Abstract

This paper aims to provide type hierarchies for Korean passive constructions on the basis of their forms within the HPSG framework. The type hierarchies proposed in this paper are based on the classification of Korean passives; suffixal passives, auxiliary passives, inherent passives, and passive light verb constructions. Verbs are divided into five subtypes in accordance with the possibility of passivization. We also provide type hierarchies for verbal nouns and passive light verbs.

1 Introduction

The passive is one of the most frequently analyzed constructions in the tradition of modern linguistics. Within the HPSG framework, the passive construction has been interpreted as a relationship between two verb forms (Sag and Wasow 1999:233), and lexical-rule based approaches have been employed in the analysis of the passive (Müller 2000). Korean passive constructions have also been a hot topic since the early days of Korean generative grammar. However, the constraint-based perspective on Korean passive constructions was introduced only recently, and there is few literature of the Korean passive in HPSG. Chang (1995) might be the first to have provided an analysis of Korean passive within the constraint-based framework. In recent years, Kim (2005) recast the Korean passive within the HPSG analysis and tried to find a solution to computational implementation for it. These previous studies offer an overall picture of Korean passives constructions, but they dealt with passives rather on an illustrative basis, showing that some samples can be handled in HPSG. The goal of this paper is to propose more fine-grained type hierarchies for the Korean passive constructions within the constraint-based grammar.

1.1 The Passive Forms

Haspelmath (1990:27) claims 'passive constructions without passive morphology do not exist.' Yeon (2005:587), likewise, says that morphological aspects have been disregarded in comparison with syntactic or semantic view in the study of Korean passives. Since passive expressions generally contain passive markers, the forms play an important role in the characterization of passives. We also regard the forms, in particular, the forms of VPs, as a significant criterion for Korean passive types. Keenan (1985:246) argues that linguists who want to study passives should take a serious view of 'ways of forming verb phrases,' because passives belong to

the process of verbal formations. In this study, we observe the verbal formation of passive constructions in Korean, and seek to find out the constraints based on their forms.

1.2 The Scope of Korean Passives

Since there seems to be no clear consensus as to the scope of the passive constructions in Korean, we adopt the following assumption from a cross-linguistic perspective. Hereafter, all analyses to Korean passives will be grounded on (1).

(1) The Scope of Korean Passives
  a. In principle, only transitive verbs can be transformed into passives. The passive sentence, therefore, must have both agent and theme roles, though the agent role may not be realized overtly.
  b. There should be a corresponding active form for each passive form. Besides, passives must be morphologically distinct from their corresponding actives.

1.3 The Data Compilation

We have attempted to consider the range of relevant data for our studies in a systematic and comprehensive way, because we believe that the data-oriented approach works for describing the characteristics of language much better. In order to collect relevant data, we took advantage of four linguistic resources as follows: the *Sejong POS-tagged Corpora*[1], the *Sejong Electronic Dictionary*, the *Standard Korean Dictionary*, and the *Yonsei Korean Dictionary*. In the following, especially in Sections 3.1 and 4.1, we will give a full detail of the process of data collection for our study.

2 Basic Data

Passive constructions in Korean are divided into three subgroups; suffixal passives, auxiliary passives, and passive light verb constructions. Suffixal passives are expressed by suffixes whose occurrence is conditioned largely by the stem-final sounds. There are four variants in the suffix; *-i*, *-hi*, *-li*, and *-ki*. For example, *ccic-* 'tear' takes the suffix *-ki* to form a passive verb like *ccic-ki-* 'be torn.' Auxiliary passives are phrasal passives which consist of a verbal stem followed by the complementizer *-e* or *-a* and the auxiliary *-ci* as in *ccic-e ci-* 'be torn.' Passive Light Verb Constructions (henceforth pLVCs, named after Chae 2003) are the ones that consist of verbal nouns (hereafter VNs) and passive light verbs (hereafter pLVs), such as *toy-*, *pat-*, and *tangha-*. For instance, the active light verb construction, such as *chepel ha-* 'punish' which is made up of a verbal noun *chepel* 'punishment' and a

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light verb *ha-*, can be transformed into the passives, as in *chepel toy-/pat-/tangha-* 'be punished.'

The issue which we would like to raise is that there are some restrictions on which type of passive construction is possible for a given active sentence. The main purpose of this study is to propose a solution for the puzzle of constraints regarding their passive forms.

2.1 Suffixal Passives vs. Auxiliary Passives

Typical passive forms of verb in Korean contain suffixes like *-i*, *-hi*, *-li* and *-ki*, and therefore the active-passive correspondence has been treated either as part of a syntactic process or as a lexical redundancy rule. However there are a large number of exceptions to this generalization, and this should be taken into account. For example, there is no passive counterpart **mandul-li-* of an active verb *mandul-* 'make', as shown in (2).[2]

> (2) a. *Mia-ka   ku   sangca-lul   mandul-ess-ta.*
>   Mia-NOM   DET   box-ACC   make-PAST-DC
>   'Mia made the box.'
>   b. **ku   sangca-ka   mandul-**li**-ess-ta.*
>   DET   box-NOM   make-**PASS**-PAST-DC
>   'The box was made.'
>   c. *ku   sangca-ka   mandul-**e**   **ci**-ess-ta.*
>   DET   box-NOM   make-**COMP**   **AUX**-PAST-DC
>   'The box was made.'

There is no such expression like (2b), because some verbs like *mandul-* cannot be used as passives with suffix. Whereas verbs like *mandul-* cannot combine with any kind of passive suffix, verbs like *tat-* 'close'[3] are the opposite with reference to passivization. Though the auxiliary passive construction is a more productive operation than the suffixal passive construction, yet certain verbs sound odd when passivized in this way.[4]

> (3) a. *Mia-ka   ku   sangca-lul   tat-ass-ta.*
>   Mia-NOM   DET   box-ACC   close-PAST-DC
>   'Mia closed the box.'
>   b. *ku   sangca-ka   tat-**hi**-ess-ta.*
>   DET   box-NOM   close-**PASS**-PAST-DC
>   'The box was closed.'

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[2] The glosses used in this paper are as follows.
 ACC: accusative, AUX: auxiliary, COMP: complementizer suffix, DAT: dative, DC: Declarative sentence-type suffix, DET: determiner, LV: light verb, NOM: nominative, PASS: passive suffix, PAST: past tense suffix, PLV: passive light verb

[3] In Korean, *tat-* 'close' is used only as a transitive verb, unlike English.

[4] It could be somewhat controversial to make a comparison between the less productive one and the more productive one. But the primary goal of this paper is to draw an outline of the Korean passive system. Therefore it is necessary to discuss about the difference in form concerning passivization, which is one of the main properties of Korean passives.

    c. ??*ku   sangca-ka   tat-**a**   **ci**-ess-ta.*
       DET   box-NOM   close-**COMP**   **AUX**-PAST-DC
       'The box was closed.'

(3c) sounds awkward, while the suffixal passive predicate in (3b) which corresponds to (3a) sounds perfect. However, as given below, some verbs like *ccic-* 'tear' can be passivized with an auxiliary verb as well as with a suffix.

  (4)   a. *Mia-ka   ku   os-lul   ccic-ess-ta.*
          Mia-NOM   DET   dress-ACC   tear-PAST-DC
          'Mia tore the dress.'
       b. *ku   os-i   ccic-**ki**-ess-ta.*
          DET   dress-NOM   tear-**PASS**-PAST-DC
          'The dress was torn.'
       c. *ku   os-i   ccic-**e**   **ci**-ess-ta.*
          DET   dress-NOM   tear-**COMP**   **AUX**-PAST-DC
          'The dress was torn.'

2.2   Passive Light Verb Constructions

There are co-occurrence restrictions between VNs and pLVs. For example, pLV *toy-* can attach to *cheypho* 'arrest' to form the passive verb *cheypho-toy-* 'be arrested,' but the same VN *cheypho* with another pLV *pat-*, such as **cheypho-pat-ta*, is not a legitimate form in Korean as shown below.

  (5)   a. *kyengchal-i   Mia-lul   cheypho-**ha**-yess-ta.*
          policeman-NOM   Mia-ACC   arrest-**LV**-PAST-DC
          'A policeman arrested Mia.'
       b. *Mia-ka   kyengchal-eykey   cheypho-**toy**-ess-ta.*
          Mia-ka   kyengchal-eykey   cheypho-pat**-ass-ta.*
          *Mia-ka   kyengchal-eykey   cheypho-**tangha**-yess-ta.*
          Mia-NOM   policeman-DAT   arrest-**PLV**-PAST-DC
          'Mia was arrested by a policeman.'

    Which nominal can be taken as the complement of pLVs also falls under the constraint on pLVCs. Korean light verb constructions have the case frame like 'VN(-*ul*/*lul*[ACC]) + *ha*.' The passive forms for the frame can be divided into two forms; 'VN(-*i*/*ka*[NOM]) + PLV' or 'VN(-*ul*/*lul*[ACC]) + PLV.' (6) shows the difference between them clearly.

  (6)   a. *kyengchal-i   Mia-lul   cheypho(-lul)   ha-yess-ta.*
          policeman-NOM   Mia-ACC   arrest-ACC   LV-PAST-DC
          'A policeman arrested Mia.'
       b. *Mia-ka   kyengchal-eykey   cheypho(-ka)   toy-ess-ta.*
          *Mia-ka   kyengchal-eykey   cheypho(-ka)   tangha-yess-ta.
          Mia-NOM   policeman-DAT   arrest-NOM   **PLV**-PAST-DC
          'Mia was arrested by a policeman.

c. *Mia-ka   kyengchal-eykey   cheypho(-lul)   toy-ess-ta.
   Mia-ka   kyengchal-eykey   cheypho(-lul)   tangha-yess-ta.
   Mia-NOM   policeman-DAT   arrest-ACC   **PLV**-PAST-DC
   'Mia was arrested by a policeman.

There are three forms of passivization for VNs, and the pLVs are distinct from each other with respect to the choice of VNs. The meanings of the three pLVs are different from each other as well. Basically, *toy-* means 'become,' *pat-* may convey a sense of 'reception,' and *tangha-* can be translated into English as 'suffer.' Sentences in (7) are the cases that *toy-*, *pat-*, and *tangha-* are made use of as main verbs with their regular verbal meanings.

(7)   a. *Mia-ka   kyoswu-ka   toy-ess-ta.*
          Mia-NOM   professor-NOM **become**-PAST-DC
          'Mia became a professor.'
       b. *Mia-ka   pyenci-lul   pat-ass-ta.*
          Mia-NOM   letter-ACC   **receive**-PAST-DC
          'Mia received a letter.'
       c. *Mia-ka   sako-lul   tangha-yess-ta.*
          Mia-NOM   accident-ACC   **suffer**-PAST-DC
          'Mia suffered an accident. (Mia met with an accident.)'

Keenan (1985:257) says that there are four types in respect of periphrastic passives. According to his analysis, periphrastic passives may fall into natural subclasses depending on the choice of the auxiliary verb: 'being' or 'becoming,' 'reception,' 'motion,' or 'experience.'

(8)   a. *Hans   wurde   von   seinem Vater   besttaft.*
          Hans   **became** 'by'   his   father   punished
          'Hans was punished by his father.'   (German, Keenan 1985:257)
       b. *Mia-ka   chepel-i   toy-ess-ta.*
          Mia-NOM   punishment-NOM **become**-PAST-DC
          'Mia was punished.'
(9)   a. *Cafodd   Wyn   ei   rybuddio   gan   Ifor.*
          get   Wyn   his   warnings   by   Ifor
          'Wyn was warned by Ifor.'   (Welsh, Keenan 1985:259)
       b. *Mia-ka   chepel-ul   pat-ass-ta.*
          Mia-NOM   punishment-NOM **receive**-PAST-DC
          'Mia was punished.
(10) a. *Quang bi   (Bao)   ghet.*
          Quang **suffer** (Bao)   detest
          'Quang is detested (by Bao).'   (Vietnamese, Keenan 1985:260)
       b. *Mia-ka   chepel-ul   tangha-yess-ta.*
          Mia-NOM   punishment-NOM **suffer**-PAST-DC
          'Mia was punished.

From this cross-linguistic viewpoint, it is not surprising that there are three elements in Korean pLVs. And our main concern regarding the difference is on the co-occurrence restrictions on the relationship between the VN and the pLVs, which will be discussed in 4.2.

2.3 Inherent Passives

There are some cases which do not include any passive morpheme on the surface, but yet show passive-active correspondence semantically. For example, verbs like *mac-* 'be hit' and *ttayli-* 'hit' behave like a passive-active pair in terms of their argument structure.
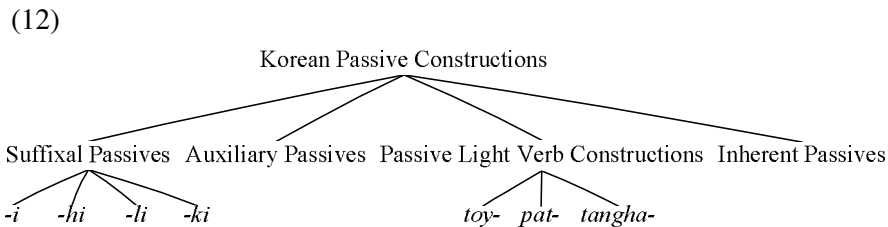
(11) a. *Inho-ka*   *Mia-lul*   *ttayli-ess-ta*.
        Inho-NOM   Mia-ACC   hit-PAST-DC
        'Inho hit Mia.'
     b. *Mia-ka*   *Inho-eykey*   *mac-ass-ta*.
        Mia-NOM   Inho-DAT   be hit-PAST-DC
        'Mia was hit by Inho.'

According to Sohn (1999), *mac-* in (11b) may be analyzed as passives in a broad sense, in terms of its passive-like meanings and syntactic behavior.[5] It is noticeable that verbs in (11) cannot be passivized with auxiliary verbs, nor with suffixes (e.g. **ttayli-i-*, **ttayli-e ci-*, **mac-hi-*, and **mac-a ci-*). We call this type 'Inherent Passives'.

2.4 Types of Korean Passives

As was mentioned before, there are some restrictions on the passivization process. It is possible to specify passivization possibility for each verb, but a more efficient way to encode the same information would be to make use of type hierarchy. It would also allow a more natural and systematic grouping of verbs in terms of passivization.

Building on some previous studies (Chang 1995, Sohn 1999, and Kim 2005) and the data given above, we classify Korean passive expressions into four subclasses, including the inherent case. The taxonomy of passives in Korean is sketched out below.

(12)

Korean Passive Constructions

Suffixal Passives   Auxiliary Passives   Passive Light Verb Constructions   Inherent Passives

-i   *-hi*   *-li*   *-ki*   *toy-*   *pat-*   *tangha-*

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5 According to the criterion on Korean passives that we assumed previously, this type also belongs to passives.

3   Suffixal, Auxiliary, and Inherent Passives

We propose that verbs in Korean are initially classified into four subtypes with respect to passivization, excluding the ones that don't allow any kind of passivization like *talm-* 'resemble.'   The subtypes are primarily differentiated from each other according to whether it allows only one of the suffixal or auxiliary passivization, or both.

(13)

$$v\text{-}pass\text{-}type$$

SUFPASS   AUXPASS

(p-1)   (p-2)   (p-3)
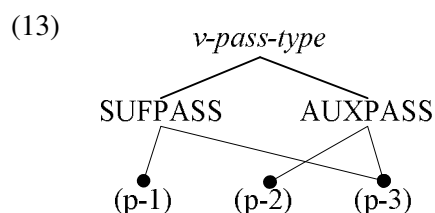
Verbs which allow only suffixal passives belong to (p-1) type.   (p-2) type involves the verbs that can be transformed into passives only by auxiliary verbs.   Verbs of (p-3) type allow both types of passives.   Then there is the other possibility where a verb allows neither suffixal nor auxiliary passives. It can be called type (p-4).   Examples for the four types are given in the following table, where the bold faced verbs indicate the blocked forms.

Table (1)

		SUFPASS	AUXPASS
(p-1)	*tat-ta* 'close'	*tat-hi-ta*	**??tat-a ci-ta**
(p-2)	*mandul-ta* 'make'	***mandul-li-ta**	*mandul-e ci-ta*
(p-3)	*ccic-ta* 'tear'	*ccic-ki-ta*	*ccic-e ci-ta*
(p-4)	*talm-ta* 'resemble'	***talm-ki-ta**	**??talm-a ci-ta**

The last line in the table should be distinguished from the cases of the inherent passive verbs like *mac-* 'be hit'.   It allows neither passivization processes, but it still has its passive counterpart, albeit inherent, so we suggest that the inherent passive forms its own type.   The overall picture of verb types are sketched out in (14)

(14)
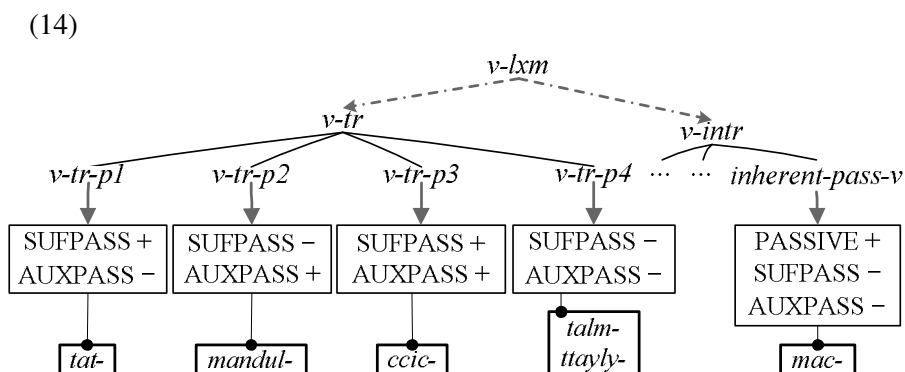
The feature specification in (14) shows clearly which kind of passivization is allowed for each type. It also shows if a given type is inherently passive.

3.1 Classification of Verbs

We started from *The Sejong POS-tagged Corpora* to get the list of verbs which have a frequency over nine. There were 1,459 verbs on our initial list. Let us call it List A. Next, we extracted the suffixal passive forms from each of *The Sejong Electronic Dictionary*, *The Standard Korean Dictionary*, and *The Yonsei Korean Dictionary*. Avoiding marginal or controversial cases, we included only the forms which are admitted to be passives in all of the dictionaries as suffixal passives. Finally, we excluded from our suffixal passives list the items whose corresponding active forms are not on List A. As a result, there were 152 Suffixal Passive forms collected in this way.

As for auxiliary passives, we searched the *Sejong POS-tagged Corpora* to find out the phrasal form like 'V-*el a ci-*.' There were 397 types of verbs which appeared in this context. From this list we excluded some cases through the following four processes. First, the list of verbs were checked against the *Standard Korean Dictionary* to find out the ones that have the suffixal passive forms (e.g. *po-i-ta*, 'be seen') or causatives (e.g. *pes-ki-ta*, 'take off other's clothes') listed in the dictionary. In this way non-active forms were excluded from the 397 types. Second, the verbs which have adjective usage (e.g. *palk-ta*, 'be bright') were also discarded, because an adjective combined with '-*el a ci-*' has an inchoative meaning as in *palk-a ci-ta* 'brighten.' Third, we also got rid of the verbs which have a locative case-mark alternation, such as NP[loc]-*ey/lul hyangha-ta* 'go towards NP[loc].' Finally, we excluded the items which are not on List A. Consequently, we got 214 verbs that can be passivized by an auxiliary. In accordance with taxonomy mentioned before, we rearranged verbs entries and classified them into three subcategories. Some examples are shown below.

(15) (p-1) *kkakk-ta* 'cut', *mek-ta* 'eat', *ssu-ta* 'use', *cap-ta* 'catch' (110 verbs)
  (p-2) *nukki-ta* 'feel', *kus-ta* 'draw', *cis-ta* 'build', *chac-ta* 'find' (172 verbs)
  (p-3) *sek-ta* 'mix', *ssu-ta* 'write', *ssis-ta* 'wash', *phwul-ta* 'solve' (42 verbs)

3.2 Suffixal Passives

(16a) shows the typical structure of a verb with its suffixes, and (17) is a type hierarchy for the sequence like (16a) proposed by Kim & Yang (2006). However, notice that passives and causatives are not properly represented in the hierarchy.[6]
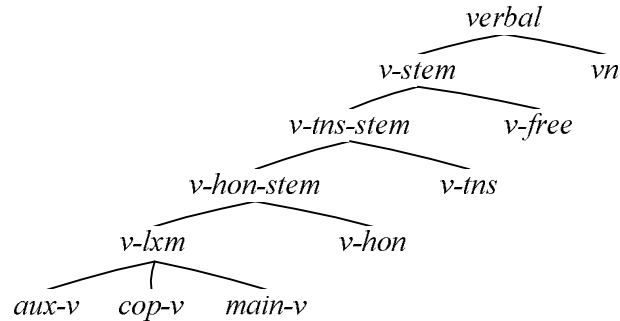
(16) a. V-base + (PASS/CAUS) + (HON) + (TNS) + MOOD + (COMP)
  b. *cap-hi-si-ess-ta* 'catch-PASS-HON-PAST-DC'

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[6] The sequence MOOD + (COMP) in (16a) is treated as forming a *v-free* node in (17).
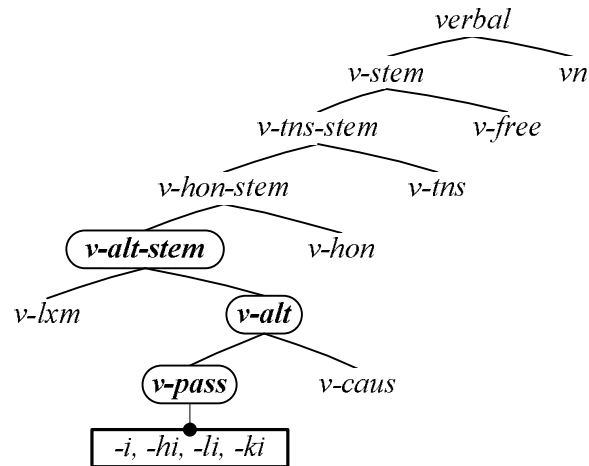
(17)

```
                                    verbal
                          ╱─────────────────╲
                      v-stem                  vn
                  ╱──────────╲
              v-tns-stem        v-free
          ╱──────────╲
      v-hon-stem        v-tns
    ╱──────────╲
  v-lxm          v-hon
  ╱   |   ╲
aux-v cop-v main-v
```

(18) is our revised verbal hierarchy which can treat a suffixal passive verb properly within the verbal system.

(18)

```
                                    verbal
                          ╱─────────────────╲
                      v-stem                  vn
                  ╱──────────╲
              v-tns-stem        v-free
          ╱──────────╲
      v-hon-stem        v-tns
    ╱──────────╲
( v-alt-stem )    v-hon
  ╱       ╲
v-lxm     ( v-alt )
          ╱      ╲
      ( v-pass )   v-caus
          |
   ┌──────────────┐
   │ -i, -hi, -li, -ki │
   └──────────────┘
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Whether passive suffixes are derivational or inflectional has been a hot issue for a long time, reflecting the difficulty of drawing a strict line between a derivational suffix and an inflectional suffix because of the morph-syntactic peculiarity of Korean verbal system.[7] Crucially though, since passive suffixes lead to argument alternations, we name the super-class of passive suffix *v-alt-stem*. The node *v-alt-stem* is inserted between *v-hon-stem* and *v-lxm* in the type hierarchy.

(19) presents a lexical rule that shows the actual derivation of passive forms. If the stem has the features [PASSIVE −] and [PASS-TYPE.SUFPASS +], it can turn into a *v-pass* type with an appropriate suffix. The process of the argument alternation will take place, as shown in the crossed linking relations of the arguments, represented as *i* and *j*, between the values of the two ARG-ST features in (19). (20) shows how (p-1) type like

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[7] Kim (1992), for example, classified Korean verbal suffix into three subgroups; Inflection, Derivation, and Inflectional derivation. Sohn (1999) also said that passive or causative suffixes in Korean are somewhat on the border between inflection and derivation. See Cho and Sells (1995) as well for further discussion.

tat-hi- 'be closed' is derived.

(19) *v-pass* $\Rightarrow$

$$
\begin{bmatrix}
\text{PASSIVE } + \\[4pt]
\text{STEM} \begin{bmatrix}
\textit{v-tr} \\
\text{PASSIVE } - \\
\text{PASS-TYPE.SUFPASS } + \\
\text{ARG-ST} \left\langle \text{NP}_i, \text{NP}_j \right\rangle
\end{bmatrix} \\[4pt]
\text{ARG-ST} \left\langle \text{NP}_j, (\text{NP}[dat]_i) \right\rangle
\end{bmatrix}
$$

(20)

$$
\begin{bmatrix}
\textit{v-tr-p}1 \\
\text{PHON} \left\langle \textcircled{1}\textit{tat-} \right\rangle \\
\text{PASSIVE } - \\
\text{PASS-TYPE} \begin{bmatrix} \text{SUFPASS} & + \\ \text{AUXPASS} & - \end{bmatrix} \\
\text{ARG-ST} \left\langle \text{NP}_i, \text{NP}_j \right\rangle \\
\text{SEM} \textcircled{2} \begin{bmatrix} \text{INDEX} & s \\ \text{ARG1} & i \\ \text{ARG2} & j \end{bmatrix}
\end{bmatrix}
\rightarrow
\begin{bmatrix}
\textit{v-pass} \\
\text{PHON} \left\langle \textcircled{1}\textit{tat-hi} \right\rangle \\
\text{PASSIVE } + \\
\text{ARG-ST} \left\langle \text{NP}_j, (\text{NP}[dat]_i) \right\rangle \\
\text{SEM} \textcircled{2}
\end{bmatrix}
$$

3.3 Auxiliary Passives

The hierarchy of syntactic structure below is from Kim (2004:76), who proposes that auxiliary passives can be handled as *hd-lex-ex*, as shown in (22).

(21)
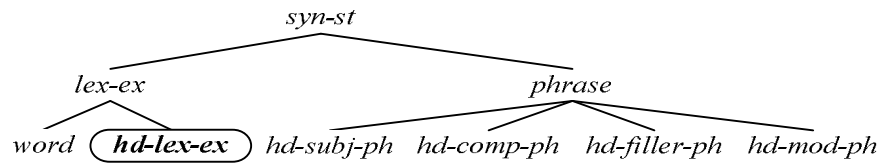
(22) $\begin{bmatrix} \textit{hd-lex-ex} \\ \text{COMPS L} \end{bmatrix} \rightarrow \textcircled{1}\begin{bmatrix} \text{LEX } + \\ \text{COMPS L} \end{bmatrix}, \text{H}\begin{bmatrix} \text{AUX} + \\ \text{COMPS} \left\langle \textcircled{1} \right\rangle \end{bmatrix}$

We agree that auxiliary passives should fall under *hd-lex-ex*. However, we would say that it is necessary for *hd-lex-ex* to branch out. We suggest *hd-lex-pass-ex* as one of subtypes of *hd-lex-ex*. There are two reasons for this.

First, let us consider which conveys the sense of passives. Is it the main verb or the passive auxiliary *ci-*? Kim (2005) proposed that main verbs cannot combine with an auxiliary such as *ci-* or passive light verbs such as

toy-, *pat-*, and *tangha-* until they are transformed into passives. Our claim is that *hd-lex-pass-ex* should be introduced as a subtype of *hd-lex-ex*, because what is responsible for passive meaning is not the verb but auxiliary *ci-* (cf. Lee 2005). Our approach has an added benefit of getting rid of, to our view, an extra process of vacuous case alternation for every verb. In our analysis, this process is triggered only when the verb combines with *ci-*, thus making the system more controlled.

Secondly, there are several other uses of Korean *-e/a ci-* construction other than passive constructions. If *-e/a ci-* phrase combines with adjectives, it represents an inchoative meaning like (23a). On the other hand, if *-e/a ci-* phrase combines with forms already passivized as in (23b), we suggest it conveys some resultative meaning. These phenomena raise the necessity to classify *-e/a ci-* phrases into several subtypes.

(23) a. *Mia-ka*   *yeypp-**e***   ***ci**-ess-ta.*
       Mia-NOM   pretty-**COMP**   **AUX**-PAST-DC
       'Mia became pretty.'
    b. *Mia-ka*   *ic-**hi**-e*   ***ci**-ess-ta.*[8]
       Mia-NOM   forget-**PASS**-**COMP**   **AUX**-PAST-DC
       'Mia has been forgotten.'

Then, (24) is a revised syntactic hierarchy that we would like to suggest for the auxiliary passive constructions.

(24)
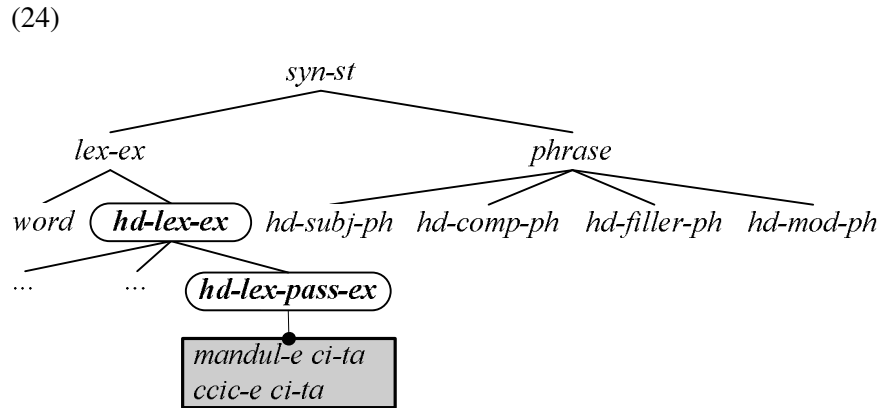
(25) is the constraint for *hd-lex-ex*, replacing (22) in the above, and (26) is the rule that we propose for the auxiliary passive construction.

(25)
$$[hd\text{-}lex\text{-}ex] \rightarrow \text{①}[\text{LEX} \ +], \ \text{H}\begin{bmatrix} \text{AUX}+ \\ \text{COMPS} \langle \text{①} \rangle \end{bmatrix}$$

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[8] In the traditional prescriptive grammar, this kind of 'double passive' form is considered to be wrong, but this form is used far more frequently than the more "correct" form *ice-hi-ess-ta.*

(26)

$$
\begin{bmatrix} \textit{hd-lex-pass-ex} \\ \text{SUBJ} \langle ② \rangle \\ \text{COMPS} \langle (①) \rangle \end{bmatrix} \rightarrow ③ \begin{bmatrix} \textit{v-comp} \\ \text{PASSIVE} - \\ \text{PASS-TYPE.AUXPASS} + \\ \text{ARG-ST} \langle ①, ② \rangle \end{bmatrix}, \begin{bmatrix} V \\ \text{PASSIVE} + \\ \text{SUBJ} \langle ② \rangle \\ \text{COMPS} \langle ③ \rangle \end{bmatrix}
$$

Now we can show how the appropriate passive forms for (p-2) type like *mandul-* 'make' are derived. Since (p-2) type has a [PASS-TYPE.SUFPASS –] feature, the suffixal passivization process will be blocked.
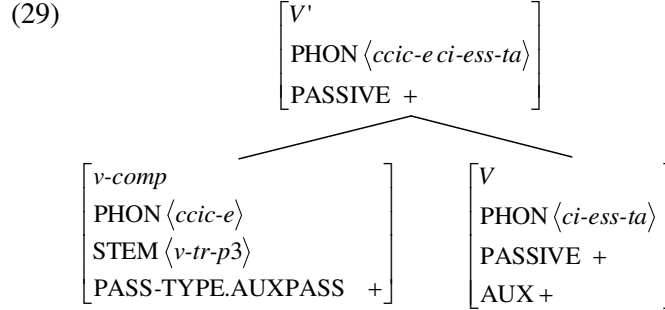
(27)

$$
\begin{bmatrix} V' \\ \text{PHON} \langle \textit{maldul-e ci-ess-ta} \rangle \\ \text{HEAD} ④ \\ \text{PASSIVE} + \\ \text{SUBJ} \langle ② \rangle \\ \text{COMPS} \langle (①) \rangle \end{bmatrix}
$$

$$
③ \begin{bmatrix} \textit{v-comp} \\ \text{PHON} \langle \textit{maldul-e} \rangle \\ \text{STEM} \langle \textit{v-tr-p2} \rangle \\ \text{PASSIVE} - \\ \text{PASS-TYPE} \begin{bmatrix} \text{SUFPASS} & - \\ \text{AUXPASS} & + \end{bmatrix} \\ \text{ARG-ST} \langle ①, ② \rangle \end{bmatrix} \qquad ④ \begin{bmatrix} V \\ \text{PHON} \langle \textit{ci-ess-ta} \rangle \\ \text{PASSIVE} + \\ \text{AUX} + \\ \text{SUBJ} \langle ② \rangle \\ \text{COMPS} \langle ③ \rangle \end{bmatrix}
$$

(28) and (29) illustrates how (p-3) type like *ccic-* 'tear' is derived. Since both PASS-TYPE features of *ccic-* are plus, *ccic-* can be transformed into either *ccic-ki-* or *ccic-e ci-*.

(28)

$$
\begin{bmatrix} \textit{v-tr-p3} \\ \text{PHON} \langle ① \textit{ccic-} \rangle \\ \text{PASS-TYPE.SUFPASS} + \end{bmatrix} \rightarrow \begin{bmatrix} \textit{v-pass} \\ \text{PHON} \langle ① \textit{ccic-ki} \rangle \\ \text{PASSIVE} + \end{bmatrix}
$$

(29)

$$
\begin{bmatrix} V' \\ \text{PHON} \langle ccic\text{-}e\ ci\text{-}ess\text{-}ta \rangle \\ \text{PASSIVE} + \end{bmatrix}
$$

$$
\begin{bmatrix} v\text{-}comp \\ \text{PHON} \langle ccic\text{-}e \rangle \\ \text{STEM} \langle v\text{-}tr\text{-}p3 \rangle \\ \text{PASS-TYPE.AUXPASS} \quad + \end{bmatrix}
\qquad
\begin{bmatrix} V \\ \text{PHON} \langle ci\text{-}ess\text{-}ta \rangle \\ \text{PASSIVE} + \\ \text{AUX} + \end{bmatrix}
$$

3.4 Inherent Passives

Inherent passive verbs need to have passive information from the start. Further information need to be specified to block the passive rules from applying to them. AVM (30) is lexical representation for the inherent passive verb *mac-* 'be hit', while (31) is for the corresponding active verb *ttayli-* 'hit' which can be passivized neither suffixally nor with auxiliary verbs. Some verbs which cannot be transformed into passives like *talm-* 'resemble' also belong to *v-tr-p4*.

(30) *mac-*

$$
\begin{bmatrix} inherent\text{-}pass\text{-}v \\ \text{PASSIVE} + \\ \text{PASS-TYPE} \begin{bmatrix} \text{SUFPASS} & - \\ \text{AUXPASS} & - \end{bmatrix} \\ \text{ARG-ST} \langle \text{NP}[nom]_j, \text{NP}[dat]_i \rangle \end{bmatrix}
$$

(31) *ttayli-*

$$
\begin{bmatrix} v\text{-}tr\text{-}p4 \\ \text{PASSIVE} - \\ \text{PASS-TYPE} \begin{bmatrix} \text{SUFPASS} & - \\ \text{AUXPASS} & - \end{bmatrix} \\ \text{ARG-ST} \langle \text{NP}[nom]_i, \text{NP}[acc]_j \rangle \end{bmatrix}
$$
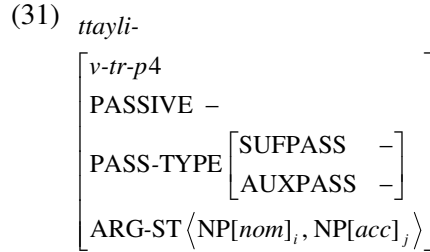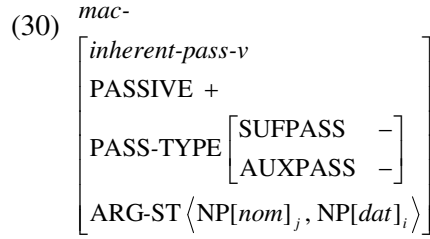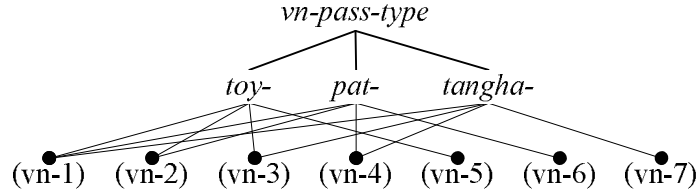
4 VNs and PLVs

VNs also constitute a type hierarchy of their own with respect to their combination with the light verbs. Therefore, we also propose a type hierarchy of VNs in relation to pLVs.

Since there are three pLVs available for combination with VNs, there are eight types of VNs with respect to passivization, including a case such as *swuhak* 'study' where a VN cannot take any pLVs.

(32)

```
                          vn-pass-type
                    /          |        \
                toy-         pat-      tangha-
              (vn-1) (vn-2) (vn-3) (vn-4) (vn-5) (vn-6) (vn-7)
```

It is rather surprising that actual verbal nouns for each of the logically possible seven types are attested in Korean. Asterisks in Table (2) show the unacceptable forms.

Table (2)

		+ *toy-*	+ *pat-*	+ *tangha-*
(vn-1)	*chepel* 'punishment'	O	O	O
(vn-2)	*yongse* 'forgiveness'	O	O	*
(vn-3)	*cheypho* 'arrestment'	O	*	O
(vn-4)	*kisup* 'raid'	*	O	O
(vn-5)	*yenkwu* 'research'	O	*	*
(vn-6)	*conkyeng* 'respect'	*	O	*
(vn-7)	*kangkan* 'rape'	*	*	O
(vn-8)	*swuhak* 'study'	*	*	*

4.1　Classification of VNs

The major diagnostic criterion for VNs is whether a given noun can be combined with the light verb *ha-*. Therefore, we first extracted from the *Sejong Electronic Dictionary* (2002-3) a list of nouns whose lexical entries specify that it can be combined with *ha-*. Among the VN items on the list, we further consulted with their entries and narrowed the list to those items whose entry specifies that they have the case frame of 'NP-*ul/lul* VN-*ul/lul ha.*' This restriction was introduced to ensure that the nontransitive VNs be excluded because they cannot have a passive counterpart in principle. We also excluded the cases where the VN consists of one syllable or over three syllables which tend to involve some semantic peculiarity. The resulting number of VNs was 2,707. The next step in our data collection and classification was to find positive evidence for possible combination of VNs and pLVs by searching the *Sejong POS-tagged Corpora*. For instance, given a VN *yenkwu* and a pLV *toy-*, we searched the corpus to see whether there is a form similar to *yenkwu-toy* in the corpus. Likewise, we also checked for sequences such as VN-*pat-*, VN-*lul pat-*, VN-*tangha-*, VN-*lul tangha-* in the corpus. Altogether 1,713 (or 1,595 if more strict criteria are adopted) VNs out of the 2,707 were found to be combinable with one or more of the three pLVs.

(33) (vn-1) *kangyo* 'forcible demand', *ekap* 'suppression',
          chepel 'punishment', *chwukwung* 'pressing hard',
          chimhay 'infringement' (54 VNs / 30 VNs)
      (vn-2) *taychwul* 'loan', *poko* 'briefing', *sangsok* 'inheritance',
          sentayk 'selection', *yangto* 'transfer' (264 VNs / 189 VNs)
      (vn-3) *kamkum* 'imprisonment', *kecel* 'refusal', *salhay* 'murder',
          apswu 'confiscation', *hayko* 'dismissal' (120 VNs / 122VNs)
      (vn-4) *myelsi* 'contempt', *chimlyak* 'invasion' (29 VNs / 6 VN)
      (vn-5) *kangjo* 'emphasis', *naptuk* 'assent', *tunglok* 'registration',
          pannap 'return', *punsil* 'loss', *sayong* 'use', *yenkwu* 'inquiry',
          yoyak 'summation', *insang* 'raising', *cunpi* 'preliminary',
          hoypok 'recovery' (1,030 VNs / 1,127 VNs)
      (vn-6) *daywu* 'respect', *senmang* 'envy', *conkyeng* 'respect',
          chingchan 'praise', *hoanyeng* 'welcome' (160 VNs / 74 VNs)
      (vn-7) *kangkan* 'rape', *sahyeng* 'punishment of death', *hoksa* 'abuse'
          paysin 'betrayal', *kwutha* 'blow', (56 VNs / 47 VNs)

The numbers following the slash at the end of each type are the resulting
number of cases where VN+*ul/lul* -pLV (e.g. *chepel-ul pat-*, *chepel-ul
tangha-*) are excluded when searching the corpus.[9]   Incidentally, there were
994/1,112 VNs for which there was no case of pLV passivization found in
the corpus, including *kikwuen* 'abstention', *paywung* 'send-off', *poksup*
'review', *swulyo* 'completion', *yehayng* 'travel', *cwuce* 'hesitation,' etc.

4.2   Types of VNs and PLVs

In the case of pLVCs, when we observed the above data in an inductive way,
we came to conclusion that there are three semantic features which seem to
be relevant to their restrictions.

First, the 'animacy' of subject seems to be relevant.   The constructions
with *pat-* or *tangha-* are inclined to have an animate subject.   Secondly,
grammatical cases of VNs are also relevant. *toy-* takes a nominative case
noun as its complement, whereas *pat-* or *tangha-* take an accusative.   For
this purpose we can make use of the feature AGT, introduced by Kim (2004).
Finally, adversity feature of VNs seems to play a role.   Almost invariably,
tangha- combines with the nouns which convey a sense of adversity.   Table
(3) shows the overall picture of these phenomena.

Table (3)

	toy-	*pat-*	*tangha-*
ANIMATE	bool	+	+
AGT	−	+	+
ADVERSITY	−	−	+

---

[9] Type (vn-4) has the fewest number of examples; apparently, if a VN can be combined with a
pLV, but cannot be combined with -*toy*, then -*pat* and -*tangha* are in complementary
distribution.

After considering all these factors, we have built up a type hierarchy for VNs as in (34).
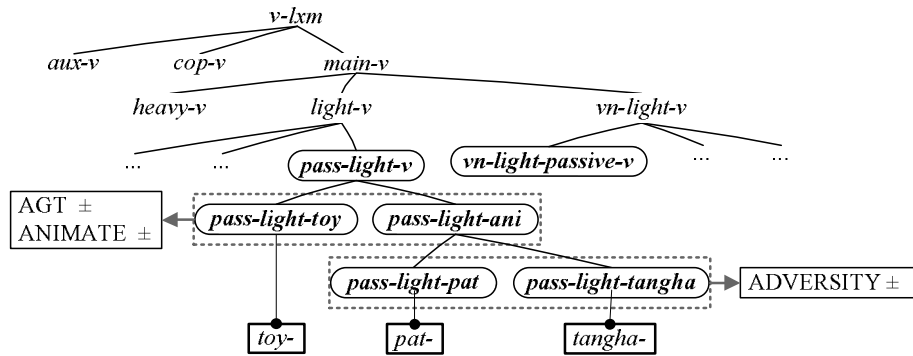
(34)

type	features	lexeme
vn-tr-plv1	ANIMATE bool / ADVERSITY bool	*chepel*
vn-tr-plv2	ANIMATE bool / ADVERSITY −	*yongse*
vn-tr-plv3	ANIMATE bool / ADVERSITY +	*cheypho*
vn-tr-plv4	ANIMATE + / ADVERSITY bool	*kisup*
vn-tr-plv5	ANIMATE − / ADVERSITY bool	*yenkwu*
vn-tr-plv6	ANIMATE + / ADVERSITY −	*conkyeng*
vn-tr-plv7	ANIMATE + / ADVERSITY +	*kangkan*
vn-tr-plv8	PLVPASS −	*swuhak*

vn ⤏ *vn-tr* branches into *vn-tr-plv1* through *vn-tr-plv8*.
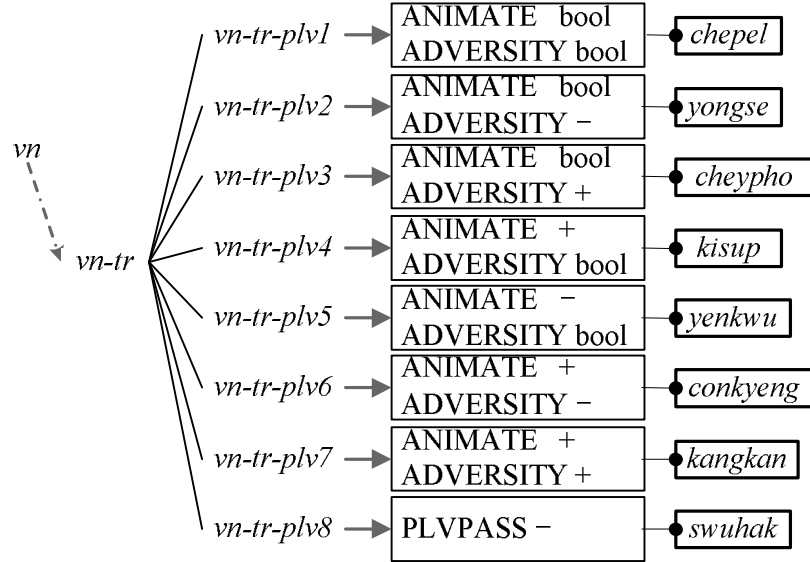
cheypho 'arrest' has an unspecified ANIMATE feature as well as [ADVERSITY +], for instance. According to the constraint, *cheypho* can combine with *toy-* or *tangha-*.
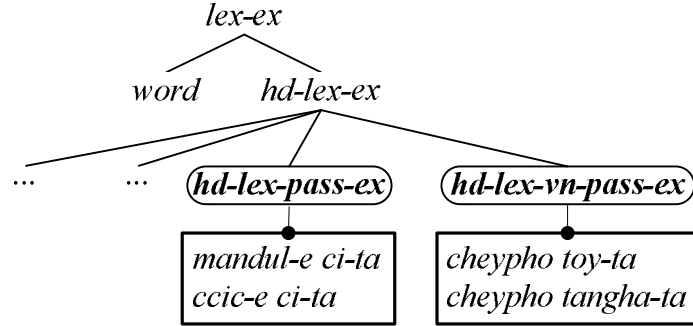
(35) shows a type hierarchy for PLVs. The upper dotted box represents a difference in the ANIMATE feature value and grammatical cases. The lower one stands for the difference in the ADVERSITY feature value. We provide *hd-lex-vn-pass-ex* as a subtype of *hd-lex-ex*, which is sketched out in (36).

(35)

```
                         v-lxm
             ┌─────────────┼───────────┐
          aux-v          cop-v       main-v
                              ┌──────────┴────────────┐
                          heavy-v   light-v       vn-light-v
                           ┌────────┴──┐          ┌──────┴─────┐
                          ...   ...  pass-light-v  vn-light-passive-v  ... ...
   ┌──────────┐          ┌──────┴──────────┐
   │ AGT  ±   │ ········ pass-light-toy  pass-light-ani
   │ ANIMATE ±│               │        ┌──────┴─────────┐
   └──────────┘          pass-light-pat  pass-light-tangha ······ ┌──────────┐
                              │              │                    │ADVERSITY ±│
                            toy-           pat-    tangha-         └──────────┘
```

(36)

With constraints and rules in (37), (38), and (39), pLVCs can now be dealt with properly. These AVMs reflect the key features that we have discussed so far; Animate, Adversity, and Grammatical cases.

(37)

$$\begin{bmatrix} \textit{hd-lex-vn-pass-ex} \\ \text{PASSIVE } + \end{bmatrix} \rightarrow \begin{bmatrix} \text{POS } \textit{noun} \\ \text{NOMINAL } + \\ \text{VERBAL } + \\ \text{ANIMATE } ① \\ \text{ADVERSITY } ② \\ \text{PLVPASS } + \end{bmatrix}, \begin{bmatrix} \text{PASSIVE } + \\ \text{ANIMATE } ① \\ \text{ADVERSITY } ② \end{bmatrix}$$

(38) head-lex-vn-pass-rule-1

$$[\textit{hd-lex-vn-pass-ex}] \rightarrow ①[\text{GCASE } \textit{nom}], \begin{bmatrix} \text{AGT } - \\ \text{COMPS } \langle ① \rangle \end{bmatrix}$$

(39) head-lex-vn-pass-rule-2

$$\begin{bmatrix} \textit{hd-lex-vn-pass-ex} \\ \text{SUBJ } \langle [\text{ANIMATE } +] \rangle \end{bmatrix} \rightarrow ①[\text{GCASE } \textit{acc}], \begin{bmatrix} \text{AGT } + \\ \text{COMPS } \langle ① \rangle \end{bmatrix}$$

A sample derivation for pLVCs is given below. The category VN is represented by the features [POS *noun*, NOMINAL +, VERBAL +].

(40) *cheypho*

$$
\begin{bmatrix}
\textit{vn-tr-plv3} \\
\text{POS } \textit{noun} \\
\text{NOMINAL } + \\
\text{VERBAL } + \\
\text{ANIMATE } \text{bool} \\
\text{ADVERSITY } + \\
\text{PASS-TYPE.PLVPASS } + \\
\text{ARG-ST } \langle \text{NP}_i, \text{NP}_j \rangle \\
\text{SEM }
\begin{bmatrix}
\text{INDEX } s \\
\text{RESTR } \left\langle
\begin{bmatrix}
\text{RELN} & \textit{arrest} \\
\text{ARG1} & i \\
\text{ARG2} & j
\end{bmatrix}
\right\rangle
\end{bmatrix}
\end{bmatrix}
$$

(41)

$$
\begin{bmatrix}
\textit{V'} \\
\text{PHON} \langle \textit{cheypho-lul tangha-ass-ta} \rangle \\
\text{PASSIVE } + \\
\text{SUBJ} \langle ② \rangle \\
\text{COMPS} \langle ① \rangle
\end{bmatrix}
$$

③$
\begin{bmatrix}
\textit{VNP} \\
\text{PHON} \langle \textit{cheypho-lul} \rangle \\
\text{ANIMATE } \text{bool} \\
\text{ADVERSITY } + \\
\text{CASE.GCASE } \textit{acc} \\
\text{ARG} - \text{ST} \langle ①, ② \rangle
\end{bmatrix}
$
$
\begin{bmatrix}
\textit{V} \\
\text{PHON} \langle \textit{tangha-ass-ta} \rangle \\
\text{ANIMATE } + \\
\text{ADVERSITY } + \\
\text{AGT} + \\
\text{ARG} - \text{ST} \langle ②, ③ \rangle
\end{bmatrix}
$

cheypho 'arrest' has an unspecified ANIMATE feature value, [ADVERSITY +], and [PASS-TYPE.PLVPASS +]. Therefore, it can combine with pLV *tangha-* which has an [ANIMATE +] as well as an [ADVERSITY +]. Even if an accusative case is allocated to *cheypho*, pLVCs will be constructed without any problem thanks to an [AGT +] of *tangha-*.

5 Conclusion

In this study, we considered various subtypes of passives and proposed comprehensive type hierarchies for verbs or verbal nouns with respect to passivization. The main points of this paper are as follows: First, we modified the verbal morphology of Kim & Yang (2006) in order to treat suffixal passives in an appropriate way. In particular, the *v-alt-stem* was

introduced into verbal morphological hierarchy. Secondly, we classified verbs into five subtypes with reference to passivization. For auxiliary passives, we introduced *hd-lex-pass-ex* into the syntactic structure as a subclass of *hd-lex-ex*. Turning to verbal nouns, we proposed a classification of verbal nouns regarding which passive light verbs they can combine with. A type hierarchy for passive light verbs was also proposed in this study.

We implemented and tested our type hierarchies for passives using the *Linguistic Knowledge Building* (*LKB*) system to check the computational feasibility. All sample sentences in this study were tested in *LKB*.

5.1 Implications and Further Study

An interesting aspect of suffixal passivization in Korean is that the passive suffixes are also used for causatives almost invariably. For example, *cap-hi-* with the suffix *hi* can be interpreted as a passive verb meaning 'be caught' or a causative verb meaning 'have someone/something caught.' Taking this fact into consideration, we can extend the suggested type hierarchy to include suffixal causatives.
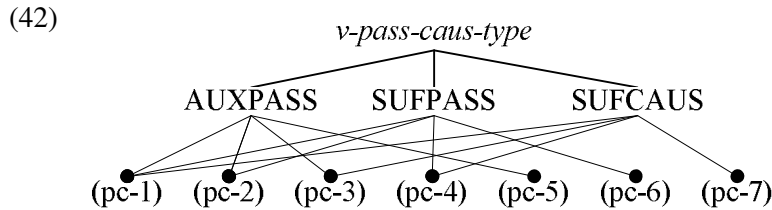
(42)

v-pass-caus-type

AUXPASS   SUFPASS   SUFCAUS

(pc-1) (pc-2) (pc-3) (pc-4) (pc-5) (pc-6) (pc-7)

Table (4)

		AUXPASS	SUFPASS	SUFCAUS
(pc-1)	*ccic-ta* 'tear'	*ccic-e ci-ta*	*ccic-ki-ta*	*ccic-ki-ta*
(pc-2)	*mit-ta* 'believe'	*mit-e ci-ta*	*mit-ki-ta*	***mit-ki-ta**
(pc-3)	*pec-ta* 'take off'	*pec-e ci-ta*	***pec-ki-ta**	*pec-ki-ta*
(pc-4)	*cap-ta* 'catch'	***??cap-a ci-ta**	*cap-hi-ta*	*cap-hi-ta*
(pc-5)	*chac-ta* 'find'	*chac-a ci-ta*	***chac-ki-ta**	***chac-ki-ta**
(pc-6)	*pel-ta* 'earn'	***??pel-e ci-ta**	*pel-li-ta*	***pel-li-ta**
(pc-7)	*ip-ta* 'wear'	***??ip-e ci-ta**	***ip-hi-ta**	*ip-hi-ta*

Furthermore, we could extend the type hierarchy to include the cases of auxiliary causatives like *-key ha-ta* and others.

Finally, we would like to point out the methodology taken in this study, that is, to make use of language resources available in an extensive and comprehensive way. We believe this kind of descriptive and inductive approach complements the more theoretically oriented approaches. We also believe that it is an efficient way to figure out the nature of language.

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