

SEMANTICS OF KOREAN GAPLESS RELATIVE CLAUSE CONSTRUCTIONS

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East Asian languages like Korean are stocked with various types of relative clause constructions, one of which can be formed without involving any syntactic gap in the adnominal clause. Though this 'gapless' relative clause construction is very similar to a noun complement clause construction both syntactically and morphologically, the two constructions are different in many semantic respects. The most important semantic property of gapless relative clause construction is that a *cause and effect* or *effect and cause* relation always holds between the adnominal clause and the head noun. Also, there are some data suggesting that there exists an event variable in the adnominal clause of the gapless relative clause construction. It is this event variable that is bound by the head noun in place of a syntactic gap. This paper investigates various syntactic and semantic properties of Korean gapless relative clause construction and then seeks to arrive at the appropriate formulation of semantics of this construction, generalizing the formulation to ordinary relative clause constructions.

1. Introduction

This paper explores the semantic properties of gapless relative clause constructions in Korean. In East Asian languages like Chinese, Japanese and Korean,¹ gapless relative clause constructions provide a very common way of forming a clausal complex noun phrase. And these constructions reveal many syntactic and semantic idiosyncrasies differentiating themselves from ordinary relative clause constructions.

The most striking syntactic property of these constructions is that they involve no gap in the relative clause. For example, unlike in the English relatives as in (1) and in the ordinary Korean relatives as in (2), no syntactic or thematic² gap is found in the gapless relatives as in (3).

(1) [_N apple]_i [_S which John ate ____i]

(2) [_S John-i ____i mek-un] [_{NP} sakwa]_i³
 NOM eat-ADN⁴ apple
'the apple which John ate'

(3) [_S komwu-ka tha-nun] [_{NP} naymsay]
 rubber-NOM burn-ADN smell

literally: 'the smell that rubber burns' ([_S rubber burns] [_{NP} smell])

meaning: 'the smell of rubber burning'

In the ordinary relative clause constructions as in (1) and (2), a gap exists in the relative clause and it binds the relative clause and the head noun. But in the gapless relative clause constructions as in (3), no gap is found and the head noun has nothing to relate to in the relative clause. That is, the head noun of the gapless relatives does not have any explicit thematic role to play in the relation represented by the main verb of the relative clause. In (3), the relative clause 'rubber burns' modifies the head noun 'smell', but no gap position is found for the modified noun phrase to relate to, since the clause is already saturated and no more further grammatical argument is needed.

In addition to this syntactic idiosyncrasy, gapless relative clause constructions also show a puzzling semantic property: the meaning of the whole noun phrase is not mere combination of the relative clause and the head noun. That is, for (3), it is not straightforward to explain how the meaning of *komwu-ka tha-nun naymsay* ('the smell of rubber burning') comes from combination of the meaning of *komwu-ka tha* ('rubber burns') and that of *naymsay* ('smell'). This is because 'smell' does not play any thematic role in the relation represented by the main verb of the clause 'rubber burns.' Some construction-specific contribution of meaning must be identified to explain the semantic compositionality of gapless relative clause constructions.

In this paper, I attempt to solve this semantic puzzle, based on neo-Davidsonian event semantics, on the assumption that some event variable exists in the gapless relative clause to be used as a bindee. I begin with providing some arguments that gapless relative clauses are really gapless against some traditional approaches as in Kuno 1973 and also that these clauses are also distinguished from noun complement clauses in the semantic relation with the head noun. Then, the semantic properties of gapless relative clause constructions are investigated in more detail, which include various instances and evidence of eventualities. Next, the semantic representations of gapless relative clause constructions are formulated according to event semantics, with generalization extended to ordinary relative clause constructions. Finally, the implication of this analysis and further issues are considered in the conclusion.

2. Status of Gapless Relative Clause Constructions

Since it is very special that relative clause constructions can be formed without a gap, some may doubt the claim that the relative clauses as in (3) are without a gap. So, I will first show that gapless relative clauses are really gapless, comparing them with seemingly gapless adjunct gap relative clauses in order to support my claim. Then, since now gapless relative clause constructions seem to belong to noun complement clause constructions because both do not involve a gap, I will also show that gapless relative clauses are also different from noun complement clauses in many semantic properties. (See Cha 1997 and 1998 for more detailed discussions which are not listed in this section.)

2.1 Really gapless?

In the gappy Korean relative clauses, two kinds of gaps may exist: argument gap and adjunct gap. Unlike the argument gap as in (2), the adjunct gap as in (4) is not easy to locate, until the adjunct gap relative clause is compared with its source sentence (5).

(4) [_S John-i ____i sakwa-lul kkak-un] [_{NP} khal_i]
 NOM apple-ACC peel-ADN knife
 'the knife **with which** John peeled an apple'

(5) John-i **khal-lo** sakwa-lul kkak-ass-ta.
 NOM **knife-with** apple-ACC peel-PAST-DECL
 'John peeled an apple **with a knife**.'

As seen in the comparison, the head noun *khal* ('knife') plays the role of instrument in the gap position of (4). In Korean relativization, a postposition or connective just drops when the noun preceding it becomes the head noun of a relative clause. In this example, the meaning of *with* in (4) seems to have been incorporated into the meaning of the relativizer or becomes implicit; therefore, the head noun comes to play the role of an adjunct, not of an argument, in (4). This fact causes difficulty in locating the adjunct gap in the relative clause.

An adjunct gap analysis can be made when the head noun plays one of the thematic roles as listed below in the event represented by the main verb of the relative clause.

(6) A partial list of thematic roles by adjunct:⁵
 instrument, source, goal, direction, spatial location, temporal location,
 cooperation, reason, cause, topic, method, manner, part-whole relation, etc.

But, gapless relative clauses as in (3) cannot be described as involving any adjunct gap to play one of the thematic roles in (6). Here I provide three tests to determine whether a gap exists in the adnominal clause or not.

2.1.1 Resumptive pro-word

An appropriate resumptive pro-word can replace a gap in many Korean constructions involving a gap, and this can be used to check the existence of a gap in the relative clause. That is, if a gap exists in the relative clause, insertion of an appropriate resumptive pro-word should be possible without affecting the original meaning. In (4), for example, which has an adjunct gap, insertion of an instrumental pro-word like *kukes-ulo* ('with it') in the adnominal clause gives out (7), which is quite acceptable.

(7) ?[_S John-i **kukes-ulo**_i sakwa-lul kkak-un] [_{NP} khal_i]⁶
 NOM **it-with** apple-ACC peel-ADN knife
 'the knife **with which** John peeled an apple'

But, as predicted, no insertion of any resumptive pro-word is possible in the adnominal clause of the gapless relative clause construction like (3), as shown in (8).

- (8) [_S komwu-ka ??? tha-nun] [_{NP} naymsay]
 rubber-NOM burn-ADN smell
 'the smell of rubber burning'

Insertion of any pro-word in the adnominal clause of (8) will change the original meaning of the phrase in this case.⁷ Thus, this constitutes an argument that gapless relative clause constructions like (3) are really gapless.

2.1.2 Pseudo-cleft sentence

When there is a gap in the relative clause, a pseudo-cleft sentence can be formed out of the relative clause construction. So, pseudo-cleft sentences (9) and (10) are possible out of the gappy relative clause constructions (2) and (4), respectively.

- (9) [_S [_{NP} [_S John-i mek-un] kes-un] [_{VP} sakwa-i-ta.]]
 NOM eat-ADN thing-TOP apple-be-DECL
 'What John ate is an apple.'

- (10) [_S [_{NP} [_S John-i sakwa-lul kkak-un] kes-un] [_{VP} khal-i-ta.]]
 NOM apple-ACC peel-ADN thing-TOP knife-be-DECL
 'The thing with which John peeled an apple is a knife, (not other instruments).'

But, as predicted, the pseudo-cleft sentence (11) out of the gapless (3), is not acceptable, as shown:

- (11) * [_S [_{NP} [_S komwu-ka tha-nun] kes-un] [_{VP} naymsay-i-ta.]]
 rubber-NOM burn-ADN thing-TOP smell-be-DECL
 Intended: 'What comes from rubber burning is smell.'

This difference comes from the fact that the head noun of the gappy relative clause construction was a constituent of the relative clause in the gap position, whereas the head noun of the gapless relative clause construction was not because of the absence of the gap in the relative clause. Thus, this also shows that gapless relative clauses are really gapless.

2.1.3 Causativization

Causativization of the gappy relative clauses in (2) and (4) does not affect grammaticality of the constructions while causativization of the gapless relative clause in (3) does affect grammaticality. That is, causativized relative clause constructions as in (12) and (13) are grammatical, since the head noun still plays a role in its gap position. Further, the gap position is still related to the original event, not to the newly introduced 'cause' event.

- (12) [_S nay-ka John-eykey ____, mek-keyha-n] [_{NP} sakwa_i]
 I-NOM DAT eat-cause-ADN apple
 'the apple which I had John eat'

- (13) [_S nay-ka John-eykey ____, sakwa-lul kkak-keyha-n] [_{NP} khal_i]
 I-NOM DAT apple-ACC peel-cause-ADN knife
 'the knife with which I had John peel an apple'

But, causativized gapless relative clause construction as in (14) is ungrammatical, because the head noun of this construction was not a constituent of the original relative clause and therefore cannot be related to the new causativized relative clause.⁸

- (14) *_S nay-ka komwu-lul tha-keyha-n] _{NP} naymsay]
 I-NOM rubber-ACC burn-cause-ADN smell

Therefore, again, the different grammatical behavior regarding causativization of relative clauses constitutes another argument that gapless relative clauses are really gapless.

To summarize, gapless relative clause constructions behave differently from gappy relative clause constructions in at least three facts – insertion of resumptive pro-word, formation of pseudo-cleft sentence and causativization of relative clauses – showing that the constructions are really gapless.

2.2 Noun complement clause construction?

There are two reasons which tempt us to identify gapless relative clause constructions like (3), repeated as (15) below, with noun complement clause constructions like (16). As can be seen in the comparison of (15) and (16), the two constructions share at least two properties: both constructions (i) use the same adnominal morpheme *nun/un/n* to connect the head noun and the clause and (ii) involve no gap in the adnominal clause.

- (15) _S komwu-ka tha-nun] _{NP} naymsay]
 rubber-NOM burn-ADN smell
 ‘the smell of rubber burning’

- (16) _S John-i nuc-un] _{NP} sasil]
 NOM late-ADN fact
 ‘the fact that John was late’

But, there also exist many semantic differences between the two constructions. Among others, I will point out two broad facts here. In complement clause constructions, the head noun is relational and takes a clause as its argument. So, the semantics of (16), which is a complement clause construction, can be represented, as in (17).

- (17) fact(^was-late’(john’))

But, in the gapless relative clause constructions, the head noun is not relational but relates to the event of the relative clause in some unique way, controlled by some ‘situated’⁹ state of affair. The details of the representation of the relation between the head noun and the gapless clause will be given in Section 3. At the moment, I will focus on the semantic differences between the noun complement clause construction and the gapless relative clause construction, regarding the relation of the head noun and the adnominal clause.

2.2.1 Unbounded dependency

When the adnominal clause is embedded inside an attitude clause, relative clause constructions and noun complement clause constructions show different behaviors regarding the relation to the original clause. In the relative clause constructions, whether gappy like (2) or gapless like (3), the head noun is still related¹⁰ to the original adnominal clause even after insertion of an attitude clause, as shown in (18) and (19). That is, in (18), 'the apple' is still related to 'John's eating', not to 'Susie's believing'. Likewise, in (19), 'the smell' is still related to 'fish burning', not to 'Susie's believing'.

(18) [_S[_S John-i ____i mek-ess-ta-ko] Susie-ka mit-nun] [_{NP} sakwa_i]
 NOM eat-PAST-DECL-COMP NOM believe-ADN apple
 'the apple which Susie believes John ate'

(19) [_S[_S sayngsen-i tha-n-ta-ko] Susie-ka mit-nun] [_{NP} naymsay]
 fish-NOM burn-PRES-DECL-COMP NOM believe-ADN smell
 'the smell which Susie believes comes from fish burning'

On the other hand, in the noun complement clause construction, after insertion of an attitude clause, the head noun is related to the immediately preceding clause, which is the attitude clause, not to the original clause. That is, in (20), 'the fact' is not about 'John's being late' any more but now about 'Susie's believing'.

(20) Noun complement clause construction
 [_S[_S John-i nuc-ess-ta-ko] Susie-ka mit-nun] [_{NP} sasil]
 NOM late-PAST-DECL-COMP NOM believe-ADN fact
 'the fact that Susie believes that John was late.'

This means that, in the relative clause construction, some 'situated' semantic relation holds between the adnominal clause and the head noun, based on world knowledge. This 'situated' semantic relation still holds even with an intervening attitude clause. But, in the noun complement clause construction, the relation between the adnominal clause and the head noun is simply formal, the head noun being the predicate and the adnominal clause being its argument.

2.2.2 Extraction

An element cannot be extracted out of the relative clause constructions to form a super complex noun phrase, in which the extracted noun is the head noun of the outer complex noun phrase, as shown in (21) and (22). However, extraction of an element is possible from the noun complement construction, as shown in (23).

(21) *_[NP][_S[_{NP]}[_S John-i ____i ____j cwu-n] sakwa_j]-lul ney-ka mek-un] Mary_i]
 NOM give-ADN apple-ACC you-NOM eat-ADN
 Intended: 'the Mary_i who you ate an apple_j which John gave ____i ____j'

(22) *_[NP][_S[_{NP]}[_S Mary-ka ____i kwup-nun] naymsay]-lul ney-ka math-un]
 NOM grill-ADN smell-ACC you-NOM take-ADN
 sayngsen_i]
 fish

Intended: 'the fish which you smelled while Mary grilled it'

- (23) [?][_{NP}[_S[_{NP}[_S John-i ____i mek-un] sasil]-ul ney-ka pwuinha-n] sakwa_i]

 NOM eat-ADN fact-ACC you-NOM deny-ADN apple

 'the apple which you denied the fact that John ate (it)'

This can also be explained by way of differences of semantic relations between the adnominal clause and the head noun in the relative clause construction and noun complement clause construction. In the relative clause construction, extraction has much influence on grammaticality since it breaks the 'situated' semantic relation between the relative clause and the head noun. But, in the noun complement clause construction, extraction has less influence on grammaticality since there is only formal relation, not 'situated' relation, between the complement clause and the head noun.

2.2.3 Verb form

Both the relative clause construction (whether gappy or gapless) and the noun complement clause construction may have two different verb forms in the adnominal clause: short form and long form (full-fledged verb form). But the relative clause construction and the noun complement clause construction show different interpretations regarding different verb forms. In the relative clause constructions, the long form always carries 'quotative' meaning while the short form carries non-quotative, simple meaning, as shown in (24) and (25). And this contrast is rather consistent.

- (24) [_S komwu-ka tha-nun] [_{NP} naymsay] (Short form)

 rubber-NOM burn-ADN(pres) smell

 'the smell of rubber burning'
- (25) [_S komwu-ka tha-n-ta-nun] [_{NP} naymsay] (Long form)

 rubber-NOM burn-PRES-DECL-ADN smell

 'the smell that **someone says** comes from rubber burning'

On the contrary, in the noun complement clause construction, the 'quotative' meaning of the long form is not always present, as shown in (26) and (27).

- (26) [_S John-i nuc-un] [_{NP} sasil] (Short form)

 NOM late-ADN(past) fact

 'the fact that John was late'
- (27) [_S John-i nuc-ess-ta-nun] [_{NP} sasil]¹¹ (Long form)

 NOM late-PAST-DECL-ADN fact

 'the fact that John was late'

In the noun complement clause construction, the meaning difference between short and long verb forms is not structural, but rather it comes from lexical properties of the head noun. For example, some nouns like *fact*, *thought*, *belief*, etc. go without quotative meaning, but some nouns like *rumor*, *claim*, etc. inherently carry quotative meaning.

What these different ways of interpretation show is that gapless relative clause construction and noun complement construction have semantically different structures. The head noun of the gapless relative clause construction does not

have any lexical influence on the adnominal clause, while the head noun of the noun complement clause construction has its lexical force over the adnominal clause. Thus, this also provides evidence that gapless relative clause construction is semantically different from noun complement clause construction.

To summarize this section, it was shown that gapless relative clause constructions go with relative clause constructions, not with noun complement clause constructions, in that some 'situated' semantic relation holds between the adnominal clause and the head noun based on world knowledge. But still gapless relative clause constructions are unique in its syntactic and semantic behaviors, not totally conforming themselves either to ordinary relative clause constructions or to noun complement clause constructions.¹² The uniqueness of the gapless relative clause construction comes from the basic fact that there exists a special relation between the gapless relative clause and the head noun, which is *cause and effect* relation. The next section investigates details of this special semantic relation between the adnominal clause and the head noun relevant to the formulation of the semantic representation of the gapless relative clause construction.

3. Semantic investigation

3.1 Specification of head-clause relation

In addition to the syntactic idiosyncrasy that no gap is found in the adnominal clause, all gapless relative clause constructions convey some construction-specific semantic relation between the adnominal clause and the head noun. The semantic relation holds between the eventuality represented by the adnominal clause and entity represented by the head noun.

Investigations of various cases of Korean gapless relative clause constructions, based on corpora and newly created examples, show that the basic relation holding between the adnominal clause and the head noun is always CAUSE and EFFECT relation. This basic relation can be instantiated in two different ways, according to the direction of the head-clause relation, as shown below.

(28) The head-clause relation in the gapless relative clause construction

ADNOMINAL CLAUSE	HEAD NOUN
Causing eventuality	Resulting entity
Resulting eventuality	Causing entity

The direction of the head-clause relation, that is, which one is cause and which one is effect, is resolved by pragmatics based on world knowledge ('natural constraints' in situation-semantics terms). For example, for (3), repeated as (29) below, the speakers determine, based on world knowledge, that 'rubber burning' is the cause and 'smell' is the effect, not the reverse.

(29) [_S komwu-ka tha-nun] [_{NP} naymsay]
 rubber-NOM burn-ADN smell
 'the smell of rubber burning'

- (37) Kay-ka cic-nun-ta
 dog-NOM bark-PRESENT-DECL
 'A dog barks.' (stage level)

Interestingly, only the stage level sentence (37) can be relativized into the gapless relative clause construction, as contrasted in (38) and (39).

- (38) *_[S] kay-nun cic-nun] [_{NP} soli]
 dog-TOP bark-ADN(pres) sound

- (39) _[S] kay-ka cic-nun] [_{NP} soli]
 dog-NOM bark-ADN(pres) sound
 'the sound of a dog barking'

The explanation of the contrast between (38) and (39) can be sought if, following Kratzer (1995), it is assumed that individual level interpretation does not involve an event variable while stage level interpretation does, and also that, instead of gap, event variable can be bound by the head noun of gapless relative clause constructions. That is, (38), which has a relative clause with individual level interpretation, is bad because it does not involve event variable to be bound by the head noun.¹³

3.2.2 Negation

Gapless relative clauses cannot be negated, as shown in (40) and (41), and the explanation of this fact can also be sought by way of an event variable. That is, if we assume that negated sentences do not involve any event, then, the unacceptability of (40) and (41) are explained because there is no event variable to be bound by the head noun in the gapless relative clause construction.

- (40) *_[S] komwu-ka tha-ci anh-nun] [_{NP} naymsay]
 rubber-NOM burn-INF not-ADN(pres) smell
 'the smell of rubber not burning'

- (41) *_[S] achim-ul mek-ci anh-un] [_{NP} ccikkeki]
 breakfast-ACC eat-INF not-ADN(past) leftover
 'the leftover from not having a breakfast'

A pragmatic explanation of this fact can, of course, be attempted, saying that, for example, (40) is bad because there can be no smell without the event of rubber burning. But, sometimes there is a case where we need to refer to 'a smell which does not come from rubber burning (but from other sources)' which should be supported by an appropriate situation. However, (40) does not fit this kind of situation, showing that the event variable approach is better than the pragmatic approach here.

3.2.3 Multiple clauses

Multiple relative clauses are not allowed for one head noun in the gapless relative clause construction as in (42), while multiple clauses are acceptable in the gappy Korean relative clause construction as in (43). The unacceptability of (42) can also be attributed to the role of event variable of the gapless relative clause, because the cause and effect relation is usually one-to-one, not many-to-one,

unless more than two events coordinate with each other to be related to one entity. This must be the place where event binding is different from gap binding in the relative clause construction.

- (42) *_[S sayngsen-i tha-nun] [_{S komwu-ka tha-nun}] [_{NP naymsay}]
 fish-NOM burn-ADN rubber-NOM burn-ADN smell

Intended: 'the smell of rubber burning and fish burning'

- (43) ?_[S Mary-ka ___i sa-n] [_{S John-i ___i mek-un}] [_{NP sakwa_i}]
 NOM buy-ADN NOM eat-ADN apple

'the apple which John ate, which Mary bought'

So far, three arguments were provided toward the claim that an event variable is present in the gapless relative clause construction. And, this event variable was assumed to be responsible for binding of the head noun and the gapless relative clause lacking a syntactic gap. In the next section, this event variable will be shown to play a crucial role in the semantic representation of the gapless relative clause construction in order to realize the CAUSE and EFFECT relation between the gapless clause and the head noun.

4. Semantic representation

4.1 Ordinary relative clause constructions

Now, formulation of semantic representations of relative clause constructions is attempted in this section, beginning with ordinary relative clause constructions. In the ordinary relative clause constructions, the representation of semantics is quite straightforward since the head noun is coindexed with a gap position in the relative clause and the gap plays the role of bindee. So, with a lambda operator, the argument gap relative clause construction (2), repeated as (44), can be represented as (45), and the adjunct gap relative clause construction (4), repeated as (46), can be represented as (47).

- (44) [_{S John-i ___i mek-un}] [_{NP sakwa_i}]
 NOM eat-ADN apple

'the apple which John ate'

- (45) $\lambda x[\text{'apple'}(x) \ \& \ \text{'ate'}(\text{John}', x)]$

- (46) [_{S John-i ___i sakwa-lul kkak-un}] [_{NP khal_i}]
 NOM apple-ACC peel-ADN knife

'the knife **with which** John peeled an apple'

- (47) $\lambda x \exists y[\text{'knife'}(x) \ \& \ \text{'apple'}(y) \ \& \ \text{'peeled'}(\text{John}', y, x)]$

The fact that 'apple' is the theme of 'eating' in (45) and 'knife' is the instrument of 'peeling' in (47) can be decided by lexical properties and world knowledge related to the relative clause verb.

4.2 Gapless relative clause constructions

As mentioned already, the semantics of gapless relative clause constructions cannot be formulated based on the binding function of gap, since these construc-

tions are really gapless, as discussed in 2.1. But fortunately, evidence was provided in 3.2 that an event variable may exist in the gapless relative clause constructions, so that it can be bound by the head noun. So, the event variable can be used instead of gap in formulating semantic representations of gapless relative clause constructions. Now, using event semantics along the line of Parsons (1985), the semantics of the gapless relative clause construction (3), repeated as (48), can be represented tentatively as in (49).

(48) [_S komwu-ka tha-nun] [_{NP} naymsay]
 rubber-NOM burn-ADN smell
 'the smell of rubber burning'

(49) $\lambda x \exists y \exists e [\text{smell}'(x) \ \& \ (\text{burning}'(e) \ \& \ \text{Theme}(e,y) \ \& \ \text{rubber}'(y))]$

But, something is missing in (49). The construction-specific semantic relation in (48) between the 'burning' event of the gapless relative clause and the head noun 'smell' is not reflected at all in (49). That is, some instance of cause and effect relation between 'rubber burning' and 'smell' should be added to (49) in some way.

Similar to basic 'natural constraints' to which intelligent systems like human beings are naturally attuned (Barwise and Perry (1981)),¹⁴ some 'situated' constraint holds between the content of adnominal clause and the content of the head noun in the gapless relative clause construction. In order to implement this, some pragmatic constraint, supported by world knowledge, can be employed in the representation of the semantics of gapless relative clause constructions.

For this purpose, the method used in the formulation of English possessive relation (Hwang 1987: 204-207) can be adopted. In this approach, *John's book*, for example, will be represented as in (50), and, according to the context, *R* can be interpreted as 'possession,' 'authorship,' 'publication,' etc.

(50) $\lambda x [R(\text{John}, x) \ \& \ \text{book}(x)]$

Now, utilizing the system employed in (50), (49) can be revised to give out the desired result as in (51).

(51) $\lambda x \exists y \exists e [\text{smell}'(x) \ \& \ (\text{burning}'(e) \ \& \ \text{Theme}(e,y) \ \& \ \text{rubber}'(y)) \ \& \ P(e,x)]$

In (51), *P* is a special predicate which takes two arguments, eventuality and entity, and renders a semantic relation between the adnominal clause and the head noun, as specified in 3.1. So in (51), *P* indicates some instance of cause and effect relation, instantiating 'rubber burning' as causing eventuality and 'smell' as resulting entity. The relation *P* here is slightly different from *R* of possessive relation in (50), because *P* is determined both semantically and pragmatically in that it reflects not only the gapless relative clause construction-specific CAUSE and EFFECT relation but also world knowledge that will decide the direction of the head-clause relation. Other gapless relative clause constructions as in (31-35) can also be represented in the same way with this semantic and pragmatic relation *P*.

4.3 Generalization

But then, the remaining question is how to map a gapless relative clause construction like (3) to the interpretation in the form of (51), not in the form of (45) or (47). In surface forms, both ordinary relative clause constructions and gapless relative clause constructions have the same syntactic structure except for the existence of gap.

One way to get out of this difficulty is to propose that the semantics of all the relative clause constructions, whether gappy or gapless, be represented in the form of (51), which was originally for gapless relative clause constructions. Under this assumption, (45) and (47) will be newly represented as (52) and (53), respectively, based on event semantics and the special predicate *P*.

(52) $\lambda x \exists e [\text{apple}'(x) \ \& \ (\text{eating}'(e) \ \& \ \text{Agent}(\text{John}',e) \ \& \ \text{Patient}(x,e)) \ \& \ P(e,x)]$

(53) $\lambda x \exists y \exists e [\text{knife}'(x) \ \& \ \text{apple}'(y) \ \& \ (\text{peeling}(e) \ \& \ \text{Agent}(\text{John}',e) \ \& \ \text{Patient}(y,e) \ \& \ \text{Instrument}(x,e)) \ \& \ P(e,x)]$

Now, we have a unified way of semantic representations for both ordinary relative clause constructions and gapless relative clause constructions. The only difference is that for ordinary relative clause constructions, *P* is rather vacuous and it does not carry any construction-specific semantic relation between the relative clause and the head noun. Thus, it is postulated that, in the ordinary relative clause constructions where a gap exists and plays the role of bindee, semantic representations with the special predicate *P* are equivalent to those without *P*. That is, (52) and (53) above are equivalent to (54) and (55), respectively, which are without the special predicate *P*.

(54) $\lambda x \exists e [\text{apple}'(x) \ \& \ (\text{eating}'(e) \ \& \ \text{Agent}(\text{John}',e) \ \& \ \text{Patient}(x,e))]$

(55) $\lambda x \exists y \exists e [\text{knife}'(x) \ \& \ \text{apple}'(y) \ \& \ (\text{peeling}(e) \ \& \ \text{Agent}(\text{John}',e) \ \& \ \text{Patient}(y,e) \ \& \ \text{Instrument}(x,e))]$

5. Conclusion

So far I have explored the properties of Korean gapless relative clause constructions and provided semantics for them, based on event-based semantics advocated by neo-Davidsonian scholars. The event-based semantic analysis was made possible since evidence was found that event variable exists in the relative clause of gapless relative clause constructions. Though gapless relative clause constructions exhibit some syntactic and semantic idiosyncrasies, a unified analysis of ordinary and gapless relative clause constructions were possible under the assumption that sentences are treated as predicates of eventualities and event variables can be bound by the head noun and the adnominal clause in the absence of the syntactic gap. One remaining problem is, the semantics of gapless relative clause constructions as represented in (51) does not reflect all the mixed properties coming from both ordinary relative clause constructions and noun complement clause constructions, as seen in the section 2 of this paper. And this can be a future topic for more fine-grained semantics of gapless relative clause constructions.

NOTES

¹ Studies of various Japanese gapless relative clause constructions can be found in the literature like Kuno 1973, Sirai and Gunji 1998 and Matsumoto 1991. Chinese informants also confirmed to me that they also have gapless relative clause constructions which show very similar properties and behaviors as Korean constructions.

² Some literature like Kuno 1973 argues that some sort of gap, like topic gap, exists in the gapless relative clause. But recent literature like Matsumoto 1991 and Yoon 1993 provides many counterexamples by which the topic gap approach cannot be supported.

³ Korean is a head-final language and thus the modified head noun always goes AFTER the modifying clause. Also, in Korean, the relative clause modifies NP rather than N', since determiners and adjectives can intervene between the relative clause and the head noun.

⁴ Since Korean is an agglutinative language, the role of suffixes is very important in understanding the structure of the language. The following abbreviations are used throughout the paper. As shown below, adnominal suffixes carry tense meaning with them, and thereby can be classified according to the tense of the clause. But, for simplicity, I will use the underspecified notation **ADN** (adnominal suffix) in this paper, unless the specification of the tense is required.

ADN(pres): present tense adnominal suffix, realized as *nun*

ADN(past): past tense adnominal suffix, realized as *un* after consonants or *n* after vowels

ADN(fut): future tense adnominal suffix, realized as *ul* after consonants or *l* after vowels

NOM: nominative case marker

ACC: accusative case marker

TOP: topic marker, realized as *nun*, a homonym of **ADN(pres)** *nun*

DECL: declarative sentence ending

⁵ Possible kinds of thematic roles here are based on a fine-grained version of theory of thematic roles as exemplified in Jackendoff 1990.

⁶ A little degradation of acceptability here appears to come from the redundancy of relevant information. However, in the unbounded dependency constructions like (i), the acceptability improves a lot.

(i) [_S[_SJohn-i **kukes-ulo**, sakwa-lul kkak-ass-ta-ko] Mary-ka cinswulha-n]
 NOM **it-with** apple-ACC peel-PAST-DECL-COMPL NOM state-ADN
 [_{NP} khal_i]
 knife

'the knife with which, Mary stated, John peeled an apple'

⁷ One way of putting something in the adnominal clause of (8), keeping the original meaning, will be like this, as adopted in Park 1993:

- (i) [?][_S komwu-ka [_S ____i **naymyense**] tha-nun] [_{NP} naymsay_i]
 rubber-NOM causing burn-ADN smell

But, this is not insertion of a pro-word any more because a verbal element like *naymyense* ('causing') is involved, creating a rather different structure with an embedded clause inside the adnominal clause, as shown above. The difference of the structure is also shown by the fact that, unlike in the case of a noun plus postposition (see the example (4) above), the verbal element *naymyense* ('causing') following the gap does not disappear after relativization.

⁸ A possible interpretation of (14) is 'the smell with which I caused the rubber to burn' in some weird context as in a science fiction. But, in this case, the 'smell' is not related to the original event 'burn' any longer, but rather, related to the newly introduced 'cause' event.

⁹ I use the term 'situated' as follows. A relation or state of affair is 'situated' if it holds only when it is supported by appropriate world knowledge. On the contrary, a relation is just 'formal' if it holds regardless of world knowledge, that is, if it is mechanical rather than based on world knowledge. For example, the relation between the noun complement clause and the head noun is NOT 'situated', because the head noun can take any saturated clause as its argument only if its lexical requirements are fulfilled regardless of the content of the clause.

¹⁰ By 'related', I mean how the head noun gets its interpretation. In the ordinary relative clause construction, the head noun gets its interpretation by playing a role in the relative clause. In the gapless relative clause construction, the head noun gets its interpretation by constructing a *cause and effect* or *effect and cause* relation between the head noun and the clause. And finally, in the noun complement clause construction, the head noun gets its interpretation by taking a clause as its argument.

¹¹ Some native speakers of Korean may have two interpretations of this expression: quotative and non-quotative. Then, they may consider the following examples instead, which do not carry any quotative meaning at all.

- (i) [John-i o-n-ta-nun] sayngkak 'the thought that John will come'
 come thought
- (ii) [John-i o-n-ta-nun] mitum 'the belief that John will come'
 come belief

¹² According to Keenan and Comrie 1977's typology, most relative clause constructions in the world languages can be defined by semantic terms, not by syntactic terms. In Korean gapless relative clause construction, *semantic* properties are shared with those of ordinary relative clause construction, not with those of noun complement clause construction, as investigated so far. This is the reason why I call this special gapless construction as a 'relative' construction, not as a 'complement' construction.

¹³ When the topic marker replaces the subject marker in the ordinary relative constructions like (2), the result is quite acceptable, as shown in (i) below, unlike in the gapless relative clause constructions.

(i) ?[_S John-**un** _____i mek-un] [_{NP} sakwa_i]
 TOP eat-ADN apple

‘the apple which John ate, (though no other person ate)’

The acceptability of (i) seems to be due to the syntactic gap of the ordinary relative clause which still can bind the head noun and the adnominal clause without the help of an event variable.

¹⁴ Here are two examples of ‘natural constraints’, which approximately say: (i) if **a** kisses **b**, **a** necessarily touches **b**; (ii) if rubber burns, it must be the case that smell arises naturally. These are ‘natural constraints’ because they are part of natural and physical phenomena in our world.

(i) If $\sigma_i(\text{kiss}, \mathbf{a}, \mathbf{b}) = 1$ then $\sigma_i(\text{touch}, \mathbf{a}, \mathbf{b}) = 1$

(ii) If $\sigma_i(\text{burn}, \text{rubber}) = 1$ then $\sigma_i(\text{exists}, \text{smell}) = 1$

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