Chapter 9
Combination of the Verb Ha- 'Do' and Entity Type Nouns in Korean: A Generative Lexicon Approach

Seohyun Im and Chungmin Lee

9.1   Introduction

The verb *ha-*'do' is known as a typical light verb in Korean like *suru* 'do' in Japanese. Since Grimshaw and Mester (1988), there has been much research on the light verb construction in Korean and Japanese. The verb *ha-*'do' usually combines with verbal nouns that denote events as in (1):

(1)   a.   Jane-un i pangbep-uro pap-cis-ki -rul   ha-ess-ta
           J-TOP   this way-in   meal-making-ACC do-PAST-DEC
           '(lit.) Jane did making a meal in this way'
      b.   Jane-un tarimi-cil -ul   ha-ko iss-ta
           J-TOP   ironing-ACC   do-PROG-DEC
           'Jane is doing ironing'
      c.   haksayngtul-i   siwui -rul   ha-ko iss-ta
           students-NOM   demonstration-ACC do-PROG-DEC
           'Students are demonstrating'
      d.   Sue-ka   swuhak kongpwu -rul   ha-ess-ta
           S-NOM   mathematics study-ACC do-PAST-DEC
           'Sue did the study of mathematics'

In (1), *pap-cis-ki* 'meal-making', *tarimi-cil* 'ironing', *siwui* 'demonstration', *kongpwu* 'study' are all event type arguments. The interrogative sentence in (2) shows the semantic selection restriction of the verb *ha-* 'do'.

S. Im (✉)
Department of Computer Science, Brandeis University, Waltham, MA, USA

C. Lee
Seoul National University, Seoul, South Korea

(2)　A:　John,　ne　mwue-ha-ni?
　　　　　John you　what-do-INT
　　　　　'John, what are you doing?'
　　　B:　chengso/*yenphil/*chayksang
　　　　　'Cleaning/*pencil/*desk'

The answer to the question 'what are you doing' is limited to the event type argument. The entity type noun *yenphil* 'pencil' and *chayksang* 'desk' is inappropriate as an answer to the question in (2). This means that the verb *ha-* 'do' typically takes an event type complement. Because the interrogative *what* is neutral in terms of which type of information it requires, the answer to *what*-question depends on the argument type of a predicate in the interrogative sentence. In other words, the answer to *what*-question can be either a substantial or an abstract entity (e.g. What did you make, yesterday? I made a <u>doll</u>), or an event (e.g. what are you doing? I'm doing <u>cleaning</u> my room). The conversation in (2) shows that *ha-*'do' prefers an event argument as its complement.

The sentence with a dot object noun (Pustejvosky 1995) and *ha-* 'do' shows that the verb *ha-* 'do' takes an event type argument (Im and Lee 2002). The noun *ppallay* 'laundry' is a typical dot object and its meaning in a context is chosen by its governing predicate.

(3)　a.　Sue-nun ppallay-rul　ha-ko iss-ta
　　　　　S-TOP　laundry-ACC　do-ing-DEC
　　　　　'Sue is washing'
　　　b.　ppallay-ka　　mwul-ey　　cec-ese　　nemwu mwugep-ta
　　　　　laundry-NOM　water-particle　wet-particle too　　heavy-DEC
　　　　　'since the wash is wet, it is too heavy'

The verb*ha-* 'do' selects the event meaning of *ppallay* 'laundry' and therefore *ppallay* 'laundry' in (3a) is interpreted as a washing act. However, the adjective *mwugep-* 'heavy' chooses *ppallay* 'laundry' as a physical object. *Ppallay* 'laundry' is an event type noun in (3a) and an entity type noun in (3b). Semantic selection of the predicates in (3) implies that the verb *ha-* takes an event type argument as its complement.

However, special groups of entity nouns are allowed as complement arguments of the verb *ha-*'do'. Consider:

(4)　a.　John-un piano-rul　ha - n-ta
　　　　　J-TOP　piano-ACC　do-PRES-DEC[1]
　　　　　'John plays the piano as a profession/major.'
　　　b.　John-un piano yencwu-lul　(cikepcek-ulo/cenkong-ulo)　ha-n-ta.
　　　　　J-TOP piano performance-ACC (as an occupation/as a major)　do
　　　　　'John does piano performance as an occupation/major.'

---

[1]TOP: topic marker, NOM: nominative case marker, ACC: accusative case marker, LOC: locative case marker, PRES: present tense, PAST: past tense, PROG: progressive aspect marker, DEC: declarative sentence marker, INT: interrogative sentence marker

The sentence in (4a) is interpreted as the sentence in (4b) in its individual level predication reading. The understanding of the sentence in (4a) requires some ellipsed information like playing or performing. Because this construction presupposes recoverable information ellipsis, we can assume that the combination like the sentence in (4a) is not a canonical form of *ha-* 'do' construction. Therefore, we note a superficial type conflict in the construction of entity type nouns with *ha-* 'do'. We can see this phenomenon, however, in many languages as in (5):

(5) a. John <u>did the chocolate cake</u> for my birthday.
     b. Tell her to go and <u>do her hair and nails</u>.
     c. Susan-wa <u>sukapu-o   si-ta</u>
         S-TOP   scarf-ACC do-PAST
         '(lit.) Susan did a scarf'
         'Susan wore a scarf'
     d. Susan <u>fait une maison</u>
         '(lit.) Susan did a house'
         'Susan built a house'
     e. Susan <u>fait le chamber</u>.
         '(lit.) Susan did the room'
         'Susan cleaned the room'

The verb *do* in English, *suru* 'do' in Japanese, and *faire* 'do' all mean do and take verbal nouns denoting events as their arguments naturally. In the above examples, they take some part of entity type nouns as their complements as *ha-* 'do' does in Korean. This phenomenon seems to be a type conflict outwardly.

This paper aims to account for direct combination of special entity type nouns with *ha-* 'do' in Korean. We, basically, argue that the combination is possible via the nature of the verb and the qualia of the relevant noun through the operation of coercion or co-composition, based on Generative Lexicon Theory (henceforth, GL, Pustejovsky 1995). The combination is possible only in the case that we can derive eclipsed predicate information from the qualia of the entity type nouns. J.-S. Jun (2001) also argues the combination of the verb *ha-* 'do' and entity type nouns in Korean. According to him, the combination is interpreted by a generative mechanism based on the qualia of the entity type nouns, not by simple pragmatic inference. The combination of entity type nouns and the Korean verb *ha-* 'do' is interpreted by the generative mechanism like type coercion or co-composition and by the qualia of the entity type nouns (Lee and Im 2003).

In Sect. 9.2, we show that the verb *ha-* 'do' typically takes an event type argument. When there is superficial type error in the combination of an entity type noun and *ha-* 'do', the verb *ha-* 'do' coerces type shifting of the entity type noun.

In Sect. 9.3, we argue that qualia structure has to have limited information necessary to explain the lexical meaning relation of words and co-occurrence constraint. In addition, the entity type nouns are classified as natural type, functional type, and complex type nouns following Pustejovsky (2001). In Sect. 9.4, we argue that qualia have to be extended to explain linguistic phenomena such as thematic role alternation or constraints on type coercion. A telic quale has to be subdivided into a direct telic, an indirect telic, and an engagement telic. An agentive quale also can be divided into 1st and 2nd agentive quale and so on.

9.2 Deep Semantic Type and Type Coercion

Some verbs allow several semantic types of arguments in deep semantic structure. Other verbs take only a semantic type of its argument but allow syntactic polymorphism of the argument (Pustejovsky 1995, 2001). The verb *cohaha-* 'like' in Korean takes any type of argument as *like* does in English. The sentences in (6) show different type arguments of the verb *cohaha-* 'like'.

(6)   a.   Verbal Noun Phrase Construction
           Sue-nun scarf chakyong-ul cohaha-ess-ta
           S-TOP   scarf wearing-ACC like-PAST-DEC
           'Sue liked wearing a scarf'
      b.   Entity Type Noun Construction
           Sue-nun scarf-rul   cohaha-n-ta
           S-TOP scarf-ACC like-PRES-DEC
           'Sue likes a scarf'
      c.   '-ki' Nominalization Construction
           Sue-nun scarf chakyongha-ki-rul   cohaha-n-ta
           S-TOP   scarf wear-nominalizer-ACC like-PRES-DEC
           'Sue likes wearing a scarf'
      d.   'kes' Nominalization Construction
           (Same Subjects, Present-tense-relative clause)
           Sue-nun scarf-rul chakyongha-nun kes-ul   cohaha-n-ta
           S-TOP   scarf-ACC wear-REL[2]   kes-ACC like-PRES-DEC
           'Sue likes wearing a scarf'

---

[2]REL: relative clause marker

In (6a, c), the verb *cohaha-* 'like' takes event type arguments and takes a proposition type argument in (6d). Specially, the verb in (6b) takes a simple entity type noun as its argument. More important point is that the interpretation of the sentence in (6b) does not need some recoverable predicate information because the verb *cohaha-* 'like' takes entity type arguments. However, the semantic selection of the verb *ha-* 'do' is different from that of the verb *cohaha-* 'like'.

(7) a. Verbal Noun Construction
     Jane-un scarf chakyong-ul ha-ess-ta
     J-TOP scarf wearing-ACC do-PAST-DEC
     '(lit.) Jane did wearing a scarf'
     'Jane wears a scarf'

   b. Entity Type Noun Construction
     Jane-un *scarf* -rul   ha-n-ta
     J-TOP scarf-ACC do-PRES-DEC
     '(lit.) Jane does a scarf'
     'Jane wears a scarf'

   c. '-ki' Nominalization Construction
     ?Jane-un scarf chakyongha-ki-rul   ha-n-ta
     J-TOP   scarf wear-nominalizer-ACC do-PRES-DEC
     'Jane does wearing a scarf'

   d. 'kes' Nominalization Construction
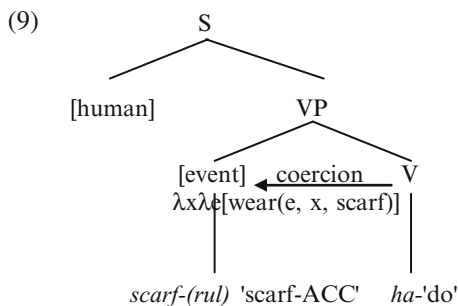   *Jane-un *scarf-rul   chakyongha-nun kes* -ul   ha-n-ta
     J-TOP   scarf-ACC wear-REL   kes-ACC   do-PRES-DEC
     'Jane does that she wears a scarf'

The verb naturally takes a verbal noun phrase that denotes an accomplishment event – wearing a scarf (7a). Unlike *cohaha-* 'like', the verb *ha-* 'do' does not allow proposition type arguments. It is necessary because *ha-* 'do' takes an event type noun as its complement. We need to take note on the difference between *cohaha-* 'like' and *ha-* 'do' in (7b). The interpretation of *scarf* in (7b) is not a scarf but wearing a scarf. The VP *scarf-rul ha-* 'scarf-ACC do' cannot be interpreted only by simple composition of *scarf* and *ha-* 'do'. We extract some implicit predicate denoting wearing from *scarf* to interpret the sentence in (7b) for *ha-* 'do' requires an event type argument. The information extraction depends on the qualia of the noun *scarf*. The verb *ha-* 'do' takes an event type noun and can take the entity type noun whose type *ha-* 'do' can coerce. Thus, type coercion explains its superficial type conflict in our first approximation, as done for the verb *enjoy* in English. We now show a tentative specific type coercion of the VP *scarf-rul ha-* '(lit.) do a scarf'. Consider:

(8)   *scarf* 'scarf'

> Scarf 'scarf'
> ARGSTR =   Arg = x: apparel
>
> QUALIA =   FORMAL = x
>   CONST =…
>   TELIC = Direct_telic = wear (x)
>   AGENTIVE =make(x)

A scarf is a kind of apparel that people wear. Wearing is a direct telic of scarf. We explain direct telic (Pustejovsky 1995) and our extended qualia in more detail in Sect. 9.4. The verb *ha-* 'do', requiring an event type argument, coerces the type shifting of the entity type noun *scarf* 'scarf' on the basis of the qualia of the noun, as in (9):

(9)   S
                    ╱   ╲
            [human]   VP
                            ╱   ╲
                     [event] ◄─coercion─   V
                     $\lambda x \lambda e$[wear(e, x, scarf)]
                            │   │
                     scarf-(rul) 'scarf-ACC'   *ha-*'do'

Type coercion of *scarf-rul ha-* 'scarf-ACC do' is based on the predicate information of the telic quale of the noun *scarf* 'scarf'. The qualia of the entity type noun are important in type coercion of the entity type noun to an event type one by the governing verb *ha-* 'do'. In Sect. 9.2, we showed type coercion of the verb *ha-* 'do' simply based on telic quale of its complement noun. Type coercion of the verb *ha-* 'do' is likely to rely on telic quale of its argument in the case that its argument denotes artifacts. While, it is inclined to make an event interpretation based on agentive quale of its argument in the case that its argument denotes a natural object. We discuss this tendency in more detail in Sect. 9.5. Before we show classification of the entity type noun and the verb *ha-* 'do' construction and its type coercion more specifically, we explore the qualia and extension of qualia.

9.3   Qualia of Entity Type Nouns in Korean

9.3.1   *Construction of Qualia*

It is one of important issues what the contents of qualia are. GL argues that lexical semantic structure has to have substructures and inferential relations among lexical

items, arguing against the Lexical Atomism (Fodor and Lepore 1998). However, GL also does not agree with some cognitive linguists' view that linguistic knowledge – dictionary meaning is not distinguished from world knowledge – encyclopedia meaning. Pustejovsky (2001) points out that research in GL points to a view of the mental lexicon that is neither that of a classical dictionary nor that of a warehouse of data within an information processing system. This means that lexical semantic structure has to explain the creative use of language but need not to include all the possible information. Therefore, lexical semantic structure, especially qualia structure has to include limited information. Let us see *coffee* for example;

(10)   *coffee* [American Heritage Dictionary]

   a.   Any of various tropical African shrubs or trees of the genus coffee, especially C. arabica, widely cultivated in the tropics for their seeds that are dried, roasted, and ground to prepare a stimulating aromatic drink.
   b.   The beanlike seeds of this plant, enclosed within a pulpy fruit.
   c.   The beverage prepared from the seeds of this plant.

(11)   *coffee* [Columbia Encyclopedia]

   Dictionary definition and Coffee plant cultivation, preparation and types of coffee, coffee in commerce, classification of the coffee plant, etc.

Although encyclopedia includes much more information of the word *coffee* than a dictionary does, linguistic meaning of *coffee* does not need to include all of the information it has. Lexical semantic structure has to have information as much as it can explain linguistic phenomena related with the word including syntax and semantics. Therefore, we suggest the two principles with which we describe qualia as in (12):

(12)   a.   qualia of a word have to explain the inferential relation between that and other words like antonym, synonym, hypernym, hyponym, etc.
   b.   qualia of a word have to explain the co-occurrence constraint, that is, semantic selection restriction.

First, let us explore the qualia in terms of the inferential relation of a word in ontology. The inferential relation of lexical items consists of a lexical meaning type lattice or a lexical concept lattice. For example, to know the meaning of *beer* is to know that a beer is a kind of alcoholic beverage but not a wine or whisky. A word inherits meaning elements from hypernym but it has distinguished meanings from the other words. In other words, the lexical meaning has to satisfy the two conditions: "~is~" and "~is not~". Both beer and wine are alcoholic beverages but their materials and making ways are different from each other. We describe the qualia of *beer* and *wine*:

(13) *beer*

> *beer*
> ARGSTR = Arg = x: alcoholic_beverage
>
> QUALIA = FORMAL = x
>   CONST = material(malt&hops, x)
>   element (alcohol, x)
>   TELIC = Direct_telic = drinking (e2, x)
>   AGENTIVE =fermentation (e1,x)

(14) *wine*

> *wine*
> ARGSTR = Arg = x: alcoholic_beverage
>
> QUALIA = FORMAL = x
>   CONST = material(grape, x)
>   element (alcohol, x)
>   TELIC = Direct_telic = drinking (e2, x)
>   AGENTIVE = fermentation (e1,x)

Although beer and wine are alcoholic beverages, beer is not wine. The meaning difference of *beer* and *wine* comes from different materials. Beer is made from malt and hops but wine is made from grape. Therefore, constitutive and agentive quale makes it possible to distinguish the two words. Although *beer* and *wine* inherit information common with each other from hypernym 'alcoholic beverage', they have different meanings based on different qualia information.

Secondly, qualia have to have enough information to explain co-occurrence constraint. We show example sentences in which *beer* is used.

(15)   a.   I want to drink/gulp/*chew a beer
        b.   I want to drink a glass of/*a piece of beer
        c.   The man liked beer
        d.   Let's have a glass of beer.

The co-occurring predicates or words are related to the qualia of the word *beer*. Because beer is a kind of liquid, we can only drink or gulp it but cannot chew it. The information is formal quale. In addition, that shows the constraint on classifiers used with *beer*. In (15c), the verb *like* has the entity type noun *beer* as its argument. It can take almost all types of arguments. We argue that the verb *ha-* 'do' can co-occur with the entity type noun *beer* by type coercion as in (15d).

In sum, qualia have to have limited information necessary to explain the relation of a word with other words including antonym, synonym, hypernym and hyponym and co-occurrence constraint. Now, we classify the Korean entity type nouns following Pustejovsky (1995, 2001).

9.3.2 Type System and Korean Entity Type Nouns

We think that generative type system suggested by Pustejovsky (2001) is a good device to describe lexical meanings of words. The architecture of the upper semantic type lattice is structured into three domains: entities, qualities, and events. Each domain is itself structured by a type ordering relation, from simpler to more complex types. The simple types in each domain are natural types. Functional types are unified types that combine qualia-based information from AGENTIVE and TELIC modes of explanation with a simple type. Complex types are even richer in structure and are formed by the application of a type constructor, creating a type that is the reification of a specific relation between two types (Pustejovsky 2001). We show the types in (16):

(16) a. Natural Type (simple type): meaning description by FORMAL and
          CONSTITUTIVE quale.
      b. Functional Type (unified type): meaning description by TELIC and
          AGENTIVE quale
      c. Complex Type: Cartesian type by construction of dot objects.

For example, the word *rock* in English is natural type word whose meaning is described by only formal and constitutive qualia. It is not an artifact and has no function. On the other hand, the noun *knife* is a functional type one because it is used for cutting and made by someone. A typical complex type word in English is *book*. It is a physical object but has information (Pustejovsky 1995).

We show entity type nouns that belong to the three types in Korean.

(17) *nuktay* 'wolf' _ simple type

$$
\begin{bmatrix}
\textit{nuktay} \text{ 'wolf'} \\
\text{ARGSTR} = \begin{bmatrix} \text{Arg} = \text{x: mammal} \end{bmatrix} \\[2mm]
\text{QUALIA} = \begin{bmatrix} \text{FORMAL} = \text{x} \\ \text{CONST} = \ldots \\ \text{TELIC} = \varnothing \\ \text{AGENTIVE} = \varnothing \end{bmatrix}
\end{bmatrix}
$$

The noun *nuktay* 'wolf' denotes a carnivorous mammal of the family Canidae following taxonomic classification. Because we do not eat or raise it for food, wolf is not a foodstuff unlike pig or cow. Therefore, *nuktay* 'wolf' in Korean or *wolf* in English belongs to natural type words. However, *toayci* 'pig' is different from *nuktay* 'wolf' in that it is used as foodstuff and raised for human's use, although it is a kind of mammals like *nuktay* 'wolf'. The noun *toayci* 'pig' is a unified functional type word.

(18) *toayci* 'pig'

$$
\begin{bmatrix}
toayci \text{ 'pig'} \\
\text{ARGSTR} = \begin{bmatrix} \text{Arg} = x\text{: mammal\_livestock\_foodstuff} \end{bmatrix} \\
\\
\text{QUALIA} = \begin{bmatrix} \text{FORMAL} = x \\ \text{CONST} = \ldots \\ \text{TELIC} = \text{eat } (x) \\ \text{AGENTIVE} = \text{raise } (x) \end{bmatrix}
\end{bmatrix}
$$

Alternation of animals and foodstuffs has been one of important issues in computational linguistics and lexical semantics. In English, they use *beef* in substitute for *cow* and *pork* for *pig* in the case that they mean foodstuff. On the other hand, we, Korean, add *koki* that means meat to the animal name like *toayci-koki* 'pig-meat' and *so-koki* 'cow-meat'. In any case, there is alternation between the two meanings. Although Copestake and Briscoe (1996) explain the alternation by a lexical rule, we think that functional type in Pustejovsky (2001) would be better in that it shows that the words have taxonomic meaning based on formal and constitutive qualia even in the case that the animals denoted by the words are used as foodstuff. The noun *toayci* 'pig' is a unified functional type. Now, let us see an instance of complex type.

(19) *ppallay* 'laundry'

$$
\begin{bmatrix}
Ppallay \text{ 'laundry'} \\
\text{ARGSTR} = \begin{bmatrix} \text{Arg} = x \bullet y\text{: [laundry\_stuff]}\bullet\text{[laundry\_activity]} \end{bmatrix} \\
\\
\text{QUALIA} = \begin{bmatrix} \text{FORMAL} = x \bullet y \\ \text{CONST} = \ldots \\ \text{TELIC} = \text{direct\_telic} = y(x) \\ \text{AGENTIVE} = \text{make}(z, x) \end{bmatrix}
\end{bmatrix}
$$

The noun *ppallay* 'laundry' is a complex type noun. We showed the example sentences that choose appropriate interpretation out of two meanings of *ppallay* 'laundry' in (3). One of its types is laundry stuffs as physical objects. The other is an activity of washing the laundry stuffs. Different predicates choose one of the two meanings. In sum, a lexical concept lattice is composed of entities, events, and qualities. Each domain is structured of simple natural type, unified functional type, and complex type. In the next section, we show the extended qualia and necessity of the extension.

9.4 Extended Qualia

Pustejovsky (1995) suggested that a telic role can be divided into a direct telic and a purpose telic and the division reflects syntactic distribution. A direct telic represents

a predicate taking the noun as its direct object. The qualia of *toayci* 'pig' have only a direct telic quale as in (20):

(20)   *icecream* 'icecream'

$$
\begin{bmatrix}
\textit{icecream} \\
\text{ARGSTR} = \quad \text{Arg} = \text{x: [food]} \\[1em]
\text{QUALIA} = \quad \begin{array}{l} \text{FORMAL} = \text{x} \\ \text{CONST} = ... \\ \text{TELIC} = \text{direct\_telic} = \text{eat (x)} \end{array}
\end{bmatrix}
$$

The expression *icecream* has only a direct telic quale - eating. On the other hand, a purpose telic quale is used to explain thematic role alternation of nouns denoting an instrument such as *hammer*. We present an example of alternation as in (21):

(21)   a. John broke the window with a hammer.
        b. The hammer broke the window.   (Pustejovksy 1995)

The noun *hammer* in (21b) is a subject of the sentence but that in (21a) is an object of the preposition *with*. When John broke the window with a hammer, John did some action that caused a hammer to break the window. It is a hammer to have broken the window. The nouns that belong to instrument class show the same alternation as *hammer*. Therefore, the hammer's role is more active than stative. The nouns need the expression *-cil* which denotes repetition of some action when they are combined with the verb *ha-* 'do'.

(22)   a. <u>instruments</u>

            kawi 'scissors', *kalkhwi* 'rake', *keley* 'duster or mop', *koayngi* 'hoe', *tarimi* 'iron', *thop* 'saw', etc.
        b. <u>action with instruments</u>

            kaw-icil 'scissoring', *kalkhwi-cil* 'raking', *keley-cil* 'scrubbing or mopping', *koayngi-cil* 'hoeing', *tarimi-cil* 'ironing', *thop-cil* 'sawing', etc.

The above nouns show agent and instrument thematic role alternation. Another example of syntactic alternation is the noun *bus* as a means of traffic.

(23)   a. John-i bus-ro cip-ey ka-ess-ta
            J-NOM bus-by home-to go-PAST-DEC
            'John went home by bus'
        b. Bus-ka sunggayktul-ul swusongha-n-ta
            bus-NOM passengers-ACC transport-PRES-DEC
            'A bus transports passengers'

The words denoting vehicles also can have an agent thematic role. Although a person drives the vehicle, it is the vehicle that transports passengers. Thus, it is more agentive. The next example sentence shows alternation.

(24) a. seyra-ka seythakki-ro ppallay-rul   ha-ko-iss-ta
          S-NOM washer-with   laundry-ACC do-PROG-DEC
          'Seyra is washing with washer'
      b. seythakki-ka ppallay-rul ha-ko-iss-ta
          S-NOM   laundry-ACC do-PROG-DEC
          'A washer is doing washing'

A washing machine also belongs to an instrument class broadly. Objects denoted by the above class of nouns have more active role.

However, there is a class of entity type nouns without alternation. The class of nouns denotes artifacts with a telic because they are used for some human activity but do not show alternation syntactically. For example, a *chayksang* 'desk' is used for studying or other activities but the noun *chayksang* 'desk' does not show syntactic alternation. Let us show the following nouns as examples that do not allow thematic role alternation.

(25) a. John-un chayksang-ey chayk-ul   noh-ass-ta.
          J-TOP desk-on   book-ACC   put-PAST-DEC
          'John put a book on the table'
      b. Sue-ka kangphan-ey tanggun-ul   kal-ko-iss-ta
          S-NOM grater-on   carrot-ACC grate-PROG-DEC
          'Sue is grating a carrot'
      c. Sue-nun pakwuni-ey sakwa-rul   tam-ass-ta
          S-TOP   basket-in   apple-ACC   put-PAST-DEC
          'Sue put apples in the basket'
      d. John-un ku congi-ey kurim-ul   kuri-ess-ta
          J-TOP   the paper-on picture-ACC draw-PAST-DEC
          'John drew a picture on the paper'
      e. Sue-nun kancang-uro   kan-ul   matchwu-ess-ta.
          S-TOP   soy souce-with saltiness-ACC adjust-PAST-DEC
          'Sue adjusted saltiness with soy source'

The nouns like *chayksang* 'desk', *kangphan* 'grater', *pakwuni* 'basket', *congi* 'paper', and *kancang* 'soy source' do not show thematic role alternation. They do not take any active roles to cause the result of the entire event. Therefore, we can say they are passive and stative. In other words, they are engaged in the entire event but do not do anything. They are just used for some purpose. We showed the two different groups of nouns out of the words with purpose telic quale. We suggest that a purpose telic quale should be divided into at least two telic qualia. We name those as indirect telic quale and engagement telic quale instead of a purpose telic quale. Therefore, we argue that a telic quale has to be divided into 3 different telic qualia. Those are a direct telic, an indirect telic, and an engagement telic quale.

(26) TELIC QUALE

 a. <u>Direct Telic</u>
  A lexical item has a direct telic quale when the object denoted by the
  word is a direct object of the event or activity the predicate in its telic
  quale denotes.
  (a typical instance is the object argument of the predicate in its telic
  quale)

 b. <u>Indirect Telic</u>
  A lexical item has indirect telic quale when the use of an object
  denoted by the word give an effect to other objects. It takes more
  active role in the entire event that the telic of the word denotes.
  (nouns with thematic role alternation between instrument and agent)

 c. <u>Engagement Telic</u>
  A lexical item has an engagement telic quale when an object denoted by
  the word has some use but does not show thematic role alternation. It
  takes no active role in the entire event that the telic of the word denotes.
  It is only used for some activity related with itself.
  (the nouns denoting artifacts except for the words in (b))

More specific distinction of telic quale explains some linguistic phenomena like type coercion we argue in this paper. In Sect. 9.6, we show the constraints on type coercion of the Korean verb *ha-* 'do' that depend on the telic quale of the entity type nouns combined with *ha-* 'do'. Now, let us consider the qualia of the noun *seythakki* 'washer' and *chayksang* 'desk' based on our extended qualia. We assume that *seythakki* 'washer' has an indirect telic because it undergoes thematic role alternation as in (24).[3] However, we do not assume a direct telic because it has no predicate denoting a specific activity which influences a washer other than the verb *sayongha-* 'use' or the verb *mantul-* 'make' in agentive telic quale. We present the qualia of *seythakki* 'washer' as in (27):

(27) *seythakki* 'washer'

$$
\begin{bmatrix}
\textit{Seythakki}\ \text{'washer'} \\
\begin{bmatrix}
\text{ARGSTR} = & \text{Arg} = x: \text{[physobj\_artifact\_instrument]} \\
 & \text{D-Arg} = y: \text{laundry}
\end{bmatrix} \\
\begin{bmatrix}
\text{QUALIA} = & \text{FORMAL} = x \\
 & \text{TELIC} = \text{indirect\_telic} = \text{wash}\ (x, y)
\end{bmatrix}
\end{bmatrix}
$$

The noun *seythakki* 'washer' has only an indirect telic quale. On the other hand, *chayksang* 'desk' denotes a table used for studying or reading. Although *chayksang* 'desk' denotes an artifact with some use, it is not a direct object of an activity or

---

[3] Thematic role alternation between agent and instrument in Korean is not as much natural as that of English. In Korean, thematic role alternation like (24) tends to be possible through personification of instrument.

an event. Therefore, *chayksang* 'desk' has no direct telic quale. Moreover, because *chayksang* 'desk' does not show a thematic role alternation, it does not have an indirect telic. *Chayksang* 'desk' has only an engagement telic quale as in (28):

(28)   *chayksang* 'desk'

> *chayksang* 'desk'
> ARGSTR =   Arg = x: [physobj_artifact_instrument]
>   D-Arg = y:[human]
>
> QUALIA =   FORMAL = x
>   TELIC = engagement_telic =
>   use_for_reading_or_some_activities(y, x)

The word *mokkeli* 'necklace' has only a direct telic and an engagement telic with exception of an indirect telic because it does not show an alternation.

(29)   *mokkeli* 'necklace'

> *mokkeli* 'necklace'
> ARGSTR =   Arg = x: [physobj_artifact_accessories]
>   D-Arg = y: [human]
>
> QUALIA =   FORMAL = x
>   TELIC = direct_telic= wear (y, x)
>   engagement_telic=use_for_adornment(y, x)

The noun *mokkeli* 'necklace' is an object of wearing act but is used for personal adornment. Therefore, *mokkeli* 'necklace' has a direct telic quale and an engagement telic. Some words such as *cacenge* 'bicycle' have direct telic and indirect telic.

(30)   *cacenge* 'bicycle'

> *cacenge* 'bicycle'
> ARGSTR =   Arg = x: [physobj_artifact_traffic-means]
>   D-Arg = y:[human]
>
> QUALIA =   FORMAL = x
>   TELIC = direct_telic = ride (y, x)
>   Indirect_telic = convey (x, y)

People ride a bicycle and move to their destination. Therefore, *cacenge* 'bicycle' has direct telic and indirect telic. It shows thematic role alternation. The noun *thayksi* 'taxi' has all of the three telic quales. First, a taxi-driver drives a taxi and passengers ride on a taxi to move to their destination. The word *thayksi* 'taxi' has direct telic qualia: driving and riding. A taxi-driver conveys his passengers by driving his taxi.

Moreover, it is a taxi that transports the passengers to their destination. Therefore, *thayksi* 'taxi' has an indirect telic quale: conveying. A more interesting point is that a taxi was made originally for business unlike other vehicles such as a bicycle that has use of transportation. We suggest the engagement telic quale as in (35). In other words, a taxi not used for business is not a taxi but a car in terms that it has lost an original aim of existence. To include this information, we assume an engagement telic quale in the qualia of *thayksi* 'taxi'.

(31)   *thayksi* 'taxi'

$$
\begin{bmatrix}
\textit{thayksi} \text{ 'taxi'} \\
\begin{aligned}
&\text{ARGSTR} = &&\text{Arg} = x: [\text{car-for-business}] \\
& &&\text{D-Arg1} = y: [\text{human}] \\
& &&\text{D-Arg2} = z: [\text{human}] \\[1em]
&\text{QUALIA} = &&\text{FORMAL} = x \\
& &&\text{TELIC} = \text{direct\_telic} = \text{drive}(y, x) \\
& && \qquad\qquad\qquad\quad \text{ride\_on}(z, x) \\
& &&\qquad\quad \text{Indirect\_telic} = \text{convey}(x, z) \\
& &&\qquad\quad \text{Engagement\_telic} = \\
& &&\qquad\qquad \text{make\_money\_with}(y, x)
\end{aligned}
\end{bmatrix}
$$

Now we argue that agentive qualia also should be extended. First, a noun class like *kotunge* 'mackerel' does not need to have extended agentive qualia. It is originally a kind of natural kind things but is reified as a unified functional type noun. Kotunge, a fish, is caught by fishing. We present only a specific agentive quale – fishing – for *kotunge* 'mackerel'. *kotunge* 'mackerel' has an undivided agentive quale as in (32):

(32)   *kotunge* 'mackerel'

$$
\begin{bmatrix}
\textit{kotunge} \text{ 'mackerel'} \\
\begin{aligned}
&\text{ARGSTR} = &&\text{Arg} = x: [\text{fish\_foodstuff}] \\
& &&\text{D-Arg} = y: [\text{human}] \\[1em]
&\text{QUALIA} = &&\text{FORMAL} = x \\
& &&\text{AGENTIVE} = \text{fish}(y, x)
\end{aligned}
\end{bmatrix}
$$

In the above, we present only agentive quale of *kotunge* 'mackerel'. It represents a fish caught by fishing. Thus, it has one agentive quale. Of course, it has telic quale: eating as a functional type word.

However, some complex type nouns require more than two agentive qualia. For example, *tampay* 'cigarette' denotes an artifact and a plant. Therefore, we have to describe enough information to show both of the two meanings.

(33) *tampay* 'cigarette'

> *tampay* 'cigarette'
> ARGSTR =   Arg = x•y: [plant]•[artifact]
>   D-Arg1 = z: [human]
>   D-Arg2 =w: [human]
>
> QUALIA =   FORMAL = x
>   AGENTIVE = 1^{st}_agentive = grow (z, x)
> 2^{nd}_agentive = process (w, x)

The noun *tampay* 'cigarette' originally denotes a plant and is reified as a material of cigarette we smoke. At the same time, it denotes an artifact we buy and smoke. Hence, it is a complex type noun. For us to smoke a cigarette, we have to grow a tobacco plant and dry its leaf and then process the material. In order to include all of the information, we suggest that an agentive quale has to be subdivided into 1st and 2nd agentive quale.[4] Until now, we argued the extended qualia are necessary for explanation of linguistic phenomena related to lexical semantics and syntax. We presented a direct, indirect, and engagement telic and argued that agentive qualia can be subdivided.

(34) Extended Qualia

>   A. TELIC quale
>   a. Direct Telic
>   b. Indirect Telic
>   c. Engagement Telic
>
>   B. AGENTIVE quale
>   Agentive qualia can be subdivided into several items depending on the events in which the object denoted by the word comes into the world.

Extended qualia in (34) make it possible for us to define the meaning of a lexical item and explain linguistic phenomena such as a thematic role alternation or a semantic selection constraint better. Especially, extended qualia are so helpful to explain type coercion of the verb *ha-* 'do' in Korean. Now, we explore type coercion of the verb *ha-* 'do' based on extended qualia.

## 9.5 Type Coercion of the Verb *Ha-* 'Do'

In Sect. 9.2, we argued that the verb *ha-* 'do' in Korean takes an event type argument as its object and coerces type shifting of the object noun when there is a type error.

---

[4]We do not exclude the possibility that agentive qualia are subdivided into more than two types.

In this section, we show more specific type coercion process of the verb *ha-* 'do'. Let us see the sentences in (35):

(35) John-uy apeci-nun   thayksi-rul ha-si-pnita.
      J-POSS father-TOP taxi-ACC   do-Honorific-PRES.
      '(lit.) John's father does taxi'
      'John's father is a taxi driver.'

The sentence in (35) means that John's father is a taxi driver. That is, the sentence implies that the job of John's father is taxi driving as an individual predication. What derives the meaning from the sentences in (35)? Our argument is this; since the verb *ha-* typically takes an event type argument, *ha-* 'do' coerces type shifting of the entity type noun *thayksi* 'taxi' to an event type one so that it has the meaning of taxi driving. The type coercion is based on the qualia information of *thayksi* 'taxi'. The noun *thayksi* 'taxi' has three kinds of telic qualia. We showed the qualia of *thayksi* 'taxi' in (31). Type coercion by the verb *ha-* 'do' requires its direct_telic and engagement_telic so that *thayksi-rul ha-* 'taxi-ACC do' is interpreted as *thayksi-wuncen-ul ha-* 'do taxi-driving (to earn money as a profession)' as an individual level predication.

(36)

          thayksi-(rul) 'taxi-ACC'   ha-'do'
           (dT: direct_telic, eT: engagement_telic)
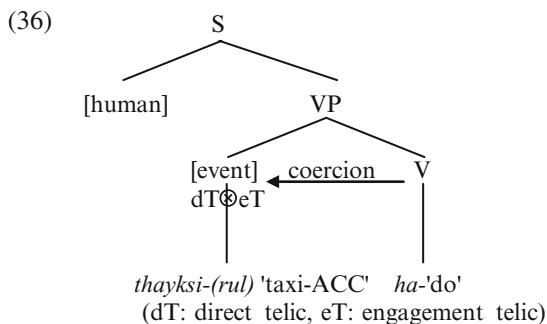
As in (36), the verb *ha-* 'do' coerces the entity type noun *thayksi* 'taxi' into event interpretation using direct and engagement telic qualia of *thayksi* 'taxi'. In the same way, *piano-rul ha-* 'piano-ACC do' can be interpreted as a professional activity and individual predication.

Type coercion on the entity type nouns by the verb *ha-* 'do' in Korean is not based only on a telic quale of the nouns but also its agentive quale. We present the kinds of nouns based on each quale. First, there are examples of type coercion based on telic quale.

(37) a. Jane-un onul   scarf-rul   ha-ess-ta   (wearing)
          J-TOP   today   scarf-ACC do-PAST-DEC
          'Jane wears a scarf today'

      b. Jane-un onul   maskhara-rul   ha-ess-ta   (applying)
          J-TOP   today mascara-ACC   do-PAST-DEC
          'Today, Jane applied mascara.'

      c. John-un tampay-rul   han-tay   ha-ess-ta.   (smoking)
          J-TOP   cigarette-ACC one-whiff do-PAST-DEC
          'John had a smoke'

      d. John,   swul   han-can ha-ca   (drinking)
          J-VOC[5]   alcoholic beverage one-glass do
          'John, let's have a drink'

      e. Jane-un piano-rul   ha-n-ta   (playing)
          J-TOP   piano-ACC do-PRES-DEC
          'John plays the piano (as a profession)'

      f. John-un thayksi-rul ha-n-ta   (driving)
          J-TOP   taxi-ACC do-PRES-DEC
          'John drives a taxi (as a profession)'

      g. John-un Seoul-eyse seythakso-rul ha-n-ta   (management)
          J-TOP   Seoul-LOC cleaner's-ACC do-PRES-DEC
          'John manages a cleaner's in Seoul'

Type   coercion in (37 a–d) causes stage level predication. Moreover, it is interesting that (37 c, d) are more natural when they are written with quantitative expressions like *han-tay* 'one whiff' or *han-can* 'one-glass'.

The sentences in (38) shows the agentive quale is used for type coercion on the entity type nouns by the verb *ha-* 'do' in Korean.

(38) a. wuri maul-un   sakwa-rul   ha-n-ta   (growing)
          we   village-TOP apple-ACC do-PRES-DEC
          'our village people grow apples'

      b. Jane-un pap-ul   ha-n-ta   (making)
          J-TOP   rice-ACC do-PRES-DEC
          'Jane boils rice (to prepare for a meal)'

      c. John-un namwu-rul   ha-re   ka-ess-ta.   (gathering)
          J-TOP   wood-ACC   do-ending go-PAST-DEC
          'John went the mountain to gather firewood'

The above examples in (38) undergo type shifting based on an agentive quale.

---

[5]VOC: vocative case

Until now, we showed type shifting of object nouns coerced by *ha-* 'do' based on either telic quale or agentive quale. However, composition of a subject noun phrase with the verb phrase can change the meaning of the verb phrase type-coerced by *ha-* 'do'. In (39a), the sentence means only that Sue is cooking noodles, but the sentence in (39b) means that this restaurant cooks and sells noodles.

(39)   a.   <u>Sue</u>-ka   wudong-ul   ha-n-ta
              S-NOM   noodle-ACC do-PRES-DEC
              'Sue is cooking noodles'
       b.   i siktang-un   wudong-ul   ha-n-ta
              this restaurant-TOP   noodles-ACC do-PRES-DEC
              'This restaurant sells noodles'

The telic quale of the noun *siktang* 'restaurant' in (39b) adds the information of selling noodles to the meaning of *wudong-ul ha-* 'cooking noodles', because the qualia of *siktang* 'restaurant' has the telic quale – cooking and selling of foods. In this way, the meaning of the entire sentence is composed through the process in which the qualia information of the subject NP choose appropriate meaning of the VP after type coercion on the entity type object argument by the governing verb *ha-* 'do'. In the next section, we explore constraints of type coercion in *ha-* 'do' construction with entity type nouns more specifically.

9.6   Constraints on Type Coercion

We explained combination of the verb *ha-* 'do' with some entity type nouns by type coercion. However, it is not applied to all entity type nouns in Korean. We show that a generative mechanism such as type coercion – especially type coercion by the verb *ha-* 'do' on entity type nouns in Korean – has some constraints.

(40)   a.   John-un kang-ul   cohaha-n-ta
              J-TOP   river-ACC like-PRES-DEC
              'John likes a river'
       b.   ??John-un kang-ul   ha-n-ta
              J-TOP   river-ACC do-PRES-DEC
              'John does a river'

The verb *cohaha-* 'like' can take the natural type noun *kang* 'river' as its argument, because it can have arguments of almost all types. However, since the verb *ha-* 'do' coerces type shifting of the argument to an event type, the noun has to satisfy the condition for type coercion. First, type coercion by *ha-* 'do' requires that the noun must be a functional type noun. Natural type nouns such as *kang* 'river' without its telic or agentive quale cannot undergo type coercion.

Secondly, entity type nouns without a direct telic cannot shift the types of themselves via type coercion as we can see in (41):

(41)   a.   ??John-un seythakki-rul ha-ess-ta
            J-TOP washer-ACC do-PAST-DEC
            '(lit.) John did a washer'
       b.   ??John-un chayksang-ul ha-ess-ta
            J-TOP   desk-ACC   do-PAST-DEC
            '(lit.) John did a desk'

In (41), *seythakki* 'washer' and *chayksang* 'desk' do not have a direct telic quale. The noun *seythakki* 'washer' has only indirect and engagement telic qualia. Moreover, *chayksang* 'desk' has only an engagement telic quale. Although the predicate in indirect or engagement telic quale denotes a typical activity related to denotation of the noun, the verb *ha-* 'do' cannot combine with the nouns. It is because the nouns have no direct telic quale predicate that takes the noun as its object argument. However, *culki-* 'enjoy' can combine with the nouns because the verb has wider range of type coercion. That is, *culki-* 'enjoy' allows event interpretation related to the noun without specific description of events and thus it can combine with more functional nouns than the verb *ha-* 'do' does. Pustejovsky (2001) calls this kind of type coercion by *enjoy* in English Natural Coercion.[6]

Thirdly, when there is an aspectual conflict between a governing verb such as *ha-* 'do' and a telic or agentive predicate of the noun, type coercion is not allowed. However, the verb *ha-* 'do' has no aspectual constraints.

(42)   a.   John-un caknyen-ey piano-rul   sicakha-ess-ta
            J-TOP   last year   piano-ACC begin-PAST-DEC
            'John began the piano last year'
       b.   Sue-nun caknyen-ey kwikeli-rul   sicakha-ess-ta
            S-TOP   last year   earring-ACC begin-PAST-DEC
            'Sue began the earring last year'
       c.   ??Jane-un 1pwun cen-ey mokkeli-rul   sicakha-ess-ta
            J-TOP   1minute before necklace-ACC begin-PAST-DEC
            'Jane began the necklace one minute before'

The verb *sicakha-* 'begin' is a kind of aspectual verbs that takes the expression denoting an accomplishment or an activity event. Therefore, *piano* in (42a) can combine with *sicakha-* 'begin' because the telic quale predicate *yencwu* 'play' is an activity verb. On the other hand, the noun *mokkeli* 'necklace' in (42c) cannot be

---

[6]Pustejovsky (2001) suggests the four kinds of type coercion. Those are Subtyping, Evaluative Predicates, Natural Coercion, and Imposed Telic. If we follow Pustejovsky (2001), type coercion by the verb *ha-* 'do' is a kind of Imposed Telic like *begin* in English because *ha-* coerces type shifting of an entity type noun based on telic quale of the noun. However, we should consider type coercion based on agentive quale of the noun.

used together with *sicakha-* 'begin' because the telic predicate *chakyong* 'wearing' is an achievement verb. However, it is interesting that *kwikeli* 'earring' in (42b) can undergo type coercion by the aspectual verb *sicakha-* 'begin', although the telic predicate of *kwikeli* 'earring' is *chakyong* 'wearing' as the case of *mokkeli* 'necklace'. Where the difference is from? The sentence in (42b) is interpreted as an habitual activity. *Kwikeli chakyong* 'wearing earring' is Sue's habit or long-term activity. That is, the sentence in (42b) means that Sue began wearing an earring as her habit or something from last year. Although the telic quale predicate of a noun is an achievement verb, type coercion by *sicakha-* 'begin' is possible, in the case that the entire event is interpreted as a habitual activity. Let us see the aspectual verb *kkutnay-* 'finish'.

(43) a. ??John-un olhay   piano-rul   kkutnay-ess-ta
          J-TOP   this year piano-ACC finish-PAST-DEC
          'John finished the piano this year'
      b. ??Jane-un pangkum kwikeli-rul   kkutnay-ess-ta
          J-TOP   just now   earring-ACC finish-PAST-DEC
          'Jane has finished the earring just now'
      c. Sue-nun ecey   chayk han-kwon-ul   kkutnay-ess-ta
          S-TOP   yesterday book one-volume-ACC finish-PAST-DEC
          'Sue finished one book yesterday'

The aspectual verb *kkutnay-* 'finish' can combine only the expression denoting an accomplishment event. Since the event denoted by *piano* is individual level predication, *kkutnay-* 'finish' cannot coerce type shifting of the noun *piano*. In addition, the telic predicate *chakyong* 'wearing' is an achievement verb that cannot combine with *kkutnay-* 'finish'. Therefore, the sentence in (43b) is difficult to be interpreted. Even though the telic quale predicate *ilk-* 'read' is an activity verb, the quantization expression *han-kwon* 'a volume' changes the aspectual property of the telic predicate to be an accomplishment predicate. It makes it possible to combine with *kkutnay-* 'finish'.

On the other hand, type coercion by *ha-* 'do' on the entity type nouns does not have an aspectual constraint.

(44) a. John-un piano-rul   ha-n-ta
          J-TOP piano-ACC do-PRES-DEC
          'John does the piano'
      b. Jane-un mokkeli-rul   ha-ess-ta
          J-TOP necklace-ACC do-PAST-DEC
          'Jane did a necklace'
      c. Sue-ka pap-ul   ha-ess-ta
          S-NOM rice-ACC do-PAST-DEC
          'Sue did the rice'

Telic quale predicates *yencwu* 'play', *chakyong* 'wearing', and *ciski* 'making' are respectively activity, achievement, and accomplishment predicate. All of the nouns with the telic quale predicates can combine with the verb *ha-* 'do'. In sum, the verb *ha-* 'do' has no aspectual constraint.

We argued that type coercion by *ha-* 'do' is possible only on the functional type nouns. The nouns without a direct telic quale cannot combine with *ha-* 'do'. On the other hand, the verb *ha-* 'do' does not have a constraint on type coercion regarding aspect. Until now, we have explored type coercion by the governing verb *ha-* 'do' on the entity type complement.

9.7   An Alternative Explanation: Co-composition

We explained the combination of the verb *ha-* 'do' with some entity type nouns by type coercion. However, the vague property of the verb *ha-* 'do' in Korean makes it possible for us to consider an alternative way to explain the combination. If we think the verb *ha-* 'do' as a kind of generic verbs that replace other more specific verbs, we can consider the possibility of explanation by co-composition. The verb *ha-* 'do' shows some different aspects from typical type coercion verbs such as *begin* or *enjoy*.

(45)   a. John-un piano-rul   sicakha-ess-ta
            J-TOP   piano-ACC begin-PAST-DEC
            'John began the piano'
        b. John-un piano-rul   yencwuha-ess-ta
            J-TOP   piano-ACC play-PAST-DEC
            'John played the piano'

The verb *sicakha-* 'begin' cannot be replaced by the verb *yencwuha-* 'play'. The sentence in (45a) does not have the same meaning as the sentence in (45b). However, *ha-* 'do' construction shows different aspect from type coercion of the verb *sicakha-* 'begin' in (45).

(46)   a. John-un piano-rul   ha-ess-ta
            J-TOP   piano-ACC do-PAST-DEC
            'John played the piano'
        b. John-un piano-rul   yencwuha-ess-ta
            J-TOP   piano-ACC play-PAST-DEC
            'John played the piano'

The sentences in (46) both have the same meaning as each other. The verb *ha-* 'do' can be replaced by *yencwuha-* 'play'. Therefore, we can consider the following structure of the verbs in Korean.

(47)

ha-'do'
… yencwuha-'play' …
chi-'beat'   pwul-'blow'   ttut-'strum'   …
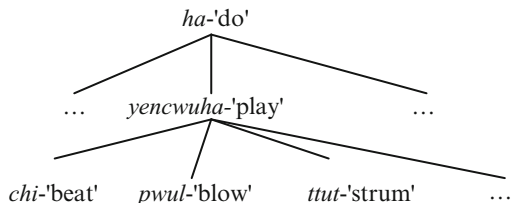
The predicates related to musical instruments have the above hierarchical lattice. The higher-level predicate is more abstract than lower-level predicates. If so, we can consider co-composition as an alternative explanation, as in the case of the verb *use* in English. Especially, the nouns denoting artifacts based on agentive telic makes the possibility more persuasive. The underspecified verb *ha-* 'do' is interpreted as a verb with a specific meaning via the specification process of its meaning by co-composition based on the qualia of the entity type nouns. However, the explanation by co-composition has a weak point in that it makes us to consider *ha-* 'do' combined with the event type noun like a predicative noun and this *ha-* 'do' as homonym. In addition, it is difficult to explain by co-composition that only some entity type nouns, not all, can combine with the verb *ha-* 'do'. Moreover, other languages have more constraints on combination of the verb class and entity type nouns. Both of the two explanations have technical merits and weak points. Which is right depends on the property of the verb *ha-* 'do'.

9.8 Conclusion

Qualia of entity-type nouns bring about direct combination of nouns with the Korean verb *ha-* 'do'. In that construction, elided information is derived from the qualia of the entity-type noun. In the end, composition of words derives a new additional meaning by using the lexical semantic structure of the words such as qualia, not simple contextual inferences. Hence, the combination has some generative principles and constraints as we show above.

Since qualia are important for explanation of syntactic or lexical semantic phenomena such as type coercion, we tried to analyze qualia more specifically. We argued that qualia have necessary information to explain the lexical semantic relation between lexicon and co-occurrence constraint. What is more, we extended the qualia: a telic quale into a direct telic, indirect telic, engagement telic and an agentive quale into the 1st agentive and 2nd agentive quale. Especially, we introduced the concept of an engagement telic quale. In addition, we described the Korean entity type nouns using the lexical meaning type lattice (Pustejovsky 2001). It consists of natural type, functional type, and complex type.

Type coercion by *ha-* 'do' has some constraints. First, natural type nouns cannot undergo type coercion. Secondly, the verb *ha-* 'do' cannot coerce type shifting of

nouns without direct telic quale. However, type coercion by the verb *ha-* 'do' has no aspectual constraint unlike aspectual verbs such as *sicakha-* 'begin'.

The subject NP also affects the meaning of the VP with type coercion by the governing verb. Finally, we suggested the alternative explanation – co-composition – because the verb *ha-* 'do' construction in Korean shows a somewhat different aspect from other typical type coercion verbs. This problem seems to be related with the essential property of the verb *ha-* 'do' and need more research. In conclusion, this research shows the nature of *ha-* 'do' in Korean in its combinability with entity-type nouns, not event-type nouns and the property of qualia of entity type nouns.

References

Copestake, A., & Briscoe, T. (1996). Semi-productive polysemy and sense extension. In J. Pustejovsky & B. Boguraev (Eds.), *Lexical semantics: The polysemy of polysemy*. Oxford: Clarendon.

Fodor, J. A., & Lepore, E. (1998). The emptiness of the lexicon: Critical reflections on J. Pustejovsky's "the generative lexicon". *Linguistic Inquiry,* 29–2.

Grimshaw, J., & Mester, A. (1988). Light verbs and theta-marking. *Linguistic Inquiry,* 19–2.

Im, S-H., & Lee, C-M. (2002). Type construction of nouns with the Verb *ha-* 'do'. In *Proceedings of the 16th Pacific Asia conference on language information and computation*, Jeju, Korea.

Jun, J.-S. (2001). Semantic co-composition of the Korean substantival nouns-ha(ta) construction: Evidence for the generative lexicon. In N. Akatsuka & S. Strauss (Eds.), *Japanese/Korean linguistics 10*. Stanford: CSLI.

Lee, C.-M., & Im, S.-H. (2003). How to combine the verb ha- 'do' with an entity type nouns in Korean – Its cross-linguistic implications. In *Proceedings of the 2nd international workshop on generative approaches to the lexicon,* Geneva, Switzerland.

Pustejovsky, J. (1995). *The generative lexicon*. Cambridge, MA: MIT Press.

Pustejovsky, J. (2001). Type construction and the logic of concepts. In P. Bouillon & F. Busa (Eds.), *The language of word meaning*. Cambridge: Cambridge University Press.