Chapter 10
Generative Lexicon Approach to Derived Inchoative Verbs in Korean

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10.1 Introduction

Since Vendler (1967), the event structure and the verbal aspect have been one of the controversial issues in verbal semantics. These issues result from the fact that all the verbs, which belong to each aspectual class, do not behave in the same way within each class. Among four aspectual classes suggested by Vendler (1967), achievement verbs show various behaviors and the subclasses of achievement verbs can be classified according to several patterns based on the similarity and difference between the various behaviors of achievement verbs. As some semanticists have suggested, some of them are called *degree achievement*.

In particular, we can observe the pattern of the change, which the verbal events show, because achievement and accomplishment events involve the changing event and their core events are also changes. According to Smith (1999), *telicity* is the important property for characterizing achievement and accomplishment situations and differentiating them from state and activity situations. A telic event implicates the heterogeneity and the complex event. This indicates that a telic event should denote the changing event. Therefore, exploiting the verbal semantics in terms of the changing event is one way of solving the long-discussed but unsolved problems related to Vendler's aspectual classes in Lexical Semantics.

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The *inchoative* aspect is another term for the achievement aspect focused on the beginning of a process or state that is the moment of a change.[1] In Korean, there are many inchoative verbs, which are composed of adjectival/verbal stems and (−*e*)-*ci*(−*ta*).[2] The form (−*e*)-*ci*(−*ta*) is an auxiliary formative, which denotes a change of state like *become* in English and can be attached to intransitive verbs and transitive verbs as well as the Korean adjectives,[3] that is, state verbs. It is a limitlessly productive device for creating morphologically-derived verbs. The noticeable phenomenon is that the derived inchoative verbs in Korean denote a variety of aspectual meanings and different argument structure, depending on their stem adjectives/verbs. In other words, the lexico-semantic structure of the derived inchoative verbs in Korean is based on the semantics of their stem adjectives/verbs.

This paper aims to explain the lexico-semantic structure of the derived inchoative verbs in Korean, focusing on (−*e*)-*ci*(−*ta*) class, by means of the Generative Lexicon approach. This paper uses the extended concepts and formalisms of the Generative Lexicon Theory (Pustejovsky 1995, 2000), especially Pustejovsky's (2000) opposition structure. The semantic structure of the Generative Lexicon Theory has three substructures: Event Structure (EVENTSTR), Argument Structure (ARGSTR), and Qualia Structure (QUALIA).[4] Also, the anlaysis on the Korean inchoative verbs is based on Y.-s. Kim et al. (1999) and Y.-s. Kim et al. (2003). Although our main interest is the Korean case, our study can be extended to other languages, such as English, Japanese, French, and so on.

The organization of this paper is as follows: In Sect. 10.2, we observe the distribution and the interpretation of the Korean derivational inchoative verbs. We try to classify three types of them based on the stem verbs. In Sect. 10.3, we analyze the argument structure based on the distribution. In Sect. 10.4, we examine the event

[1] Instead of *achievement*, we use the term *inchoative* for the achievement verbs having the *change-of-state* meaning, because we will analyze these verbs focusing on the change.

[2] In Korean, some single stems can occasionally function as either an adjective or a verb, as in *palk-ta* 'bright'/'become bright,' the verb meaning of which is equivalent to *palk-a ci-ta* 'become bright' (the present tense *–nun-* can be attached), and subject to all the constraints discussed here. There are still two more types of change-of-state verbs: one has the form composed of a verb/adjective stem + *key* (or a predicate noun + NOM) and an auxiliary but unbound verb *toy-ta* 'become'. The other type is with a causative/passive meaning derived from a verbal stem with a causative/passive morpheme, such as *-i-*, *-hi-*, *-li-*, *-ki-*, forming the causative/passive category as well as the inchoative. In this paper, we aim to explain the lexico-semantic structure of the derived inchoative verbs by the bound morpheme (−*e*)-*ci*(−*ta*) 'become' in Korean based on the property of their adjective/verb stems and focusing on the aspect of the changing events which the inchoatives denote. In this sense, (−*e*)-*ci*(−*ta*) class shows a relatively pure change-of-state event and our analysis excludes other types of verbs.

[3] In Korean grammar, adjectives (*hyengyongsa* in Korean) are a kind of predicate similar to verbs rather unlike in English grammar Here we call Korean adjectives *state* verbs tentatively but adjectives with (−*e*)-*ci*(−*ta*) become real verbs. There are few ambiguous stems. In (2a), the stem.*nuc-* is ambiguous between an adjective 'late' and a verb 'get delayed'.

[4] But C. Lee et al. (1998) develops the semantic structure to describe the lexical semantics of Korean predicates and adds one extra substructure, the so-called "**Case Structure** (**CASESTR**)," which illustrates case realization patterns of core arguments of predicates in Korean.

structure of each type by means of the opposition structure suggested by Pustejovsky (2000) and suggest the qualia structure of (−*e*)-*ci*(−*ta*) inchoatives. In Sect. 10.5, we explain the variety of the argument realization by the generative mechanism *type coercion*.

10.2 Distribution, Interpretation and Types

10.2.1 Distribution and Interpretation

As we noted in Sect. 10.1, (−*e*)-*ci*(−*ta*) is a very productive morpheme which results in inchoative verbs. It can be attached to any kind of predicate, but the derived inchoative verbs behave differently according to which kind of verb is their stem. So the distribution of the Korean (−*e*)-*ci*(−*ta*) inchoative verbs is unrestricted, but their interpretations are various depending on their stem's meaning. Consider the following examples;

(1) (a) i wulthali-ka noph-a-ci-ess-ta.
This fence-Nom become higher-Past-Dec
Lit. 'This fence became higher.'

(b) pang-uy onto-ka nac-a-ci-n-ta.
roon-Gen temperature-Nom become lower-Present-Dec
Lit. 'The temperature of the room becomes lower.'

(2) (a) kicha-uy chwulpal-i nuc-e-ci-ess-ta.
train-Gen departure-Nom become late-Past-Dec
Lit. 'The train's departure became delayed.'

(b) sikthak-i kkaykkusha-e-ci-ess-ta.
Table-Nom become clean-Past-Dec
Lit. 'The table became clean.'

(3) (a) John-i eps-e-ci-essta.
John-Nom become-not exist-Past-Dec
Lit. 'John disappeared.'

(b) chospwul-i kku-e-ci-ess-ta.
the candle-light-Nom become extinguished-Past-Dec
Lit. 'The candle-light became extinguished.'

In (1), *noph-a-ci-ta* (to become higher) and *nac-a-ci-ta* (to become lower) are interpreted as *the change of degree*, while (2) and (3) means *the change of state* which happens to their subjects. In the case of (1), the stem verbs are gradable state verbs, *noph-ta* (to be high) and *nuc-ta* (to be delayed). *Pang-uy onto* (The temperature of the room), the subject in (1b), is a typical degree noun. *Nuc-e-cita* (to become delayed) and *kkaykkusha-e-cita* (to become clean) in (2) are considered

as the change of state about an event at a certain criterion, although they are related to some scale. That event is related to the theme argument of the sentence. However, *eps-e-cita* (to disappear) and *kku-e-cita* (to become extinguished) in (3) are derived from non-gradable verbs, *eps-ta* (not to be) and *kku-ta* (to extinguish), respectively. Thus, the sentences in (3) denote the typical change of state and achievement event.

10.2.1.1 Time Adverbials and Comparative Phrases

As Dowty (1979) and many other have mentioned, one of the classical tests for the aspectual classes is the test by means of the time adverbials, such as *in an hour*, *for an hour*, and *at one o'clock*. Many previous studies explained that the frame adverbials, such as *in an hour*, can co-occur with accomplishments and achievements, but the durative adverbials, such as *for an hour*, can modify activities and accomplishments. The point adverbials, such as *at one o'clock*, appear with the verbs denoting the culminating point, such as achievements and accomplishments. We can also observe the distribution of the comparative phrases related to the progression of the whole event denoted by the verb. Now we will examine these adverbials one by one.

First, the point adverbials, such as *twu-si-ey* (at two o'clock), can occur with *noph-a-ci-ta* because its event implicates the changing event and has the culminating point, as we see in (4a). However, *noph-a-ci-ta* does not guarantee the definite resultant state. In (4c), this adverbial can also occur with *kku-e-cita* because of the prominent resultant state involved. On the other hand, *nuc-e-ci-ta* with a point adverbial is somewhat anomalous in (4b). Observe the following examples:

(4) (a) onto-ka twu-si-ey noph-a-ci-ess-ta.
temperature-Nom two o'clock-Loc become higher-Pat-Dec
Lit. 'The temperature rose at two o'clock.'

(b) ??kicha-uy chwulpal-i twu-si-ey nuc-e-ci-ess-ta.
train-Gen departure-Nom two o'clock-Loc become late-Past-Dec
Lit. 'The train's departure became delayed at two o'clock.'

(c) chospwul-i twu-si-ey kku-e-ci-ess-ta.
candle-Nom two o'clock-Loc become extinguished-Past-Dec
Lit. 'The candle was extinguished at two o'clock.'

Second, we can make sure that the event structure of *noph-a-ci-ta* and *kkaekkusha-e-ci-ta* can have a prominent process, considering the combining relation with durative adverbials, such as *kyeysok* (continuously), and frame (or time span) adverbials, such as *samsippwun-tongan* (30 min). Observe the following examples:

(5) (a) onto-ka kyeysok noph-e-ci-ess-ta.
temperature-Nom continuously become higher-Pat-Dec
Lit. 'The temperature rose continuously.'
(b) sikthak-i kyeysok kkaykkusha-e-ci-ess-ta.
table-Nom continuously become clean-Past-Dec
Lit. 'The table became clean continuously.'
(c) haksayng-tul-i kyeysok eps-e-ci-ess-ta.
Student-pl.-Nom continuously disappear-Past-Dec
Lit. 'Students disappeared continuously.'

(6) (a) onto-ka samsippwun-tongan noph-a-ci-ess-ta.
temperature-Nom for thirty minutes become higher-Pat-Dec
Lit. 'The temperature rose for thirty minutes.'
(b) sikthak-i samsippwun-tongan kkaykkusha-e-ci-ess-ta.
table-Nom for thirty minutes become clean-Past-Dec
Lit. 'The table became clean for thirty minutes.'
(c) haksayng-tul-i samsippwun-tongan eps-e-ci-ess-ta.
student-tul-Nom for thirty minutes disappear-Past-Dec
Lit. '?*Students disappeared for thirty minutes.'

The sentences in (5a-b) and (6a-b) mean that their processes keep on going, but the sentences in (5c) and (6c) have two meanings: the continuation of the result state, or the reiteration of the whole event. As Dowty (1979) and others have said, the former examples, (5a-b) and (6a-b), reflect the ambiguity of the degree achievements.

Third, the comparative phrase, such as *pothong-pota* (more than normal state) or *cen-pota* (than the degree of dimension at a specific time of e_1), can occur with *noph-a-ci-ta* and *nuc-e-ci-ta*, instead of the point adverbials, because their events implicate the degree changing events compared with another value, that is, the criterion. But, *kku-e-cita* does not appear with the comparative phrase because the criterion is not necessary to judge the change. Consider the following examples:

(7) (a) onto-ka pothong-pota noph-a-ci-ess-ta.
temperature-Nom normal-COMP[5] become higher-Pat-Dec
Lit. 'The temperature rose more than normal state.'
(b) kicha-uy chwulpal-i pothong-pota nuc-e-ci-ess-ta.
train-Gen departure-Nom normal-COMP become late-Past-Dec
Lit. 'The train's departure became more delayed than normal time.'
(c) *chospwul-i pothong-pota kku-e-ci-ess-ta.
candle-Nom normal-COMP become extinguished-Past-Dec
Lit. '*The candle was more extinguished than normal time.'

[5]COMP = comparative

10.2.1.2 V-*ko iss-ta* and V-*e iss-ta*

Generally, 'V-*ko iss-ta*' is considered as the corresponding construction of '*be –ing*,' while 'V-*e iss-ta*' is thought of as that of '*have –en*.' So, 'V-*ko iss-ta*' means the progressive meaning, i.e., the continuing process, and 'V-*e iss-ta*' denotes the perfective, i.e., the resultant state. In Korean, however, 'V-*ko iss-ta*' has another aspectual meaning: the resultant state and the iteration of the whole event. Look at the examples in (8) and (9).

(8) (a) onto-ka noph-a-ci-ko iss-ta.
temperature-Nom become higher-Asp be-Dec
Lit. 'The temperature is rising.'
(b) sikthak-i kkaykkusha-e-ci-ko iss-ta.
table-Nom become clean-Asp be-Dec
Lit. '?*The table is getting cleaned.'
(c) ?*haksayng-tul-i eps-e-ci-ko iss-ta.
Student-pl.-Nom disappear-Asp be-Dec
Lit. '?*Students are disappearing.'

(9) (a) onto-ka noph-a-ci-e iss-ta.
temperature-Nom become higher-Asp be-Dec
Lit. 'The temperature has risen.'
(b) sikthak-i kkaykkusha-e-ci-e iss-ta.
table-Nom become clean-ASP be-Dec
Lit. 'The table became clean.'
(c) haksayng-tul-i eps-e-ci-e iss-ta.
student-tul-Nom disappear-Asp be-Dec
Lit. 'Students have gone.'

As we can see in (8), *noph-a-ci-ta* and *kkaekkusha-e-ci-ta* appear in the 'V-*ko iss-ta*' construction, which denotes a continuous process, while *eps-e-ci-ta* does not. If (8c) is possible, it means the iteration of the whole event. In the cases of *noph-a-ci-ta* and *kkaekkusha-e-ci-ta*, the aspectual meanings of the 'V-*ko iss-ta*' constructions are the same as those of the activity verbs. *Noph-a-ci-ta* and *kkaekkusha-e-ci-ta* are degree achievements, but *eps-e-ci-ta* belongs to the typical achievements. On the other hand, all of these verbs, such as in (9), can occur with the 'V-*e iss-ta*' construction, which denotes the continuation of a result state.

10.2.2 Three Types

According to the distribution and interpretation as in (1)–(9), we can suggest three types of (−*e*)-*ci*(−*ta*) inchoative verbs in Korean as follows:

(10) (a) Type-I: *Gradable inchoatives*
noph-a-ci-ta[6] (‘to become higher’),
nac-a-ci-ta (‘to become lower’),
nelp-e-ci-ta (‘to become wider’),
cop-a-ci-ta (‘to become narrower’),
...
(b) Type-II: *Semi-gradable inchoatives*
nuc-e-ci-ta (‘to become delayed’),
kkaykkusha-e-ci-ta (‘to become clean’),
...
(c) Type-III: *Ungradable inchoatives*
eps-e-ci-ta (‘to become non-existent, to disappear’),
kku-e-ci-ta (‘to become extinguished’),
...

The first verbal type is derived from stem verbs with a scalar dimension, the second is from stem verbs with a scalar dimension and a criterion for the change, and the third is derived from the stem verb without such a dimension or a criterion.[7] Based on this observation, we call Type-I *gradable inchoatives*, Type-II *semi-gradable inchoatives*, and Type-III *ungradable inchoatives*, respectively.[8] In particular, we can infer that semi-gradable inchoatives are related to a certain scale but restricted to the culmination point.

In the following sections, we continue to discuss the argument, qualia structure, and event structure of three types of derived inchoatives. We will also talk about type coercion, which is one of the generative mechanisms in Generative Lexicon.

10.3 Argument Structure

Above all, we will examine the argument structure. Basically, each argument of each type is a theme in terms of theta-role, because it has no volition. We can recognize that in the following examples:

[6] ‘*-a-cita*’ is a vowel harmony phonetic variant of ‘*-e-ci-ta.*’

[7] We will discuss the nature of the criterion in Sect. 10.3.

[8] Instead of *gradable*, the term *scalar* can be used. Generally, however, this is used for the scales of different predicate items, while that is for the difference of the degree in the same predicates. Therefore, we adopt the term ***gradable***.

(11) (a) *i wulthali-ka ilpwure noph-a-ci-ess-ta.
This fence-Nom intentionally become higher-Past-Dec
Lit. '*This fence became higher intentionally.'
(b) *kicha-ka ilpwule nuc-e-ci-ess-ta.
train-Gen intentionally become late-Past-Dec
Lit. '?*The train became delayed intentionally.'
(c) *chospul-i ilpwule kku-e-ci-ess-ta.
candle-Nom intentionally become extinguished-Past-Dec
Lit. '*The candle became extinguished intentionally.'

(12) (a) *i wulthali-ka cosimsulepkey noph-a-ci-ess-ta.
This fence-Nom carefully become higher-Past-Dec
Lit. '*This fence became higher carefully.'
(b) *kicha-ka cosimsulepkey nuc-e-ci-ess-ta.
train-Gen carefully become late-Past-Dec
Lit. '?*The train became delayed carefully.'
(c) *chospul-i cosimsulepkey kku-e-ci-ess-ta.
candle-Nom carefully become extinguished-Past-Dec
Lit. '*The candle was extinguished intentionally.'

The adverb *ilpwule* (intentionally) denotes the volition of a subject. Thus, *ilpwule* does not appear with all the verbs in (11). Also, the adverb *cosimsulepke* (carefully) cannot present itself with these inchoative verbs, as in (12).

The most outstanding point is that the arguments of gradable inchoatives and semi-gradable inchoatives have a unique property. Consider the following examples:

(13) (a) i wulthali-ka noph-a-ci-ess-ta.
This fence-Nom become higher-Past-Dec
Lit. 'This fence became higher.'
(b) i wulthali-uy nophi-ka noph-a-ci-ess-ta.
This fence-Gen height-Nom become higher-Past-Dec
Lit. 'The height of this fence became higher.'
(c) i wulthali-ka nophi-ka noph-a-ci-ess-ta.
This fence-Nom height-Nom become higher-Past-Dec
Lit. 'The height of this fence became higher.'

(14) (a) onto-ka noph-a-ci-ess-ta.
temperature-Nom become higher-Asp-Dec
Lit. 'The temperature rose.'

(b) i pang-uy onto-ka noph-a-ci-ess-ta.
this room-Gen temperature-Nom become higher-Asp-Dec
Lit. 'The temperature of this room rose.'
(c) i pang-i onto-ka noph-a-ci-ess-ta.
This room-Nom temperature-Nom become higher-Asp-Dec
Lit. 'The temperature of this room rose.'

(15) (a) kicha-ka nuc-e-ci-ess-ta.
train-Gen become late-Past-Dec
Lit. 'The train became delayed.'
(b) kicha-uy chwulpal/tochak-i nuc-e-ci-ess-ta.
train-Gen departure/arrival-Nom become late-Past-Dec
Lit. 'The train's departure/arrival became delayed.'
(c) kicha-ka chwulpal/tochak-i nuc-e-ci-ess-ta.
train-Nom departure/arrival -Nom become late-Past-Dec
Lit. 'The train's departure/arrival became delayed.'

(16) (a) chospwul-i kku-e-ci-ess-ta.
the candle-light-Nom become extinguished-Past-Dec
Lit. 'The candle-light became extinguished.'
(b) *chospwul-uy palkki/khyeki-ka kku-e-ci-ess-ta.
the candle-light-Gen brilliance/lighting-Nom become
extinguished-Past-Dec
Lit. 'The brilliance of the candle/Lighting the candle
became extinguished.'
(c) *chospwul-i palkki/khyeki-ka kku-e-ci-ess-ta.
the candle-light-Nom brilliance/lighting-Nom become
extinguished-Past-Dec
Lit. 'The brilliance of the candle/Lighting the candle became
extinguished.'

Nophi (height) in (13b) and (13c) and *onto* (temperature) in (14) denote a certain dimension, or scale. In the case of gradable inchoatives, the change does not appear directly on a theme argument, but reflects indirectly by the change of degree. Actually, the noun *onto* itself means the degree of *hotness*. So the argument of gradable inchoatives is *dimensional noun* which is related to a scale or dimension. As in (13b), dimensional nouns, such as *nophi*, can occur as only argument, like *onto* in (14b), when they are modified with the nouns with the genitive case *–uy* (of). In other related sentences like (13c) and (14c), the genitive modifiers, such as *i wulthali-uy* or *i pang-uy*, are replaced with the subject arguments with nominative markers, such as *i wulthali-ka* or *i pang-i*. These dimensional expressions, however, are not allowed to occur with semi-gradable or ungradable inchoatives. In (15a), *kicha* (train) does not express just the vehicle as a physical object, but the event

related to the train, the departure or arrival, depending on the context, as in (15b). That is, *kicha* is forced to have the eventual argument's interpretation. Although the event nouns are not dimensional nouns, the sentences including them denote accessing the criterion point, the culmination point. The event nouns can offer a kind of dimension *indirectly* and semi-gradable inchoatives like (15) have the somewhat weak scalar property, because the theme argument itself is not affected and what undergoes the actual change is the subevent related to it. In other words, the degree of the event's access to the culmination point has the scalar property. Thus, semi-gradable inchoatives take the event noun as their true argument. On the other hand, ungradable inchoatives like (16b) and (16c) are not associated with the scale of any domain. As in (16a), the affected theme is *chospwul*, and the event like *khyeki* or degree noun like *palkki* is not allowed, as we see in (16b) and (16c).

In the argument structure, there is a difference between the three types of (−*e*)-*ci*(−*ta*) inchoative verbs. Gradable inchoatives are a dimensional noun as a true argument. Semi-gradable inchoatives, however, take an event argument, while ungradable inchoatives have the typically affected theme argument. Each inchoative verb has a different kind of argument from each other. But, the arguments of all these inchoatives are not volitional and these verbs can be characterized as unaccusatives.

10.4 Opposition Structure, Event Structure, and Qualia Structure

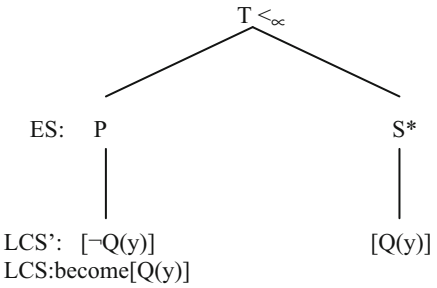
In this section, we discuss the event structure and qualia structure of three types of inchoatives, considering their opposition structures suggested by Pustejovsky (2000). Lee (1973) suggests that (−*e*)-*ci*(−*ta*) is an inchoative auxiliary formative and the most productive construction for forming the change-of-state construction. In particular, if (−*e*)-*ci*(−*ta*) is attached to a state verb's stem, which denotes a pure state, it adds a certain changing process to a pure state. The inchoative verb, however, expresses an instantaneous change, not a gradual one, and it is usually accepted that an inchoative verb is an achievement verb. So the added process is relatively short and instantaneous.

Generally, we can assume three basic event types (Vendler 1967; Dowty 1979): state, process and transition. Pustejovsky (1991) suggests that state and process are homogeneous events but, that transition is not. Transition is composed of at least two subevents. The inchoative sentence should presuppose the negative state before the change of state, which the verb stem denotes (Lee 1973; Pustejovsky 1991). In this vein, Pustejovsky (2000) indicates that the event implying a certain change has the opposition structure. Let us observe the following examples:

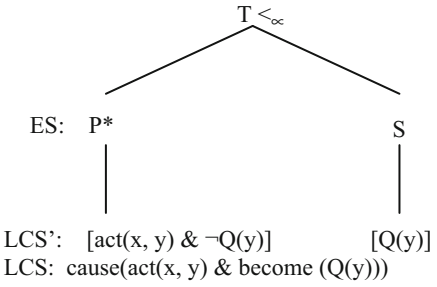
(17) (a) The window broke.
(b) [become([broken(the-window)])]

In (17a), *broke* is a typical inchoative verb and (17b) is its lexical conceptual structure (LCS). (17a) presupposes the unbroken state of the window. After the instantaneous change happens, the resultant state of (17a) is the broken window. Pustejovsky (1991) describes the event structure and its related qualia structure of the inchoative (=achievement) verb and the accomplishment verb as follows:

(18) *inchoative* (=achievement)



(19) *accomplishment*



But, all the event structures and qualia structures of the (−*e*)-*ci*(−*ta*) inchoative verbs are not similar to (18). Gradable inchoatives do not denote instantaneous changes, but gradual ones, and have no presupposition of their negative states. Dowty (1979) called these kinds of achievement verbs, *degree achievements*. He and other scholars also have mentioned that the degree achievements denote telic or atelic events depending on the argument or the adjunct, like activity verbs. Observe the following examples:

(20) (a) onto-ka cemcem noph-a-ci-ess-ta.
temperature-Nom gradually become higher-Past-Dec
Lit. 'The temperature rose gradually.'

(b) catongcha-uy sokto-ka cemcem nuc-e-ci-n-ta.
car-Gen speed-Nom gradually become slower-Present-Dec
Lit. 'The car's speed became slower and slower gradually.'

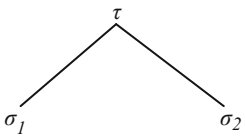
(21) (a) kicha-uy chwulpal-i cemcem nuc-e-ci-ess-ta.
train-Gen departure-Nom gradually become late-Past-Dec
Lit. 'The train's departure became delayed gradually.'
(b) sikthak-i cemcem kkaykkusha-e-ci-ess-ta.
table-Nom gradually become clean-Past-Dec
Lit. 'The table became clean gradually.'

(22) (a) ?*chospwul-i cemcem kku-e-ci-ess-ta.
candle-Nom gradually become extinguished-Past-Dec
Lit. '*The candle was extinguished gradually.'
(b) ?*John-i cemcem eps-e-ci-ess-ta.
John-Nom gradually disappear-Past-Dec
Lit. '*John disappeared gradually.'

The adverb *cemcem* (gradually) can occur in (20) and (21), while it cannot in (22). That is because *cemcem* modifies only the process and cannot be an adjunct of achievement verbs. So, gradable inchoatives express a gradual change, while ungradable inchoatives denote an instantaneous change. (20a) does not imply that the resultant state is the absolute high state of the temperature. We can just assume that the temperature becomes higher than before the change of state.

As we mentioned above, Pustejovsky (2000) suggests that the event structure of the change of state verb should presuppose *the opposition structure*, whether it is a *binary* opposition or a *polar* one. Pustejovsky (2000) maintains that each opposition has the property as follows:

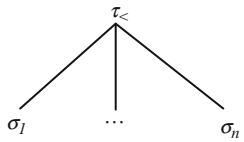
(23) Binary Property
(a) $<\sigma_1, \sigma_2, \tau, \sqcup, \sqsubseteq>$ *realizes* a binary predicate *P*, where τ is a local top type for this sortal array, such that $\sigma_1, \sigma_2 \sqsubseteq \tau$, and $\neg\exists\, \sigma\, [\sigma \neq \sigma_1 \vee \sigma \neq \sigma_2]$. That is, σ_1 and σ_2 exhaustively partition τ.
(b)



(c) <P, ¬P>, <P,Q>, <¬Q, Q>

(24) Polar Property
(a) $<\Sigma,\tau,\sqcup,<,\sqsubseteq>$ *realizes* a polar predicate *P*, where Σ is a sortal array of types, τ is a local top for this sortal array, such that $\sigma_1, \ldots, \sigma_n \sqsubseteq \in \Sigma$ for $\sigma_i \sqsubseteq \tau$, and $\sigma_i < \sigma_{i+1}$, and there are two poles σ_1, and σ_n, that are distinguished sorts.

(b)



(c) $d_1 \succ_{pos\phi} d_2 \iff d_2 \succ_{neg\phi} d_1$

In our analysis, gradable inchoatives have the *polar* property, while ungradable inchoatives have the *binary* property. In the case of gradable inchoatives, when the change denotes increasing degrees gradually on a scale, the scale should have just one end expressing the lowest degree. In this vein, in (20a) and (20b), we cannot guess the end point of its process because the scale of *temperature* or *speed* is open-ended.

However, the sentences in (22) have the presupposition of the negative state. Therefore, the adverb *cemcem* (gradually) can occur in (20a) and (20b), while it cannot in (22a) and (22b). In the case of ungradable inchoatives, two end points are contradictory and incompatible. On the other hand, two end points of gradable inchoatives are contrary and it is possible that there is something belonging to neither endpoint.

Semi-gradable inchoatives, as in (21), seem to be problematic. They are ambiguous, because they behave as gradable or ungradable inchoatives depending on the context. But this problem can be solved simply by using the opposition property, binary or polar. Thus, it can be inferred that semi-gradable inchoatives have both binary and polar property, because they appear as two contrastive inchoatives, scalar or non-scalar.[9]

Accepting Pustejovsky's (2000) opposition structure, we can assign the binary or polar property to each inchoative type as follows and differentiate theme from each other:

(25) Binary/Polar Property and Three Types of Inchoatives

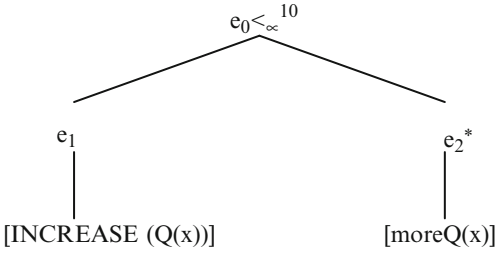
	Binary	Polar
Gradable inchoatives	−	+
Semi-gradable inchoatives	+	+
Non-gradable inchoatives	+	−

The distribution of the opposition in (25) suggests that the changing aspects of the three types of inchoatives are different and these different aspects are reflected in the lexico-semantic structure of each type's inchoatives. According to Pustejovsky (2000), the opposition structure is related to a *gating function*, which introduces the new resultant state or removes or changes the initial state. The binary or polar property make a verb denote the changing event.

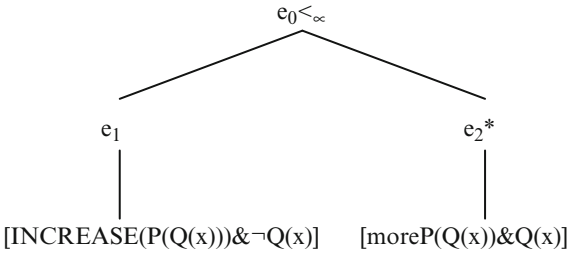
[9]This can be treated as the underspecification of the property. In this case, however, we should underspecify the value of two properties, binary and polar. Generally, it is possible to underspecify only one property's value.

Now we can suppose each event structure and qualia structure for the three types of inchoatives as follows:

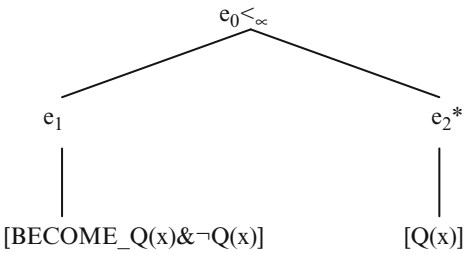
(26) *Gradable inchoatives*



(27) *Semi-gradable inchoatives*



(28) *Ungradable inchoatives*



The asterisks show the headedness of the event structure. According to Pustejovsky (1995), headedness is assigned to the most prominent subevent in the event structure of a predicate and is very important to link the surface structure. All the event structures of derived inchoatives in (26)–(28) assign the headedness to the resultant state and there is no negative presupposition. This means that all of these inchoatives belong to achievement verbs.

[10] According to Y-S. Kim (2002), scalar inchoatives are typical degree achievements and the subevents are overlapping each other partially. In this paper, however, we will not discuss the overlapping subevents in detail, because the opposition structure is the focus of this paper.

In Hay et al. (1999), the event of degree achievement is represented as follows:

(29) (a) INCREASE(Q(x))(d)
(b) DECREASE(Q(x))(d)

As Rothstein (2004) indicated, Hay et al.'s (1999) event structure of degree achievement is a non-complex event, that is, a single event, 'INCREASE.' Here, 'x' is the property of change, 'Q' is a function changing 'x' to the property related to the verb, and 'd' denotes the difference value. If a degree achievement verb occurs with an adjunct related to a difference value, the event of that verb is telic. However, Rothstein (2004) maintained that the extent of an event is not determined by the relation between the event and an argument, but that it should be defined by the event structure itself. She offered an example in this connection: "My mother-in-law shortened the sleeves of my jacket 5 cm in only half an hour." According to her, the culmination of the particular event described in this sentence is determined by the canonical endpoint of that process, not the extent of the difference variable such as "5 cm." In this paper, we do not adopt this difference variable 'd' either; basically it is not a lexical property. The difference of a change is determined by context.

In their qualia structures, there are obvious differences between them. As for inchoatives with scalar property, the predicate INCREASE, denoting changed degree, appears in the initial subevent and the predicate moreQ or moreP in the terminus subevent. The latter expresses the resultant state of changing degree. In particular, the event denoted by a verb should be telic if it is quantized by means of adverbials and contexts.

As we see in (26), the qualia structure for gradable inchoatives only has INCREASE(Q(x)) in the initial subevent and moreQ(x) in the terminus subevent. This means that these inchoatives have the scalar property. On the other hand, the qualia structure for semi-gradable inchoatives as in (27) includes INCREASE(P(Q(x))) and ¬Q(x) as its conjunct in the initial subevent, while it has moreP(Q(x)) and its conjunct Q(x) in the terminus subevent. As we have mentioned in Sect. 10.3, semi-gradable inchoatives take an event argument, such as *tochak* (arrival) or *chwulpal* (departure), so Q(x) inside P implies an event argument. Thus, INCREASE(P(Q(x))) means that the theme argument itself is not affected and the degree of the related subevent changes. MoreP(Q(x)) denotes the resultant state of the event changing degree. ¬Q(x) in the initial subevent and Q(x) in the terminus subevent contrast each other in the opposition structure. In the case of semi-gradable inchoatives, the qualia structure has the scalar property and the binary property at the same time. In (27) and (28), the second conjunct of e_1 is a presuppositional meaning, so its precise representation should be [INCREASE(P(Q(x)))&presupp:¬Q(x)] and [BECOME_Q(x)&presupp: ¬Q(x)], respectively.

The aspectual meanings similar to activities, which appear with gradable inchoatives and semi-gradable inchoatives, as in (6), (7) and (8), result from the interaction of the polar property and INCREASE predicate. The ending point is not fixed because of the polarity and INCREASE predicate can applied endlessly. So their events seem to be extended without restriction and behave like activities. There is,

however, no such predicate in the event structure of ungradable inchoatives. In terms of the event structure, ungradable inchoatives are typical achievements.

Considering the characteristics of these inchoatives and using the frame of the Generative Lexicon, we can suggest the following lexico-semantic structure:

(30)
$$\left[\begin{array}{l} \textit{Gradable Inchoatives} \\ \text{EVENTSTR} = \left[\begin{array}{l} E_1=e_1\text{: process} \\ E_2=e_2\text{: state} \\ \text{RESTR}=< \\ \text{HEAD}=e_2 \end{array}\right] \\ \text{ARGSTR} = \left[\begin{array}{l} ARG_1=x : \text{dimension} \end{array}\right] \\ \text{QUALIA} = \left[\begin{array}{l} \textit{state\_change\_lcp} \\ \text{FORMAL}=\text{moreQ}(e_2,x) \\ \text{AGENTIVE}=\text{increase}(e_1,Q(x)) \end{array}\right] \end{array}\right]$$

(31)
$$\left[\begin{array}{l} \textit{Semi-gradable Inchoatives} \\ \text{EVENTSTR} = \left[\begin{array}{l} E_1=e_1\text{: process} \\ E_2=e_2\text{: state} \\ \text{RESTR}=< \\ \text{HEAD}=e_2 \end{array}\right] \\ \text{ARGSTR} = \left[\begin{array}{l} ARG_1=x : \text{event} \end{array}\right] \\ \text{QUALIA} = \left[\begin{array}{l} \textit{state\_change\_lcp} \\ \text{FORMAL}=\text{moreP}(e_2,Q(x))\&Q(e_2,x) \\ \text{AGENTIVE}=\text{increase}(e_1,P(Q(x))) \end{array}\right] \end{array}\right]$$

(32)
$$\left[\begin{array}{l} \textit{Ungradable Inchoatives} \\ \text{EVENTSTR} = \left[\begin{array}{l} E_1=e_1\text{: process} \\ E_2=e_2\text{: state} \\ \text{RESTR}=< \\ \text{HEAD}=e_2 \end{array}\right] \\ \text{ARGSTR} = \left[\begin{array}{l} ARG_1=x : \text{physical\_obj} \end{array}\right] \\ \text{QUALIA} = \left[\begin{array}{l} \textit{state\_change\_lcp} \\ \text{FORMAL}=Q(e_2,x) \\ \text{AGENTIVE}=\text{become\_Q}(e_1,x) \end{array}\right] \end{array}\right]$$

10.5 Generative Aspects of Derived Inchoatives

We mentioned the various surface syntactic forms in Sect. 10.3. Now, we consider the polymorphic realization of the argument structure in gradable inchoatives and semi-gradable inchoatives and look at the following examples again:

(33) (a) i wulthali-ka noph-a-ci-ess-ta.
This fence-Nom become higher-Past-Dec
Lit. 'This fence became higher.'
(b) i wulthali-ka nophi-ka noph-a-ci-ess-ta.
This fence-Nom height-Nom become higher-Past-Dec
Lit. 'The height of this fence became higher.'
(c) i wulthali-uy nophi-ka noph-a-ci-ess-ta.
This fence-Gen height-Nom become higher-Past-Dec
Lit. 'The height of this fence became higher.'

(34) (a) kicha-ka nuc-e-ci-ess-ta.
train-Gen become late-Past-Dec
Lit. '?*The train became delayed.'
(b) kicha-uy chwulpal/tochak-i nuc-e-ci-ess-ta.
train-Gen departure/arrival-Nom become late-Past-Dec
Lit. 'The train's departure/arrival became delayed.'
(c) kicha-ka chwulpal/tochak -i nuc-e-ci-ess-ta.
train-Nom departure/arrival -Nom become late-Past-Dec
Lit. 'The train's departure/arrival became delayed.'

As we noted in Sects. 10.3 and 10.4, gradable inchoatives take a dimensional noun as their true argument and semi-gradable inchoatives take an event noun. However, (33a) and (34a) are not compatible with their lexico-semantic structures and we predicted that their arguments should be interpreted as a dimensional or an event noun, respectively. To explain this polymorphic phenomenon, we must examine the semantics of the argument noun. Then, we will try to explain the generative mechanism for this polymorphism.

First, we examine the argument noun of gradable inchoatives in (33a). This noun denotes just a physical object; we have to infer how this physical object can be interpreted into a dimensional noun. But, all the nouns meaning the physical object have the size, weight, and other properties, by which they are characterized in the perceptual aspect. Thus, it is necessary that the lexico-semantic structure of the physical object noun should include the information of these properties. In this point, we must decide which role these properties are assigned in the qualia structure. The abstract properties of the physical object, including the dimensional properties, can belong to the elements of the physical object. So the CONSTITUTIVE role covers the predicate related to the dimensional properties.

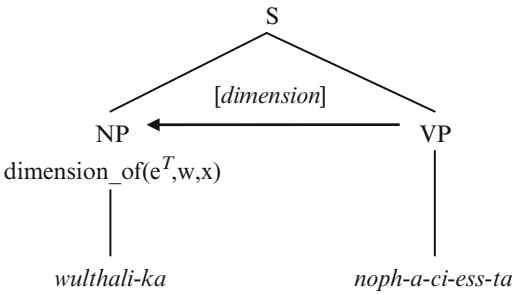
But, if the number of the predicate in the CONSTITUTIVE is more than two, how can we express them? In this case, the properties in CONSTITUTIVE are unique and they are independent of the context. Therefore, each predicate related to each property conjuncts to another predicate and the dimensional property is also one of the conjunct in CONSTITUTIVE role. We can represent this as follows:

(35)

$$\begin{bmatrix} \textit{wulthali} \text{ (fence)} \\ \text{ARGSTR} = \begin{bmatrix} \text{ARG}_1\text{=x : physical\_obj} \\ \text{D\_ARG}_1\text{=y: human} \\ \text{D\_ARG}_2\text{=z: material} \\ \text{D\_ARG}_3\text{=w: dimension} \end{bmatrix} \\ \text{QUALIA} = \begin{bmatrix} \text{FORMAL=x} \\ \text{CONSTITUTIVE=material\_of}(e^T,z,x)\& \\ \qquad \underline{\text{dimension\_of}(e^T,w,x)} \\ \text{TELIC=R}(e^P,y,x) \\ \text{AGENTIVE=make}(e^T,v,x) \end{bmatrix} \end{bmatrix}$$

When the noun *wulthali* (fence) is the theme argument of gradable inchoatives, type coercion operates, such as in (36), and the argument must be interpreted as the dimensional noun.[11] In other words, gradable inchoatives coerce the argument NP type as the dimensional noun.

(36)



Then, we look into the case of semi-gradable inchoatives. In that case, the theme argument is also a physical object and artefact alike. So its TELIC role is outstanding, but depends on the context. If the number of the predicate is more than

[11] A reviewer indicated that this analysis looks more like a case of selective binding. We think that selective binding is a device for solving the polysemy of adjectives which we can find in examples such as *a fast boat*, *a fast typist*, or *a fast driver*. In the case that we treat here, the meaning of a verb is fixed, while its noun complement can be interpreted variously. Therefore, we can infer this case as a kind of type coercion.

two, we can disjoint each predicate in TELIC role. The representation of the noun *kicha* (train) is as follows:

(37)

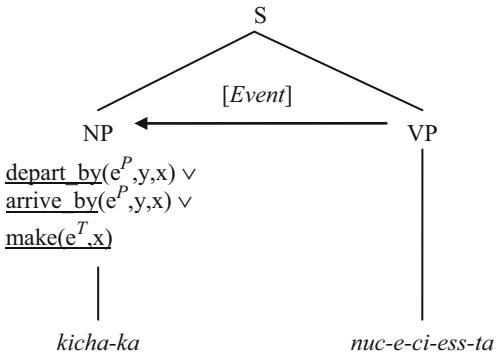
kicha (train)

ARGSTR =
- ARG_1=x : vehicle
- D_ARG_1=y: human
- D_ARG_2=z: material
- D_ARG_3=w: dimension

QUALIA =
- FORMAL=x
- CONSTITUTIVE=material_of(e^T,z,x)& dimension_of(e^T,w,x)
- TELIC=move_by(e^P,y,x) ∨
  - depart_by(e^T,y,x) ∨
  - arrive_by(e^T,y,x) ∨
  - …
- AGENTIVE=make(e^T,v,x)

When the noun *kicha* (train) is the theme argument of semi-gradable inchoatives, type coercion operates, such as in (38), and the argument must be interpreted as the event noun. That is, semi-gradable inchoatives coerce the argument NP type as the event noun. The event interpretation also results from TELIC role or AGENTIVE role depending on the context.

(38)



10.6 Conclusion

In this paper, we have analyzed three types of derived inchoative verbs and their lexico-semantic structures in Korean, based on Generative Lexicon Theory. The proposed typology and the lexico-semantic structures of derived inchoatives, the (−*e*)-*ci*-(*ta*) verbs, are just a starting point for further study of a comprehensive

class of inchoative verbs; this typology can be easily extended to the description of various kinds of other change-of-state verbs, which are related to inchoatives, such as *nem-e-ci-ta* (to fall down), *cwuk-ta* (to die), and *palk-ta* (to become brighter). The last intransitive verb, *palk-ta,* forms a class of such verbs that are identical to their original adjective forms, such as *palk-ta* (bright). But, we predict that their lexico-semantic structures are basically identical to their *verbal stem* + (*−e*)-*ci*-(*ta*) counterparts. We may be able to consider the possibility of having both the adjective meaning and the inchoative intransitive meaning in one AVM lexical representation, as done for transitive and intransitive verbs such as *break* in English by Pustejovsky (1995), although its plausibility is a different matter.

Also, this observation shows that the stem verbs of the (*−e*)-*ci*-(*ta*) class inchoatives can be classified into three groups: the gradable, the semi-gradable and the ungradable. This paper also identifies various types of change-of-state verbs in Korean with semantic structures unlike those in Pustejovsky (1995). In addition, we suggest that gradable and semi-gradable inchoatives show the generativity of the lexicon by type coercion.

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