structures as their corresponding active sentences. We have also seen that the derivation of passive sentences assigns different syntactic features to the thematic roles as the derivation of active sentences does. Thus, as far as the meaning of active and passive sentences are concerned, they have the same thematic structure and also the same argument structure. In order to treat the argument structures of passive sentences we look at the examples of passive sentences in (3a) and (4a) of Chapter 2.2. first.
18) a. koyangi-ka Ch’olsu-lül mul-öss-ta.
cat-SUBJ -OBJ bite-PAST-DEC
→ Ch’olsu-ka koyangi-eke mul-i-öss-ta.
-SUBJ cat-OBL0 bite-PASS-DEC

b. Thematic Structure:
Argument Structure:

```
<table>
<thead>
<tr>
<th>PREDICATE</th>
<th>&lt;ARG1 ARG2&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>bite’</td>
<td></td>
</tr>
</tbody>
</table>
```

ARG1-ag

```
CM λPP{c}
MODE CM
PM λPP{x}
```

ARG2-th

```
CM λPP{ch}
MODE CM
PM λPP{x}
```

c. mul-ta: bite’
koyangi: λPP{c}
Ch’olsu: λPP{ch}

koyangi-ka Ch’olsu-lül mul-öss-ta.: bite’(λPP{ch})(λPP{c})
→ bite’(ch)(c) (MP2 적응)
→ bite’(c, ch) (RN 적응)

The result of the translation of (18c) shows that the predicate takes the extension of the entity ‘c’ (=koyangi) and ‘ch’ (=Ch’olsu). If the ‘koyangi’ indicates, however, a special cat, then the argument structure for (18a) and its translation into the language of intensional logic should be as follows.
All of the other passive sentences can be described as (18a), i.e. with the type of argument structure of either (18b) or (18b'). Thus we skip them and go to the treatment of the argument structure of causative sentences.

3.3. Argument Structure of Causative Sentences

In Chapter 2.3. we have described two kinds of derivations of causative sentences. The one is the causativization derived by adding the causative suffix ‘-i, -hi, -ri, -ki, -u, -ku,’ or ‘-ch’u’ to the verbal or adjectival stem. The other is the causativization derived by adding the ‘-ke ha-ta’ (the connective affix ‘-ke’ + auxiliary verb ‘ha-ta’) to the verbal or adjectival stem. In the following we examine the argument structure and its semantic translation for each of them. First, we present the thematic structure of the example (7a) in Chapter 2.3.

(19) a. koyangi-ka chuk-öss-ta.

→ Ch'ölsu-ka koyangi-lül chuk-i-öss-ta.
In the causativization process the predicate of the subordinated proposition is attached to the causative suffix ‘-i’, and at the same time the thematic role [Th] of the subordinated proposition is incorporated to the thematic role [Th] of the main proposition. The incorporated thematic role leaves the variable x in its original place. Thus, we can establish a quantifier-variable relation between them. In Chapter 2.3. we have shown this process as follows.\footnote{In this case also the QR can be applied. Thus we have two kinds of QR Application. The one is for any quantifier phrase, and the other is for the incorporated thematic role as a quantifier phrase which binds its own trace, i.e. variable.}

(19) a’. Causativization -i <Ag Th chuk-ta<Th>

\[ \theta\text{-incorp. } <Ag Th \quad - \quad <x> \quad (Th) \]

We now map this thematic structure into the following argument structure.

(19) b. Causativization -i < Ag Th die<x> >

A-Structure: PREDICATE <ARG1 ARG2 PROP>

\[
\begin{align*}
\text{PREDICATE} & \quad \text{CAUSE} \\
\text{ARG1-ag} & \quad \text{CM } \lambda \text{PP\{ch\}} \\
& \quad \text{MODE CM} \\
& \quad \text{PM } \lambda \text{PP\{x\}} \\
\text{ARG2-th(th)} & \quad \text{CM } \lambda \text{PP\{c\}} \\
& \quad \text{MODE CM} \\
& \quad \text{PM } \lambda \text{PP\{x\}} \\
\text{ARG3-prop} & \quad \text{QP} \\
& \quad \text{PREDICATE} \quad <j> \\
& \quad \text{ARG} \quad [x] \\
\end{align*}
\]

koyangi: \lambda \text{PP\{c\}} \quad \text{Ch’lsu: } \lambda \text{PP\{ch\}}
In the above argument structure the variable \( x_j \) is bound by the ARG-th (th). Thus the QR in (15) can be applied. Let us translate this argument structure into the language of intensional logic.

(19) c. chuk-\( \text{ta}: \) die'
\[
\begin{align*}
  x_j : & \forall PP(x_j) \\
  x_j-\text{ka chuk-\( \text{ta}: \) die'} & (\forall PP(xi)) \\
  \rightarrow & \text{die'}(x_j) \quad (\text{MP1 applied})
\end{align*}
\]

Applying QR:

\[
\begin{align*}
  \text{koyangi} & \rightarrow \lambda PP(c) \\
  \lambda PP(c) & (\forall x_j [\text{die'}(x_j)]) \\
  \rightarrow & \text{die'}(c) \\
  \text{CAUSE} & \rightarrow \text{CAUSE'} \\
  \text{Ch'-\text{o}lsu} & \rightarrow \lambda PP(ch) \\
  \text{Ch'-\text{o}lsu-ka koyangi-l-lul chuk-i-\text{-\text{o}ss-ta}:} \\
  \rightarrow & \text{CAUSE'}(\forall PP(c))(\forall [\text{die'}(c)])(\forall PP(ch)) \\
  \rightarrow & \text{CAUSE'}(\forall PP(ch), \forall PP(c), \forall [\text{die'}(c)]) \quad (\text{RN applied})
\end{align*}
\]

In the result of the translation we see that the abstract \text{CAUSE} is a three place predicate that takes the intension of the set of properties of the individual 'ch' and 'c', and a proposition. This situation is certainly against our intuition. Thus we need the following meaning postulate:

(20) MP3: \( \forall x \forall y \forall \mathcal{P} \mathcal{Q} [\delta'(\mathcal{P}, \mathcal{Q}, \phi) \leftrightarrow \mathcal{Q} \{ \forall x [\mathcal{P} (\lambda x[\delta'(x, y, \phi)])] \}]
\]

If we apply MP3 to the result of (19c), we obtain the following correct semantic translation.

(19) c'. \text{CAUSE'}(c)(\forall [\text{die'} \ast (c)]) (ch)
\[
\rightarrow \text{CAUSE':(ch, c, \forall [\text{die'} \ast (c)])} \quad (\text{RN applied})
\]

In the semantic translation of 'koyangi' we have assumed that it is like a kind name that always has a narrow scope with respect to the abstract predicate \text{CAUSE}. If 'koyangi' has a meaning of a quantifier phrase such as "a cat" or "the cat", then it should stay outside of the scope of \text{CAUSE}, as shown in the following argument structure:

...
The above argument structure is now translated into the language of intensional logic. This time we give just an abbreviated translation as follows.

(19) c' AGR3-Prop: die<(xj) (MP1 applied)

Main Proposition:
CAUSEʾ(\{λPP{xj}\}) (\{dieʾ(xj)\}) (\{λPP{ch}\})
→ CAUSEʾ(ch, xj, \{dieʾ(xj)\}) (MP3, RN applied)

Applying QR:
λQ\exists x[catʾ(x) ∧ Q(x)](λxj[CAUSEʾ(xj) (\{dieʾ(xj)\})(ch)])
→ \exists x[catʾ(x) ∧ CAUSEʾ(x) (\{dieʾ(x)\})(ch)]
→ \exists x[catʾ(x) ∧ CAUSEʾ(ch, x, \{dieʾ(x)\})] (RN applied)

The result of the translation of (19c') says that there exists a certain cat, and that Ch'olsu caused it to die. Thus we have a correct semantic translation of the language of intensional logic for (19a).

Up to now we have described two very important phenomena of Korean causativization concerning the scope differences of the first argument of the subordinated proposition which is connected with the second argument of the main proposition. If it has a wide scope with respect to the abstract predicate CAUSE, then it has a de re reading in the sense of intensional se-
mantics (indicated in the argument structure of (19b')). If it has, however, a narrow scope with respect to the CAUSE as shown in the argument structure (19b), then it has a de dicto reading. The other kind of causativization, namely, with an auxiliary verb ‘-keha-ta’ presents the same argument structure. Thus, we skip it and turn to the treatment of the argument structure of control sentences.

3.4. Argument Structure of Control Sentences

We have treated the thematic structure of control sentences in Chapter 2.4. Now we try to present the argument structure corresponding to the thematic structure for the control sentences. First we look at the examples of (7a) and (7b) in Chapter 2.4, again.

    -SUBJ -OBJ0 school-OBL0 go-DEC-CON promise-PAST-DEC
    (Ch’olsu promised Yonghi to go to school.)

(22) Ch’olsu-ka Yonghi-eke hakkyo-lul tōna-torok sōld ikha-ess-ta.
    -SUBJ -OBJ0 school-OBJ leave-CON persuade-PAST-DEC
    (Ch’olsu persuaded Yonghi to leave school.)

We again give the thematic structure and its corresponding argument structure for (21) as follows.

(21) a. yaksokha-ta < Ag, Go, ka-ta < φ Loc > >
    θ-incorp. (Ag) ————
b. Argument Structure: PREDICATE < ARG1 ARG2 PROP >

\[
\begin{align*}
\text{ARG1-} & \text{ag}(ag) \quad \text{ARG2-} \text{go} \\
\text{ARG3-} & \text{prop} \\
\text{PREDICATE} & \quad \text{promise'} \\
\text{PROP} & \quad \text{QP} <i> \\
\text{ARG1} & \quad \text{ARG2} \\
\text{ARG3-} & \text{prop} \\
\end{align*}
\]

ka-ta: go' \quad \text{yaksokha-ta: promise'}

The argument structure of the control sentences is not very different from that of the causative sentences. However, we have to mention one very important difference between them. The causative sentences do not allow that the first thematic role of the subordinated proposition to be incorporated with the first thematic role of the main proposition. In the case of control sentences, however, there is no such restriction. This means that the thematic role of the first argument of the subordinated proposition can be connected with any thematic role of the main proposition, as the name of subject or object control states.

Now we present an abbreviated translation for the above argument structure as follows.

(21) c. AGR3-Prop:
    go'(xi, s) (MP1 applied)
    Applying QR:
    \( \lambda PP(ch) \checkmark xi [ka-ta'(s) (xi)] \)
We turn now to our last example (22) which is known as an object control sentence. The thematic structure and its corresponding argument structure look like the following:

(22) Ch'olsu-ka Yonghi-eke hakkyo-lul ttōna-torok sóldūkha-ess-ta.

a. sóldūkha-ta < Ag Go ttōna-ta < Ag Loc>

θ-incorp. Ag Go < ø Loc>

b. Argument Structure: PREDICATE < ARG1 ARG2 PROP>

```

PREDICATE     persuade'
ARG1-ag        CM APP(ch)
               MODE CM
               PM APP(xi)

ARG2-go(ag)    CM APP(yo)
               MODE CM
               PM APP(xj)

ARG3-prop     QP < j >
               PREDICATE leave'
               ARG1 [ xj ]

               ARG2
               CM APP(s)
               MODE CM
               PM APP(xk)

sóldūkha-ta: persuade'
ttōna-ta: leave'
```
In the above argument structure the first argument of the subordinated proposition is a variable that is bound by the second argument of the main proposition, i.e. 'Yŏnghi' by way of the coindex j. Now we just give the result of translation of the argument structure for (22) as follows.

(22) c. persuade\( (ch, yo, \text{leave}\( yo, s\)) \) (RN 정용)

We have handled the simple sentences of control phenomena in which only the proper nouns appear. We believe, however, that now we are able to handle the complicated quantifier phrases also as shown in the treatment of passive and causative sentences. They may raise some scope ambiguity, though it could be handled appropriately within our framework of the LMT.

4. Conclusion

The present development of the LMT shows that the lexical mapping of the thematic structure into the GFs is quite freely performed. However, it has not yet been proven that the LMT is also applicable for the complex sentences, i.e. composed of main- and embedded or subordinated clauses. Alsina’s treatment of the causative construction of Chichewa makes one exception in which she proposes the sharing of thematic roles, i.e. thematic fusion between the main- and subordinated thematic structures. Her treatment is, however, restricted to the simple sentences that are derived from the complex thematic structures. We have expanded her idea in order to treat not only the simple sentences of causativization and passivization but also the complex sentences of control phenomena. Within the frame of LMT Principles we have also developed a new method of incorporating thematic roles and the composition of complex predicates between the main- and the subordinated proposition for the derivation of GFs such as XCOMP, COMP. Incorporating the thematic roles and the predicate composition mean the sharing of not only thematic roles and predicates but also their syntactic features. Thus, the incorporated thematic roles or the incorporated predicates have their own syntactic features, which make it possible to map them into the abstract GF XCOMP and XCOMP-SUBJ. We believe that our method is also applicable to the derivation of other GFs such as XADJ, ADJ, POSS etc. More interestingly, the thematic incorporation presents a parallel treatment of semantic interpretation. Thus the incorporated the-
matic role acts as quantifier phrase that binds its trace in the original place as its variable. Thus, the various problems in describing the semantic phenomena concerning, for instances, the scope ambiguity, the de re and de dicto reading of sentences, can be in our method appropriately handled.

Finally, the great advantage of mapping the thematic structure into the argument structure is demonstrated by the fact that the semantic translation of the argument structure into the language of intensional logic does not alone satisfactorily describe the meaning of sentences. For instance, the sentence, 'Ch’olsu-ka hakkyo-e kan-ta' has the semantic translation of go' (ch, s) in the language of intensional logic, which indicates an extensional relation go between the entities ch (=Ch’olsu) and s (=school). Certainly it is not quite enough to describe the meaning of natural languages in this way, because Ch’olsu and school do not play the same thematic role. In our treatment of the argument structure it is explicitly demonstrated what kind of thematic roles each argument has, e.g. ARG1-ag, ARG2-th, because the semantic translation in our treatment is presupposed to have a certain relationship with the thematic structure. Thus, we are able to describe the correct meaning of natural languages.

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ABSTRACT

Thematic Structure and Argument Structure: An Application of Lexical Mapping Theory for Korean

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In the recent development of Lexical Functional Grammar it has been shown that various syntactic phenomena such as passive, applicative and causative constructions can be appropriately described by deriving them directly from the argument structures of the predicates. Thus, we might not need the f-structure, which connects the surface c-structure with the argument structure. The Lexical Mapping Theory achieves this task in this paper for the treatment of Korean syntax and semantics. We first have tried the correct thematic structures for Korean passivization, causativization and the so-called control sentences, and then have established to derive grammatical functions from the thematic roles with the feature combination of \([\pm r, \pm o]\). Thereby we have shown various morphological operations such as Theta-Incorporation, Predicate Incorporation etc. which can alter the thematic structures by adding, suppressing or binding the thematic roles or predicates between main and subordinates clauses. On the other hand the thematic structure serves as an input for the function-argument structure which is translated into the language of intensional logic for the semantic interpretation of sentences. We have argued that the thematic structure plays a very important role, because the logical treatment of the semantic structure can not reflect the correct meaning of natural languages. For instance, John loves Mary is translated into the language of intensional logic as \(\text{loves}(j, m)\), which simply states the extensional relation between the entities of j and m. However, our treatment for this sentence shows that the entity j playing a thematic role of Agent stays in a love-relation with the entity m playing a thematic role of Theme. Besides, we have treated various scope problems of Korean nominal phrases, espe-
cially their *de dicto* and *de re* readings in the argument structures.

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