EVENT-STRUCTURE AND THE INTERNALLY-HEADED RELATIVE CLAUSE
CONSTRUCTION IN KOREAN AND JAPANESE

A Dissertation Presented

by

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John Donne, a famous English metaphysical poet, once wrote, “No man is an Island.” Although I think the context in which he wrote this sentence had little to do with dissertation-writing, I feel that the sentence, in fact, quite accurately captures my present feelings. Writing this dissertation has been a long and lonely process, but I never felt totally isolated because I was always connected to other islands. Indeed, without the access to the brilliant minds around me, the love and support from my family and friends, I wouldn’t have been able to get through the process.

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ABSTRACT

EVENT-STRUCTURE AND THE INTERNALLY-HEADED RELATIVE CLAUSE CONSTRUCTION IN KOREAN AND JAPANESE

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This dissertation investigates how syntactic, semantic, and pragmatic factors interact to produce the Internally-Headed Relative Clause (IHRC) construction in Korean and Japanese.

The IHRC construction differs from the more familiar Externally-Headed Relative Clause (EHRC) construction in several ways. First, unlike an EHRC, an IHRC’s content restricts the matrix clause’s content, rather than the semantic head’s. Second, its interpretation is heavily influenced by the discourse context in ways not seen with the EHRC. Third, unlike the head of an EHRC, the head of an IHRC does not correspond to any overt syntactic phrase, so it needs to be determined by language users, based on the relative clause’s content, the matrix predicate’s semantics, and the discourse context.

The literature offers numerous insightful analyses of the IHRC construction, but it leaves two central questions unanswered: what determines the interpretation of the
construction? And, if pragmatic principles have a role to play, how do they interact with the morphosyntax and the semantics?

I answer these questions within an event semantics framework. I show that the construction’s interpretation is determined partly by grammatical factors (e.g., the embedded clause’s aspect, the matrix predicate’s semantics) and partly by pragmatic factors (e.g., the discourse context and discourse participants’ world knowledge). In particular, I isolate two sources of the semantic variability of the construction.

First, the matrix clause contains a pronominal definite description, whose denotation contains a free relation variable. This variable’s value is determined by the embedded clause’s event structure, the matrix predicate’s semantics, and the discourse context. Second, the relative operator that occurs in this construction connects the embedded clause’s content with the matrix clause’s content by establishing either a temporal or a causal relation between them, depending on whether the embedded clause describes a temporary state or a permanent state.

This study establishes important connections between the semantics of a definite description and event structure, thereby solving the particularly challenging formal-linking problem, one that afflicts existing E-type pronoun analyses. It also provides a constrained but flexible interpretive mechanism for the construction, eliminating the need for many of the extra-grammatical constraints that characterize existing treatments.
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CHAPTER 1
INTRODUCTION

1.1. Introduction

In recent linguistics literature, one of the most important topics of inquiry has been: how do different modules of grammar interact with each other in deriving the meaning of a sentence? The present study attempts to answer this question by investigating the interplay between morphosyntax, semantics, and pragmatics in interpreting what is often called the Internally-Headed Relative Clause (henceforth IHRC) construction in Korean and Japanese. The IHRC construction is illustrated in (1) and (2).

(1) The IHRC construction in Korean:

Jinho-nun [[totwuk- TOMANGKA-N]-un kes]-ul capassta.
J.-top [[thief-nom run.away-imprf]-rel kes]-acc caught.
‘A/the thief was running away and Jinho caught him.’

(2) The IHRC construction in Japanese:

Taroo-wa [[doroboo-ga nige-ru]-∅]-o tukamaeta.
T.-top [[thief-nom run.away-imprf]-rel-no]-acc caught.
‘A/the thief was running away and Taroo caught him.’

1 For the transcription of the Korean data presented in this study, Yale Romanization is adopted.
The IHRC construction has two notable formal features. First, the semantic head of an IHRC occurs **internal** to the relative clause, whereas the head noun of a more familiar Externally Headed Relative Clause (EHRC) appears **external** to it. Hence, unlike an EHRC, an IHRC does not contain a gap which is co-indexed with the head noun. To illustrate the differences between the two types of relative clauses, compare (1-2) and (3-4). (In these examples, the semantic head of the relative clause is highlighted and ‘e’ indicates a gap and a roman subscript indicates co-indexation.)

(3) **The EHRC construction in Korean:**

Jinho-nun [[
\[ e_i \]
tomangka-n]-un [\[ toiwuk_i \]-ul] capasssta.

J.-top [[ __ run.away-imprf]-rel [\[ thief \]-acc] caught.

‘Jinho caught a/the thief who was running away.’

(4) **The EHRC construction in Japanese:**

Taroo-wa [[
\[ e_i \]
nige-ru]-∅ [\[ doroboo_i \]-o] tukamaeta.

T.-top [[ __ run.away-imprf]-rel [\[ thief \]-acc] caught.

‘Taroo caught a/the thief who was running away.’

Another notable feature of the IHRC construction is that the relative clause is always followed by a grammatical element, i.e., *kes* in Korean, and *no* in Japanese, whose exact
morphosyntactic status is rather controversial.² (For this reason, throughout this study, I gloss them as kes and no.)

Ever since Yuki Kuroda’s seminal work in the mid seventies (Kuroda 1975-76, 1976-77, republished in Kuroda 1992), the IHRC construction has received considerable attention in the literature.³ The existing analyses show that the IHRC construction differs from the EHRC construction both syntactically and semantically. For instance, the IHRC construction behaves differently from the EHRC with respect to weak crossover effects (see, among others, Ito 1986, Watanabe 1992, and Jung 1995). In addition, the content of an IHRC does not restrict the content of its semantic head noun; rather, it restricts the content of the clause within which it is embedded (see Kuroda 1976-77, 1992, Hoshi 1995, Jung 1995, C. Kitagawa 1996, Shimoyama 1999). Furthermore, the interpretation of a sentence instantiating the IHRC construction is determined by pragmatic factors such as the discourse context and the discourse participants’ knowledge of the world (see Kuroda 1976-77, 1992).

In the literature, various proposals have been made to account for the syntactic and semantic differences between the IHRC and the EHRC constructions (e.g., Ito 1986, Watanabe 1992, Jung 1995, Hoshi 1995, C. Kitagawa 1996, Chung and Kim 2003). In addition, attempts have been made to offer a formal semantic analysis of the IHRC construction and thereby derive the interpretation of the construction in a compositional manner (e.g., Hoshi 1995, Fuji 1998, Shimoyama 1999).

² As will be discussed in Chapter 5, there are three competing analyses of these morphemes: (i) the nominalizer analysis (e.g., N. Kim 1984; Kuroda 1976-77); (ii) the complimentizer analysis (e.g., Jhang 1994; Hoshi 1995); and (iii) the pronoun analysis (B. Yang 1993, M. Kim 2002b, Chung and Kim 2003).

The existing analyses have resolved many of the challenges posed by the IHRC construction. But there are at least two remaining questions. One is: why do pragmatic factors play an important role in interpreting the IHRC construction? The other is: what determines the interpretation of the construction—for instance, what is the balance between grammatical and pragmatic factors?

In this study, I aim to provide answers to these questions by offering an event-based semantic analysis of the IHRC construction. In answer to the first question, I argue that the discourse sensitivity of the construction comes from two factors: (i) the presence of an anaphoric element in the clause embedding an IHRC and (ii) the semantics of the relative operator that occurs in the construction. In answer to the second question, I establish that the interpretation of the IHRC construction is determined jointly by grammatical factors such as aspect and lexical semantics, and pragmatic factors such as the discourse context and the discourse participants’ world knowledge.\(^4\)

In the remainder of this chapter, I first introduce some of the defining characteristics of the IHRC construction, addressing the problems and the challenges posed by these properties. I then outline the analysis I will put forward in this study and its basic theoretical assumptions. I close the chapter with a brief mention of the organization of the study.

Before proceeding, a few remarks on the terminology are in order:

\(^4\) Stump (1985) also investigates the contribution of pragmatic factors such as language users’ inferences in interpreting the absolute construction in English, which is illustrated in (i) and (ii). (Here, the absolutes are highlighted.)

(i) **Walking home**, he found a dollar.
(ii) **His father being a sailor**, John knows all about boats.  

(Stump 1985: 1, (1a) and (1b), respectively)

As we shall see in Chapters 4 and 7, there are several striking parallels between the IHRC construction and the absolute construction.
• The semantic head of an IHRC will be called the internal head and the semantic head of an EHRC the external head.

• The gapless clause that occurs preceding the relative marker, i.e., –un in Korean and the zero morpheme (∅) in Japanese, will be called the embedded clause and the predicate of this clause the embedded predicate.

• The combination of the embedded clause and the relative marker will be referred to as an IHRC.

• Finally, the term matrix clause will be used in reference to the clause that embeds the IHRC+kes/no string and the term matrix predicate in reference to its predicate.

1.2. Basic properties of the IHRC construction

In this section, I present four basic properties of the IHRC construction that are well known in the literature. Of the four properties, the first two pertain to the internal head and the other two pertain to the IHRC. We begin with the properties that pertain to the internal head.

1.2.1. Properties of the internal head

1.2.1.1. Duality

One of the most notable properties of an internal head is that it plays a dual role in the sentence in which it occurs (Hoshi 1995, Shimoyama 1999, Y. Kim 2002). Unlike an external head, an internal head is buried inside the relative clause, but it is interpreted in such a way that it seems to serve not only as an argument of the embedded predicate but
also as an argument of the matrix predicate. To illustrate, consider (1b). In this sentence, the noun phrase *totwuk* ‘thief’ plays the role of the embedded subject, but it also seems to be interpreted as the object of the matrix verb *cap*- ‘catch’, for our intuitions tell us that what Jinho caught was the thief.

1.2.1.2. Indeterminacy

The other notable property of the internal head is that it is intrinsically “indeterminate.” That is, it can vary depending on the discourse context and the matrix predicate’s semantics (Kuroda 1976-77; 1992, Watanabe 1992, 2003, Hoshi 1995: 148, M. Kim 2004a, 2004c). According to Kuroda (1976; 1992), this variability arises because, unlike an external head, an internal head is not morphologically marked.

To illustrate how the internal head is affected by the discourse context, consider a Japanese sentence given in (5).

(5) Taroo-wa [[nek-o ga] nezumi-o oikake-tei-ta]-∅-no]-o
    T.-top [[cat-nom mouse-acc chase-imprf-past]-rel-no]-acc
    tukamaeta.
    caught.

Reading 1: ‘A/the cat was chasing a/the mouse and Taroo caught the cat.’
Reading 2: ‘A/the cat was chasing a/the mouse and Taroo caught the mouse.’
Reading 3: ‘A/the cat was chasing a/the mouse and Taroo caught the cat and the mouse.’
What is remarkable about sentence (5) is that it can receive as many as three readings, as the English translations suggest. In a neutral context, the internal head is most likely to be construed as the cat, because it is the protagonist of the event described by the embedded clause. But, if the context is set up in such a way that the focus is on the mouse, then the internal head can also be construed as the mouse. Furthermore, if both the cat and the mouse are salient in the discourse, then the sentence receives the reading where Taroo caught both the cat and the mouse. The availability of this reading is evidenced by the fact that the floated quantifier *hutaritomo* ‘both’ can occur in the matrix clause referring to both the cat and the mouse, as shown in (6).

(6) Taroo-wa [[neko-[ga nezumi-[o oikake-tei-ta]-Ø]-no]-o
T.-top [[cat-[nom mouse-[acc chase-imprf-past]-rel]-no]-acc
hutaritoi+-mo tukamaeta.
two-also caught.
‘A/the cat was chasing a/the mouse and Taroo caught them both.’

We obtain an identical pattern with the Korean IHRC construction, as the ambiguity of (7) shows (Jhang 1994, Chung and Kim 2003).
Again, the availability of the plural entity reading is confirmed by the optional occurrence of the floated quantifier *twul* *ta* ‘both’ in the matrix clause in reference to the cat and the mouse, as shown in (8).

(8) Jinho-nun  

[[koyangi-ka  

[cat-nom  

[coch-ko  

iss-n]-un  

J.-top  

[cat-nom  

[coch-ko  

iss-n]-un  

kes]-ul  

capessta.  

twul  
	ta]-j  

capassta.  

two  

capplied  

catcher.  

‘A/the cat was chasing a/the mouse and Jinho caught them both.’

To see how the matrix predicate’s semantics affects the internal head of a relative clause, consider the following Korean sentences:
(9) Jinho-nun [[ai-ka kwukswu-lul salm-ko iss-n]-un
J.-top [[child-nom noodles-acc boil-comp cop-imprf]-rel
kes]-ul mek-ess-ta.
kes]-acc eat-pst-decl.

‘A child was boiling noodles and Jinho ate them (= the noodles).’

(10) Jinho-nun [[ai-ka kwukswu-lul salm-ko iss-n]-un
J.-top [[child-nom noodles-acc boil-comp cop-imprf]-rel
kes]-ul kancilephi-ess-ta.
kes]-acc tickle-pst-decl.

‘A child was boiling noodles and Jinho tickled him/her (= the child).’

In (9) and (10), an identical string of words occurs in the object position. Furthermore, just like (8) above, the embedded clauses of these sentences contain two potential semantic head nouns, namely, ai ‘child’ and kwukswu ‘noodles’. Even so, the two sentences receive different readings. The only possible reading for (9) is the one where the internal head is construed as kwukswu; the internal head is unlikely to be construed as the noun phrase ai, because it is highly unlikely that John ate the child. But, in (10), the opposite picture emerges. Here, the internal head is most likely to be construed as ai, because it will be pragmatically anomalous to tickle noodles.

Consider now (11) in comparison with (9) and (10).

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5 See also Kuroda 1992: 154 for a similar observation.
In this sentence, the internal head can be construed either as the child or as the noodles. In addition, it can even be construed as referring to the event of the child boiling noodles. This three-way ambiguity arises because, unlike the matrix verbs of (9) and (10), the matrix verb of (8) is a direct perception verb and hence it can select for any noun phrase that refers an individual, be it a human, a non-human, or an eventuality (i.e., an event or a state).

1.2.2. Properties of the IHRC

1.2.2.1. Interaction with the matrix clause’s content

One of the most well-known semantic properties of an IHRC is that, unlike an EHRC, it does not restrict the denotation of the head noun (Kuroda 1976-77; 1992: 174, C. Kitagawa 1996, Shimoyama 1999, Y. Kim 2002). To illustrate, compare (12) and (13), which contain an EHRC and an IHRC, respectively.
In (12), the content of the EHRC restricts the content of the head noun `totwuk` ‘thief’. This is because combining the denotations of the relative clause and its head noun amounts to intersecting the set of individuals that have the property of running away and the set of individuals that have the property of being a thief. Hence, the sentence will be felicitous even if it is uttered in a context where there were ten thieves running away and John caught only three of them. Sentence (13) will be false in such a context, however; this sentence will be felicitous only if there were exactly three thieves running away and John caught all of them.

Given the contrast between (12) and (13), it seems that the semantics of the IHRC does not interact with the denotation of the internal head or that the former does not
restrict the latter, to say the least. If this is indeed the case, what then is the semantic
collection of an IHRC to the sentence in which it occurs?

It has been shown by several authors that the content of an IHRC interacts with
that of the matrix clause (e.g., Kuroda 1975-6; 1992: 152-174, Fuji 1998, Shimoyama
1999, C. Kitagawa 2003, Y. Kim 2002). More specifically, its content restricts the
eventuality described by the matrix clause as if it were a modifier of the matrix clause. To
see this, consider (14).

(14) Jinho-nun [[sayngsen-i tel ik-∅-un kes]-ul mekessta.
    J-top [[fish-nom yet cook-prf-rel kes]-acc ate.

   ‘Jinho ate the fish when it was not (fully) cooked yet.’

In this sentence, the IHRC’s content specifies the time of the event described by the
matrix clause, as the English translation suggests. Hence, the sentence will be judged
false if the fish was fully cooked at the time when Jinho ate it.

It is important to note that the corresponding EHRC sentence, which is given in
(15), can be true in such a context.

(15) Jinho-nun [e₁ tel ik-∅-un sayngsen₁]-ul mekessta.
    J-top [___ yet cook-prf-rel fish]-acc ate.

   ‘Jinho ate the fish which was not (fully) cooked yet.’
Suppose that this sentence was uttered in the following context: Yesterday Jinho’s mother
made some fish dish for dinner but she made it slightly uncooked. Today Jinho wanted to
eat the leftover of the fish, but he ate it only after he cooked it fully, because he cannot
eat anything unless it is well-done. When uttered in this context, (15) can be judged
felicitous.

Given that an IHRC is non-restrictive with respect to the denotation of its head
noun, one might suspect that an IHRC has the same semantics as a non-restrictive (or
appositive) relative clause (RC), which is illustrated in (16).

(16) Jinho-nun \[\langle e_i \text{ tomangka-n}-\text{un } \text{Mila}_i\rangle\text{-lul capassta.}\]

J.-top \[\langle \underline{\text{run.away-imprf}}\rangle\text{-rel } \text{M.}\text{-acc caught.}\]

‘Jinho caught Mila, who was running away.’

In fact, several authors have suggested that IHRCs should be treated as a kind of non-
restrictive RC (e.g., Jung 1995, Y. Kim 2002 for Korean; Fuji 1998, C. Kitagawa 2003
for Japanese).\(^6\) There are, however, several important semantic differences between the
two types of RCs.

First, while the content of a non-restrictive RC is more or less independent of the
content of the matrix clause (see, for example, Ross 1967, Emonds 1979, Stump 1985),
the content of an IHRC bears a “tighter” relation to the content of the matrix clause, to
put it in Yuki Kuroda’s terms.

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\(^6\) Kuroda (1976-77, 1992) and Shimoyama (1999, 2002) also draw parallels between IHRCs and non-
restrictive relative clauses. But they caution that the two types of relative clauses do not have an exactly
identical semantics and hence cannot be treated in a uniform way.
To illustrate, compare (17) and (18), which contain an IHRC and an appositive clause, respectively.

(17) Jinho-nun [[Mila-ka Sangho-wa ssawu-∅]-n kes]-ul

J.-top [[M.-nom S.-comt fight-prf]-rel kes]-acc

yatanchiessta.

scolded.

‘Mila fought with Sangho and Jinho scolded her for that.’

(18) Jinho-nun [[e_i Sangho-wa ssawu-∅]-n Milai]-lul yatanchiessta.

J.-top [[__ S.-comt fight-prf]-rel M.]-acc scolded.

‘Jinho scolded Mila, who had fought with Sangho.’

In (17), the content of the embedded clause specifies the reason for the occurrence of the matrix event, as indicated by the English translation. Hence, the sentence will be judged infelicitous if Jinho scolded Mila for a reason different from her having fought with Sangho, say, for her not having done her homework yet. To verify this, consider (19). This sentence shows that adding a linguistic expression that conveys the information that the content of the embedded clause is not the reason for Jinho scolding Mila makes sentence (17) infelicitous. 7 (Here, the symbol ‘#’ indicates semantic or pragmatic anomaly.)

7 But sentence (19) can be judged acceptable, if the aspect of the embedded clause changes from the perfect to the imperfective, as the grammaticality of (i) shows.
In contrast, sentence (18) can be true even if the embedded clause’s content does not provide the reason for Jinho scolding Mila. Hence, the sentence can still be judged felicitous even if we add some linguistic expression that conveys the information that Jinho scolded Mila for a reason different from her having fought with Sangho, as shown in (20).

\[
\text{(19) } \text{Jinho-nun} \quad [[\text{Mila-ka} \quad \text{Sangho-wa} \quad \text{ssawu-∅}-n \quad \text{kes}-ul} \\
\text{J.-top} \quad [[\text{M.-nom} \quad \text{S.-comt} \quad \text{fight-prf}\text{-rel} \quad \text{kes}-\text{acc}} \\
\text{swukcey-lul} \quad \text{an} \quad \text{ha-ess-ta-ko} \quad \text{yatanchi-ess-ta}. \\
\text{homework-acc} \quad \text{neg} \quad \text{do-pst-decl-comp} \quad \text{scold-pst-decl.}
\]

Intended: ‘Mila fought with Sangho and Jinho scolded her because she didn’t do her homework.’

In Chapter 4, I show that the aspect of the embedded clause plays an important role in interpreting a sentence instantiating the IHRC construction and determining its grammaticality or acceptability.
Another difference between the IHRC construction and the restrictive RC construction concerns a temporal restriction on the embedded clause. Descriptively speaking, while the time of the embedded clause of the IHRC construction cannot be different from the time of the matrix clause, as shown in (21), there is no such restriction on the time of the embedded clause of the restrictive RC construction, as shown in (22). (Here, the symbol ‘*’ indicates ungrammaticality.)

(21)  *John-un  onul  [Mila-ka  cangcha  casin-uy  anay-ka
      J.-top  today  [M.-nom  later  self-gen  wife-nom
      toy]-l  kes-wa  kil-ese  macwuchiessta.
      become]-rel.future  kes-comt  street-loc  encountered.

      Intended: ‘Mila was to become John’s wife later and today John ran across her on the street.’
Today John ran across Mila on the street, who was to become his wife later.

Notice that (21) becomes grammatical, if the time of the embedded clause becomes identical to that of the matrix clause, as shown in (23).

Today Mila was coming out of a store and John ran across her.

Needless to say, a sentence with the corresponding non-restrictive EHRC is grammatical, as shown in (24).

Today John ran across Mila, who was coming out of a store.
Taken together, these facts lead us to conclude that IHRCs cannot be analyzed as appositive RCs.

1.2.2.2. Semantic variability relative to the matrix clause’s content

Another well-known property of the IHRC is that it can receive different interpretations relative to the matrix clause’s content depending on various factors such as the discourse context and the matrix predicate’s semantics.

To illustrate, consider sentences (25-27): these sentences show that an IHRC can receive more than one interpretation, as indicated by the possible relations inside the parentheses. Take (25) for example. In this sentence, the IHRC can be interpreted as bearing a temporal relation to the content of the matrix clause, but it can also be interpreted as bearing a causal relation as well, because we can parse the sentence to mean something like ‘John comforted a/the child, because she was crying.’

(25) **circumstance (or causation):**

Jinho-nun     [[ai-ka wul-n]-un kes]-ul tallay-ess-ta.
‘Jinho comforted a/the child while she (= the child) was crying.’
(26) temporal precedence (or causation):
Jinho-nun [[Mila-ka swul-ul mantul-∅]-un kes]-ul
J.-top [[M.-nom alchol-acc make-prf]-rel kes]-acc
mas-po-ess-ta.
taste-try-pst-decl.
‘Mila made alcohol and then Jinho tasted it.’

(27) concession (or temporal precedence):
Jinho-nun [[Mila-ka twu tal cen-ey chayk-ul
J.-top [[M.-nom two month ago-loc book-acc
ponay-∅]-n kes]-ul onul(-ey-ya) pat-ess-ta.
send-prf]-rel kes]-acc today(-loc-foc) receive-pst-decl.
‘Although Mila sent a book two months ago, Jinho received it (only) today.’

The potential ambiguity of the above sentences suggests that the semantic relation between an IHRC and the matrix clause is intrinsically indeterminate (just like the internal head of a relative clause) and hence needs to be determined by the discourse participants, on the basis of the semantics of the matrix predicate, the discourse context, and their knowledge of the world.8

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8 As observed by authors like Kuroda (1976-77, 1992), Shimoyama (2002: 123-4, fn. 29), and Y. Kim (2002), this semantic variability of the IHRC construction is reminiscent of that of the free adjunct (or absolute) construction in English: Stump (1985) has shown that the relation between a free adjunct and the matrix clause (the superordinate clause in his terminology) can vary depending on the discourse context and hence a string-identical sentence can receive more than one interpretation. To see this, consider the following examples. (In these examples, the semantic relation inside parentheses is intended to be a less prominent relation in a neutral context.)
1.2.3. Summary of the basic properties of the IHRC construction

In the preceding two subsections, I have outlined some of the defining properties of the IHRC construction that are relatively well-documented in the literature. These properties are summarized as follows:

(28) **Basic properties of the IHRC construction:**

(i) The internal head plays a dual role in the structure: it serves as an argument of the embedded predicate and also as an argument of the matrix predicate.

(ii) The internal head is indeterminate: it can vary depending on various factors such as the discourse context and the matrix predicate’s semantics.

(iii) The content of the IHRC restricts the content of the matrix clause, rather than that of the semantic head, as if it were a modifier of the matrix clause.

(iv) The IHRC can receive different interpretations relative to the matrix clause, depending on the discourse context and its content, etc.

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(i) **simultaneity (or circumstance)**

*Walking out of the house*, John hit himself on the wall.

(ii) **temporal precedence (or causation)**

*Having given it a full consideration*, he was not for an open convention.

(iii) **circumstance (or causal)**

*Listening to the radio*, John fell asleep.

(iv) **concession (a circumstantial)**

*Suffering from a severe cold*, John helped other people to move.

This striking parallel between the IHRC construction and the free adjunct construction suggests that the semantics of one construction is likely to shed light on the semantics of the other.

In Chapter 4, I draw further parallels between the two constructions and, in Chapter 7, I suggest a possible way to account for the parallels.
These properties suggest that there is an intricate relation between the syntax, semantics and pragmatics of the IHRC construction. Furthermore, they raise the following questions:

(29) **Questions raised by these properties:**

(i) How does the internal head’s meaning get accessed by the matrix predicate?
(ii) How is the internal head determined? By pragmatic factors or by grammatical factors as well as pragmatic factors?
(iii) How does the embedded clause’s content bear a relation to the matrix clause’s content, when there is no overt connective between them?
(iv) How is the embedded clause’s interpretation determined? By purely discourse pragmatic factors or by combination of grammatical and pragmatic factors?

In the next section, I outline the analysis I will propose in this study in attempt to answering these questions.

1.3. **The gist of the proposal**

1.3.1. **On the semantics of the IHRC construction**

The analysis I will provide has two parts to it. One part concerns the properties of the internal head and the problems they present and the other part concerns the properties of the IHRC and the problems they present.
First, building on the E-type pronoun analyses proposed by Hoshi (1995) and Shimoyama (1999), I argue that the internal head’s meaning gets indirectly accessed by the matrix predicate via a pronominal definite description (pro), which is formally linked to the internal head’s content. I depart from the existing E-type pronoun analyses, however, by proposing that interpreting pro does not involve recovering a property of entities from the discourse context; rather, it involves recovering a salient thematic role that the potential referent of pro bears in the state described by the embedded clause. The basis for this proposal comes from the novel observation that only an entity that bears a thematic role in a state described by the embedded clause can serve as an internal head. I show that the proposed denotation of pro enables us to account for why the internal head can vary depending on the discourse context and the matrix predicate’s semantics.

Second, I propose that the tight semantic relation that holds between the embedded clause and the matrix clause is due to the semantics of the relative operator (REL) that occurs in this construction. The idea is that REL takes two sets of states as its arguments, and it ensures that one set of states stands in either a temporal intersection or a causal relation to the other. I show that the proposed analysis of the IHRC can capture the semantic relation that holds between the embedded clause and the matrix clause, without imposing extra-grammatical conditions on the IHRC construction such as the Relevancy Condition proposed by Kuroda (1976, 1992: 147).9

In addition to a new semantics of pro and REL, I also propose a new semantic treatment of aspect. This new treatment will be necessary to derive the interpretation of the IHRC construction in a compositional manner. The gist of the proposal is that aspect relates events to times, as Kratzer (1998) argues, but it also introduces a state which is

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9 The relevancy condition will be discussed in detail in Chapter 3.
derived from the set of events it combines with. This proposal will draw heavily on Parsons (1990), who claims that sentences can describe different types of states depending on their aspect.

1.3.2. On the syntax of the IHRC construction

To begin with the internal structure of the IHRC+kes/no string, I adopt the complement-head analysis, which is proposed by Chung and Kim (2003), among others. I thus assume that the string has a structure where an N-level pronominal head, which is morphologically realized as kes in Korean and no in Japanese, takes an IHRC as its complement. Yet I depart from Chung and Kim in two important respects.

First, I propose that the IHRC+kes/no string is a DP, not just an NP, and its head hosts the feature [+definite]. Second, I claim that the embedded clause has a truncated (or small clause) structure whose highest maximal projection is an Aspect Phrase, rather than a Tense or Inflection Phrase.

Regarding the syntactic status of the IHRC+kes/no string in the matrix sentence, I adopt what is called the argument analysis (e.g., Hoji 1995, Shimoyama 1999, and Chung and Kim 2003), as opposed to what is called the adjunct analysis (e.g., Tsubomoto 1991, Murasugi 1994, D. Chung 1999), which posits that the DP containing the IHRC+kes/no is base-generated in an argument position of the matrix clause, rather than in an adjunct position.

Under the proposed analysis, sentence (30), which is repeated from (1), will have something like (31) as its overt syntactic structure. Here, RelP corresponds to IHRC.
(30) Jinho-nun [[totwuk-i tomangka-n]-un kes]-ul capassta.
J.-top [[thief-nom run.away-imprf]-rel kes]-acc caught.
‘A/the thief was running away and Jinho caught him.’

(31) The overt syntactic structure of (30):
I accommodate the adjunct analysis, however, by following authors like Fuji (1998) and Shimoyama (1999), who claim that the IHRC gets interpreted like an adjunct modifier of the matrix clause by raising and adjoining to one of the verbal projections of the matrix clause at the level of interpretation. But I also differ from these authors in several respects.

First, while Fuji and Shimoyama assume that the IHRC raises all the way up to the IP level of the matrix clause, I argue that it raises only up to the Aspect Phrase level. Second, unlike Fuji, I claim that only the IHRC raises out of the DP containing the IHRC+kes/no string. That is, the pronominal kes or no stay in-situ. Third, unlike Shimoyama, I interpret the trace of the raised IHRC. In so doing, I resolve the so-called formal linking problem of pro, which afflicts the existing E-type pronoun analyses (e.g., Hoshi 1995, Shimoyama 1999).

Under this analysis, sentence (30) will receive (32) as its LF-structure. Here, sj and tk stand for the traces of the raised IHRC and matrix subject, respectively, and J and K indicate their indices.
1.4. Basic theoretical assumptions

In this section, I outline some of the basic theoretical assumptions that my analysis will hinge on. I begin with the semantic assumptions and then move onto the syntactic assumptions.
1.4.1. The semantic assumptions

1.4.1.1. Basic assumptions

The new semantic analysis of the IHRC construction I develop in this study is model-theoretic and type-driven. By the expression “model-theoretic”, I mean that a linguistic expression $\alpha$ is interpreted with respect to a model which contains a set of domains $M$ and an assignment function $g$. The application of the interpretation function to $\alpha$ will be written as $[[\alpha]]_{M,g}$. I call the result of this function application the logical representation or the denotation of $\alpha$.\(^{10}\)

What I mean by “type-driven” is that the semantic type of a node is determined by the semantic types of its daughter nodes (unless it is a terminal node). In other words, the semantic type of a mother node will be the same as the semantic type of the value that results from combining the denotations of its daughters. In a type-driven semantic analysis, the computation mechanism “sees” only the denotations of lexical items and the hierarchical structure in which they are arranged (see E. Klein and Sag 1985, Heim and Kratzer 1998, Ch. 3). Hence, the syntactic node labels and the linear orders of lexical items do not really matter in semantic computation.

In addition to making these assumptions, the new analysis will also employ a Neo-Davidsonian event theory as its theoretical framework. In the next subsection, I review some of the basic features of this theory.

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\(^{10}\) I defer presenting the details of the ontological assumptions until Chapter 6, where I present a new semantic analysis of the IHRC construction, as they do not have a direct relevance to the present discussion.
1.4.1.2. A brief introduction to the (neo)-Davidsonian event theory

The Neo-Davidsonian event theory builds on, but departs from, the Davidsonian event theory, which in turn diverges from the more traditional view of sentence and verb meanings. Hence, I begin this section with a brief introduction to the classical semantics (e.g., Montague 1973, Stalnaker and Thomason 1973) as a way of setting the stage for introducing the Davidsonian event theory and the Neo-Davidsonian event theory.

In order to see some basic tenets of the classical semantic analysis, consider the sentences in (33).

(33) a. Jones buttered the toast.

b. Jones buttered the toast slowly in the bathroom with a knife.

Under the classical approach, verbs like butter denote a two-place relation between two nominal arguments, namely, the subject and the object, and adverbs like slowly denote functions from verb meanings to verb meanings. Hence, when a verb combines with an adverbial modifier, they form a complex two-place relation.

Under the classical semantic approach, we therefore obtain something like (34a) and (34b) as the logical representations for (33a) and (33b), respectively. Here, j stands for John, t for toast, k for knife, and b for bathroom.

(34) a. BUTTER (j, t)

b. ([WITH(k)(IN(b))(SLOWLY(BUTTER))])(j, t)
What is called the Davidsonian theory of event arguments, which was proposed by the philosopher Donald Davidson, makes several radical departures from the traditional semantic analysis.

First, it assumes that action verbs (non-statatives) denote relations between individuals and events. That is, they select for an implicit event argument, in addition to typical arguments such as a subject and an object.

Second, the Davidsonian theory posits that modifiers are predicates of an event argument and hence are added conjunctively to the semantics of the sentence, thereby constraining the event described by the verb phrase.

Third, this theory hypothesizes that the meaning of a sentence involves existential quantification over the event argument introduced by the verb of the sentence. Declarative sentences are thus viewed as assertions that the events described by the VPs took place.

Given these assumptions, the Davidsonian event theory yields something like (35a) and (35b) as the logical representations for sentences (33a) and (33b). Here, e stands for event, j for John, t for toast, k for knife, and b for bathroom.

(35) a. $\exists e \left[ \text{BUTTER}(e, j, t) \right]$

b. $\exists e \left[ \text{BUTTER}(e, j, t) \& \text{SLOWLY}(e) \& \text{IN}(e, b) \& \text{WITH}(e, k) \right]$

One notable advantage of the Davidsonian event theory over the traditional semantic theory is that it can readily capture the fact that (35b) entails (35a). This entailment relation holds because, in this theory, verb modifiers are analyzed as
predicates of an event argument which are added conjunctively to the logical structure of
the sentence, rather than functions from verb meanings to verb meanings.

What is called the Neo-Davidsonian theory has been advanced and explored by
authors like Parsons (1990) and Higginbotham (1983). This theory diverges from the
original Davidsonian theory in at least three respects.

First, it assumes that not only non-statives or action verbs but also stative verbs
take an implicit event argument.

Second, it hypothesizes that verbs denote one-place predicates of eventualities,
rather than relations.

Third, it posits that not merely adverbial modifiers but also core arguments of
verbs are added conjunctively to the meaning of a sentence via thematic roles such as
Agent, Theme, and Instrument.

When applied to the sentences in (33), the Neo-Davidsonian theory yields the
following denotations for them.

(36) a. \( \exists e [butter(e) \& \text{Agent}(j)(e) \& \text{Theme}(t)(e)] \)

b. \( \exists e [butter(e) \& \text{Agent}(j)(e) \& \text{Theme}(t)(e) \& \text{slowly}(e) \& \text{Location}(b)(e) \& \text{Instrument}(k)(e)] \)

In this study, I adopt Parsons’ Neo-Davidsonian event theory over the original
Davidsonian theory. But this decision should not be taken as a strong endorsement of one
over the other. \(^{11}\) I choose the former largely because the semantic analysis of the IHRC

\(^{11}\) See Landman (2000) for a review of the two theories with respect to several important semantic issues
such as the plurality of events and event individuation.
construction I develop in this study will utilize thematic roles in building a formal link between an internal head and an argument of the matrix predicate.

1.4.2. The syntactic assumptions

First, I adopt the VP-internal subject hypothesis (e.g., Fukuki and Speas 1986, Kuroda 1988, Koopman and Sportiche 1991) and thus assume that the subject of a sentence originates inside a verbal projection but it can move to the specifier position of Tense Phrase (TP) in overt syntax. This is illustrated by the movement of the matrix subject Jinho in (31).

Second, following the standard assumption in the generative grammar, I posit that there is a syntactic level called Logical Form (henceforth LF) (see Chomsky 1977, May 1977, Huang 1982). I further assume that this level provides the input for semantic computation. What this means is that the computational system will derive the meaning of a sentence based on the syntactic structure represented at LF.

Third, I assume that syntactic movement of linguistic material leaves a trace in the base position of the moved material. In addition, following Heim and Kratzer (1998), I posit that the movement creates an index node immediately below the moved material and this index introduces a λ-operator that binds the variable introduced by the trace of the moved item. To illustrate the consequence of making these assumptions, consider (37).

(37)  John loves every student.
In this sentence, a quantificational phrase (QP) *every student* occurs in the object position. This QP has the semantics of a generalized quantifier, rather than that of a referential expression, but the verb *loves* seeks a referential expression as its argument. Hence, there arises a semantic type-mismatch between the verb and its object. We can resolve this mismatch problem by raising the QP at LF to a position where it can be interpreted such as the adjoined position of IP (or TP). This Quantifier Raising (QR) yields the LF structure given in (38), where an index node (which is indicated by the number 1) is created immediately below the moved material.

(38) **The LF structure of (37):**

![Diagram of the LF structure](image)

12 For simplicity, in this structure, I do not apply the VP-internal subject hypothesis. In addition, here, I assume that tense denotes an identity function, which takes a set of entities and returns the same set of entities.
In the above structure, the index node introduces a $\lambda$-operator that binds the trace of the raised QP. Since IP$_1$ denotes a truth-value, this predicate-abstraction makes IP$_1^*$ denote a set of entities. This newly created set of states combines with the denotation of the raised QP, yielding a truth-value.

1.5. The organization of the study

This dissertation proceeds as follows: Chapter 2 discusses the existing analyses of the IHRC construction that are concerned with the properties of the internal head. In this chapter, I present arguments for the E-type pronoun analysis over the LF-head raising analysis and the referential pronoun analysis. I then review two versions of the E-type pronoun analysis and sort out the problems that remain to be resolved such as the so-called formal linking problem.

Chapter 3 examines three existing analyses of the semantic properties of the IHRC which are couched within different theoretical frameworks. I show that the semantics of the IHRC is determined not only by discourse pragmatic factors but also by grammatical factors such as the aspect of the embedded clause and the semantics of the matrix predicate.

Chapter 4 reexamines the factors that govern the interpretability of the IHRC construction. I establish that what is at the heart of interpreting this construction is to ensure that the embedded clause describes a state that temporally intersects with the eventuality described by the matrix clause and that this state contains the referent of pro. In addition, I show that a sentence can receive different truth-conditions depending on whether the embedded clause describes a temporary state or a permanent state.
Chapter 5 outlines the syntactic structure of the IHRC construction and the syntactic assumptions that will be central to the compositional semantic analysis of the IHRC construction I present in the next chapter.

In Chapter 6, I first outline the ontological assumptions of the new semantic analysis of the IHRC construction. I then propose new denotations for kes (or no), the [+definite] feature, REL, and aspect. Next, I evaluate the proposed interpretive mechanism against a wide range of data. I show that the proposed analysis is constrained but flexible enough to capture all the defining properties of the construction and derive correct interpretations for various instances of IHRCs.

Chapter 7 concludes the present investigation with a brief summary of its main proposals and their theoretical implications. I show that the IHRC construction parallels seemingly unrelated constructions in other languages such as the correlative construction in Hindi, the absolute construction, and small clauses in English. In addition, I discuss how the proposed event-based account of the IHRC construction might extend to these constructions. I close the chapter by addressing issues that can serve as topics for future research.
2.1. Introduction

In this chapter, I discuss how the existing analyses of the IHRC construction deal with the problems presented by the internal head’s properties. In Chapter 1, I showed that an internal head has two notable properties: (i) it is interpreted in such a way that it seems to serve not only as an argument of the embedded predicate but also as an argument of the matrix predicate; (ii) it is intrinsically indeterminate and hence can vary depending on various factors such as the discourse context and the matrix predicate’s semantics.

The first property of the internal head presents a syntax-semantics mismatch problem because it suggests that a single noun phrase fills two argument positions at the same time. The other property presents a semantics-pragmatics interface problem because it suggests that the interpretation of the IHRC construction is heavily influenced by contextual factors.

As far as I am aware, the semantics-pragmatics interface problem has not been much addressed in the literature but the syntax-semantics problem has been. There are two basic approaches to the syntax-semantic mismatch problem: One is the LF head-raising analysis and the other is the pronominal analysis. The LF head-raising analysis posits that the internal head raises at LF to a position where it can be accessible to the matrix predicate. The pronominal analysis takes a more indirect approach. It posits that the construction contains a (null) pronoun. This pronoun is base-generated somewhere inside the IHRC+kes/no string and it serves as the mediator between the internal head and
the matrix predicate. That is, what serves as an argument of the matrix predicate is the pronominal element, rather than the internal head noun.

In what follows, I first discuss the LF head-raising analysis and then the pronominal analysis. The primary focus of the discussion will be whether the analysis at hand can provide a solution to the syntax-semantics mismatch problem presented by the internal head while remaining compatible with other defining properties of the IHRC construction, some of which were already mentioned in Chapter 1, and some of which will be introduced, as we proceed.

2.2. The LF-head raising analysis

What is known as the LF-head raising analysis was predominant in the literature up until the mid 1980s. The proponents of this analysis hold that the internal head noun raises at LF to a position where it can be accessible to the matrix predicate and from where it binds the trace in its base-position (e.g., Ito 1986, Watanabe 1992, Jung 1995, Fuji 1998).

There are at least two different versions of the LF-head raising analysis. The two versions differ from each other in terms of their assumptions about the landing-site of the internal head. One analysis posits that the internal head raises all the way up to a position external to the IHRC, ultimately yielding a structure which is identical to the overt syntactic structure of the corresponding EHRC construction (e.g., Ito 1986, Jung 1995). ¹

¹ To be more accurate, Ito’s (1986) analysis should be called the LF’-head raising analysis, as Shimoyama correctly (1999) notes. This is because Ito posits that the invisible movement of the internal head occurs at the level called LF’, which is later than LF. That is, the head is still in-situ at LF. For Ito, the motivation for distinguishing the two levels of representations comes from the observation that the internal head behaves differently from the external head with respect to some LF-related phenomena such as weak crossover effects (see Jung 1995 for parallel facts about the Korean IHRC construction). To capture this semantic behavior of the IHRC construction, Ito hypothesizes that the construction has a different LF structure from
The other hypothesizes that the internal head raises only up to the highest maximal projection of the matrix clause (e.g., Watanabe 1992, Fuji 1998). For convenience, I call the former the *IHRC-external head-raising approach* and the latter the *IHRC-internal head-raising approach.* These two approaches are schematically represented in (1) and (2).

(1) **The IHRC-external head-raising approach:**

```
           NP
           /     /
        CP   NP_i
           /   /
          C'  C
           /   \
          IP   no/kes
         /   |
        t_i   
```

the EHRC construction but has the same LF’ structure as the EHRC construction. The idea is that at LF’, the internal head raises to the external head position, thereby receiving a thematic role from the matrix predicate, and from where it binds its trace in the base-position, which receives a thematic role from the embedded predicate.

2 Watanabe (1992) assumes that an IHRC is a CP, whereas Fuji (1998) assumes that it is an IP. Murasugi (2000) also analyzes Japanese RCs as IPs, although she does not endorse an LF head raising analysis. Since the node labels are immaterial to semantic computation, I simplify matters somewhat by assuming that the embedded clause is an IP and the internal head is an NP.

3 This analysis is essentially identical to the proposals made by authors such as Cole (1987), Lefebvre and Muysken (1988) for the IHRC construction in Quechua, and is similar to Broadwell’s (1985) analysis of the IHRC construction in Chocktaw. See Basilico 1996 for technical details.
From a theoretical point of view, the IHRC-external raising approach seems more attractive than the IHRC-internal raising approach, because it offers a uniform semantic account of the IHRC and the EHRC constructions by positing the same LF structure for them. As it turns out, however, this approach has more empirical problems than the other.

One problem with the IHRC-external head-raising analysis is that, contra its prediction, the IHRC construction turns out to have different truth-conditions than the EHRC construction (see Ishii 1991, Jung 1995, Hoshi 1995, Shimoyama 1999). As I showed in Chapter 1, while the content of an EHRC restricts that of the head noun, the content of an IHRC does not. To illustrate, compare (3) and (4), which instantiate the EHRC construction and the IHRC construction in Korean, respectively. While (3) is felicitous in a context where there were ten thieves running away and John caught only

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4 This analysis is similar to the proposals made by Williamson (1987) for Lakhota and Barss et al. (1990) for Navajo. See Basilico 1996 for technical differences between them.
three of them, (4) can be felicitous only if there were exactly three thieves running away and John caught all of them, as the English translation suggests.

(3) John-un [[e1 tomangka-n]-un sey-myeng-uy totwuk]-ul
J.-top [[__ run.away-imprf]-rel three-cl-gen thief]-acc
capassta.
caught.
‘John caught three thieves (out of many more) who were running away.’

(4) John-un [[sey-myeng-uy totwuk-i tomangka-n]-un kes]-ul
J.-top [[three-cl-gen thief-nom run.away-imprf]-rel kes]-acc
capassta.
caught.
‘(Exactly) three thieves were running away and John caught all of them.’

The next inadequacy of the IHRC-external head-raising analysis is that, as pointed out by Hoshi (1995) and Shimoyama (1999), it makes incorrect predictions about the scopal interactions between a quantificational internal head noun and the scope-bearing elements that occur in the matrix clause. To illustrate this problem, a brief introduction to the scope phenomenon in Japanese and Korea is necessary. Hence, I take a short excursion to this topic below.

In Japanese and Korean linguistics literature, it is commonly assumed that the relative scope between quantifiers is determined by their surface order (see Hoji 1985 and
S. Ahn 1991). To illustrate, compare (5a) and its variant (5b), where the surface order of the subject and the object QPs is reversed by scrambling the object. Notice that the relative scope between the QPs in these sentences is exactly the opposite of each other.

(5a) Hotondo-no gakusei-ga dono syukudai-mo teisyutusita.  
most-gen student-nom every homework-mo turned.in.  
‘Most students submitted every assignment.’

(i) Most > ∀; (ii) *∀ > Most

b. Dono syukudai-mo hotondo-no gakusei-ga ti teisyutusita.  
every homework-mo most-gen student-nom turned.in.  
Lit.: ‘Every homework, most students turned in.’

(i) *Most > ∀; (ii) ∀ > Most

(Shimoyama 1999: 151, (6))

In this paradigm, Reading (i) can be true in a context where the teacher gave out five assignments and four out of six students turned in all the five assignments. On the other hand, Reading (ii) can be verified in a context where the teacher gave out five assignments and, for every one of the five assignments, there were more than three students who submitted the homework.

Let us now see how the relative scope between quantificational elements works in the relative clause constructions in Korean and Japanese. Consider first the sentences in (6), in comparison with those in (5). In these sentences, the object contains an EHRC whose head noun is quantificational. These sentences show that, although the external
head of the relative clauses in (6a) and (6b) is buried inside a DP, it interacts with the matrix QP subject, yielding exactly identical scopal patterns as in (5a) and (5b). Compare the possible readings for the sentences in (5) and (6).

(6a)  Hotondo-no  gakusei-ga  [[Taro-ga  e₁  sikenmae-ni
most-gen  student-nom  T.-nom  __  before.exam-loc
assigned  every  homework-mo]  turned.in.

‘Most students turned in every homework that Taro assigned before the exam.’ (i) Most > ∀; (ii) *∀ > Most)

b.  [[Taro-ga  e₁  sikenmae-ni  dasita]  dono
T.-nom  __  before.exam-loc  assigned  every
syukudai-mo]j  hotondo-no  gakusei-ga  t_j  teisyutusita.
homework-mo]  most-gen  student-nom  turned.in.

Lit.: ‘Every homework that Taro assigned before the exam, most students turned in.’ (i) *Most > ∀; (ii) ∀ > Most)

(Shimoyama 1999: (8))

Again, (6a) will be true in a context where Taro gave out five assignments, and four out of six students turned in all the five assignments. However, (6b) will be false in such a context; it will be verified only if Taro gave out five assignments and, for every one of the five assignments, there were at least three students who turned it in.
Consider now (7) in comparison with (6). In this paradigm, the object position of each sentence contains an IHRC with a quantificational head. It may appear that this paradigm parallels (6), because, in (7b), the object has scrambled across the subject, yielding the reversed surface order of (7a). Notice, however, that this reversed word order does not bring about a scope difference. In both (7a) and (7b), the subject takes scope over the scrambled object. If the internal head indeed raised to the external head position at LF, then the object of sentence (7b) would take scope over the subject, just as it does in sentence (6b).

(7)a. Hotondo-no  gakusei-ga  [[Taro-ga  dono  syukudai-mo
most-gen  student-nom  T.-nom  every  homework-mo
sikenmae-ni  dasita]-no]-o  teisyutusita.
before.exam-loc  assigned]-no]-acc  turned.in.

‘Taro assigned every homework before the exam and most students turned them in.’ ((i) Most > ∀; (ii) *∀ > Most)

b.  [[Taro-ga  dono  syukudai-mo  sikenmae-ni
T.-nom  every  homework-mo  before.exam-loc
dasita]-no]-o\_\_ t\_\_ most-gen  student-nom  turned.in.
hotondo-no  gakusei-ga  turned.in.

‘Taro assigned every homework before the exam and most students turned them in.’ ((i) Most > ∀; (ii) *∀ > Most)

(Shimoyama 1999: (9))
The scopal pattern that obtains for (7) suggests that an internal head noun is not interpreted in the same position as an external head noun, contra what the IHRC-external head-raising analysis predicts.

Another empirical problem with the IHRC-external head-raising analysis concerns the relative scope of a quantificational internal head and other scope-bearing elements inside the embedded clause. Under the IHRC-external head-raising analysis, the internal head noun is expected to be located higher than any other quantificational element in the embedded clause, as it raises at LF to a position external to the relative clause. It is thus predicted that the head noun will take widest scope in the embedded clause. As shown by Shimoyama (1999: 154), however, this prediction is not borne out.

To illustrate, consider the sentences in (8). Here, the matrix object contains an IHRC and the clause which is embedded under this IHRC has a QP subject and a QP object, namely, *hotondo-no gakusei-ga* ‘most students’ and *dono syukudai* ‘every homework’. The internal head noun of this IHRC is the object QP, namely, *dono syukudai* ‘every homework.’ If an internal head indeed raised at LF to an external head position, then we would expect to obtain a reading where the embedded object takes scope over the embedded subject. But this reading never comes about, unless the object is scrambled to the left of the embedded subject, as the English translation of (8b) shows.
The scopal patterns that emerge from the sentences in (8) suggest that the internal head does not undergo LF-raising (or it does not raise higher than the embedded subject, to say the least.)

There are yet additional challenges for the IHRC-external head-raising analysis. First, as has been noted by several authors, not every IHRC contains a noun phrase that has the interpretation of the “semantic” head noun of the relative clause (see Matsuda 1993, Hoshi 1995: 123-129, Kikuta 2002, and Chung and Kim 2003). To illustrate, consider (9) and (10), which instantiate the IHRC construction in Japanese and the IHRC construction in Korean, respectively.
(9) John-wa [[koori-ga sara-no ue-de toketesimatta]-∅
J.-top [[ice-nom plate-gen top-loc melted]-rel
no]-o gokugoku nonda.
no]-acc gulped.down.

‘John gulped down the water which resulted from the ice’s having melted on the plate.’

(taken from Hoji 1995: 120, (8))

(10) John-un [[Mary-ka nal sayngsen-ul ikhi-∅]-n kes]-ul
J.-top [[M.-nom raw fish-acc cook-prf]-rel kes]-acc
mek-ess-ta.
eat-pst-decl.

‘John ate the raw fish after it got cooked.’

In sentence (9), the IHRC seems to contain a noun phrase that can potentially serve as the head noun of the relative clause, namely, the noun phrase koori ‘ice’. But what is interpreted as the internal head is the liquid form of the ice after it had melted on the plate, rather than the ice itself, as one cannot gulp down ice (cubes). Given this, we are led to conclude that the IHRC of (9), in fact, does not contain a noun phrase that can serve as its semantic head.

Sentence (10) presents an essentially identical problem. Here, what appears to be the internal head is the noun phrase nal sayngsen ‘raw fish.’ But our intuition tells us that

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5 Hoshi (1995) attributes this example to Yoshi Kitagawa (personal communication) (p. 120, fn. 3).
what John ate was cooked fish, not raw fish—to be more accurate, the result of cooking
the raw fish. Hence, we cannot analyze *nal sayngsen* as the semantic head of the IHRC.

Sentences (9) and (10) present a rather serious problem for the IHRC-external
head-raising analysis, because if an IHRC does not contain a noun phrase that can serve
as the internal head, then there will be nothing to raise at LF. We cannot assume that the
noun phrases *koori* and *nal sayngsen* undergo LF-raising and thereby occur in the
external head position, because the LF-raising will generate pragmatically anomalous
sentences, as the following EHRC sentences show.

(11) #John-wa [[e₁ sara-no ue-de toketesimatta]-∅
J.-top [[__ plate-gen top-loc melted]-rel
koori]-o gokugoku nonda.
ice]-acc gulped.down.

‘John gulped down the ice which had melted down on the dish.’

(12) #John-un [[Mary-ka e₁ ikhi-∅]-n nal sayngsen]-ul
J.-top [[M.-nom __ cook-prf]rel raw fish]-acc
mek-ess-ta.
eat-pst-decl.

‘John ate the raw fish that got cooked.’

Although these facts seem to present enough difficulty for the IHRC-external
head-raising analysis, there are even more difficult cases: As Chung and Kim (2003)
observe, there are cases where a sentence instantiating the IHRC construction can be judged more or less acceptable even though the semantic head of the IHRC is not linguistically expressed. To see this, consider (13).

(13) ?John-un [[pac-i-ka telewe-ci-∅]-n kes]-ul
     J.-top [[pants-nom get.dirty-comp-prf]-rel kes]-acc
takkanay-ess-ta.

wipe.out-pst-decl.

Lit.: ‘John’s pants got dirty and John wiped the dirt from his pants.’

(adapted from Chung and Kim 2003: (40); the judgment is theirs)

According to our intuitions, what is interpreted as the semantic head of the IHRC of this sentence is the dirt that got on to John’s pants, rather than the pants, as the English translation shows. But the embedded clause does not contain a noun phrase that has that meaning. Hence, under the LF-head raising analysis, this sentence is predicted to be unacceptable, as there is nothing to raise at LF, but the sentence is nonetheless acceptable (with a little help of accommodation).

Let us now turn to the IHRC-internal head-raising analysis. Compared to the IHRC-external head raising analysis, the IHRC-internal head raising analysis seems to have fewer empirical problems: first, this analysis correctly predicts that the IHRC construction will have different truth-conditions than the EHRC construction, because, under this analysis, the internal head raises to the specifier position of the maximal projection of the embedded clause, rather than to the external head position. Furthermore,
this analysis correctly predicts that the internal head will not interact with the scope-bearing elements in the matrix clause. This prediction falls out because, in this analysis, the QP internal head will stay inside the embedded clause even after the LF-raising and, hence, it will interact only with the elements in that clause, given the standard assumptions about the locality condition on QR (Hoji 1985, Heim and Kratzer 1998).

Despite these merits, however, the IHRC-internal head-raising analysis cannot be adopted as a proper treatment of the IHRC construction, because it is subject to all the other problems of the IHRC-external head-raising analysis. For instance, it also makes incorrect predictions about the scopal interactions between a quantificational internal head and other quantificational elements inside the embedded clause, because, even in this analysis, the internal head is predicted to be located higher than any other scope-bearing elements in the IHRC at the time of semantic interpretation. In addition, this analysis also has difficulty accommodating sentences like (9), (10), and (13), because these sentences are interpretable despite the fact that they do not contain noun phrases that can undergo LF-raising and thereby serve as an argument of the matrix predicate. In view of these facts, we are led to conclude that the IHRC-internal head-raising analysis cannot be maintained although it is less problematic than the IHRC-external head-raising analysis.

To summarize and conclude: despite its theoretical appeal, the LF-head raising analysis does not provide a viable solution to the syntax-semantics mismatch problem presented by the internal head, irrespective of what is assumed to be the landing-site of the internal head. Let us now turn to the pronominal analysis and see whether it fares better with the problems and the challenges we have explored thus far.
2.3. The pronominal analysis

What I call the pronominal analysis posits that the internal head stays in-situ at LF, but its meaning gets nonetheless accessed by the matrix predicate in an indirect way. The basic idea is that the IHRC+kes/no string contains a (null) pronominal element which is base-generated in an IHRC-external position but which is anaphorically linked to the internal head, and this pronominal plays the role of an argument of the matrix predicate.

There are two versions of this analysis. One is the referential pronoun analysis and the other is the E-type pronoun analysis. These two analyses posit a similar syntactic structure for the IHRC+kes/no string but, while the referential pronoun analysis treats the pronominal that occurs external to the IHRC as a typical pronoun which is co-referential with the internal head noun, the E-type pronoun analysis analyzes it as a disguised definite description which spells out ‘the NP.’ In the next two subsections, I briefly outline these two types of pronominal analysis.

2.3.1. The referential pronoun analysis

The referential pronoun approach has been incarnated in several different ways. These different versions of the referential pronoun approach differ from each other in two points: (i) the location of the pronominal element relative to the IHRC+kes/no string—that is, whether it is inside the string or outside it, and if it occurs inside the string, exactly where it is located relative to the IHRC—and (ii) its morpho-phonemic realization—that is, whether it is overtly realized or covertly realized.

In this section, I discuss a particular version of the referential pronoun analysis, namely, the one where the IHRC+kes/no string is base-generated in an argument position.
of the matrix clause and the pronominal element (henceforth pro)\(^6\) is base-generated inside the IHRC+kes/no string, heading the maximal projection that contains the string. This structure is schematically represented in (14).\(^7\) Notice that this structure does not contain the morphemes kes and no. This is because, as I mentioned briefly in Chapter 1, the status of these morphemes is extremely controversial and, hence, authors do not agree on where they occur inside the IHRC+kes/no string. For present purposes, however, the exact morphosyntactic status or syntactic locations of these morphemes do not matter. Thus, to keep matters simple, I assume that they are not visible in the following structure, deferring a detailed discussion of their status until Chapter 5.

\[(14) \quad [\text{IP1} \ldots [\text{NP/DP} [\text{IP2} \ldots \text{NP} _1 \ldots \text{V}] [\text{N/D pro} _1] \ldots \text{V}]\]

\(^6\) Here, I highlight pro to differentiate it from a pro, which typically refers to a base-generated empty category in the literature. This differentiation is necessary because not every proponent of the referential pronoun analysis treats the pronominal element that occurs in the IHRC+kes/no string as a null category. Authors like Chung and Kim (2003), for instance, argue that pro is realized as kes in Korean. This topic is discussed further in Chapter 5.

\(^7\) Authors like C. Kitagawa (2003) posits that the entire IHRC+no string is base-generated as an argument of the matrix predicate and a null pronominal (pro) is base-generated inside the IHRC+no string, to the right of no, as depicted in (i). Notice that, in (i), the IHRC is adjoined to the NP that contains pro. This is because, according to C. Kitagawa, IHRCs in Japanese are a kind of non-restrictive relative clause.

\[(i) \quad [\text{IP1} \ldots [\text{NP} [\text{IP2} \ldots \text{NP} _1 \ldots \text{V}] \text{no} [\text{NP pro} _1]] \ldots \text{V}] \ldots \text{I}]

On the other hand, authors like Tsubomoto 1991, Mihara (1994), D. Murasugi (1994, 2000), and D. Chung (1999) posit that the entire IHRC+no/kes string is base-generated as an adjunct to the matrix VP and pro is base-generated in an argument position of the matrix clause, as schematically depicted in (ii).

\[(ii) \quad [\text{IP1} \ldots [\text{VP1} [\text{NP2} [\text{IP2} \ldots \text{NP} _1 \ldots \text{V}] \text{+}(\text{no/kes})] [\text{VP1}[\text{NP1 pro} _1] \ldots \text{V}]] \ldots \text{I}]

I discuss the first version of the referential pronoun analysis below and the second version in Chapter 5 when discussing the basic syntactic structure of the IHRC construction, as this analysis bears on the syntax-semantics mismatch problem exhibited by the IHRC, which refers to the fact that the relative clause is interpreted as a modifier of the matrix clause although it is base-generated inside a maximal projection that receives a structural case from the matrix predicate.
The referential pronoun analysis outlined above can readily accommodate cases where the internal head noun is a referential expression such as a proper name and a pronoun, as illustrated by the Japanese sentences in (15) and the Korean sentences in (16). (In the following examples, the intended semantic head of the relative clause is highlighted.)

(15)a. Naomi-ga [[Sue-ga naiteiru]-∅ no]-o nagusameta.
N.-nom [[S.-nom weeping]-rel no]-acc comforted.

‘Naomi comforted Sue when she was crying.’
b. Naomi-ga [[kanozo-ga naiteiru]-∅ no]-o nagusameta.
N.-nom [[she-nom weeping]-rel no]-acc comforted.

‘Naomi comforted her when she was crying.’

J.-top [[S.-nom cry-imprf]-rel kes]-acc comforted.

‘John comforted Sue when she was crying.’
J.-top [[she-nom cry-rel]-imprf kes]-acc comforted.

‘John comforted her when she was crying.’

The referential pronoun analysis cannot capture the full range of facts, however. For instance, it cannot deal with sentences such as (17-20), where the internal head is a quantificational expression. In these sentences, it is hard to maintain that pro is co-
referential with the internal head noun, because quantificational noun phrases do not “refer” (Evans 1980).

(17) Naomi-wa [[hotondo-no gakusei-ga naiteiru]-∅ no]-o
N.-top [[most-gen student-nom weeping]-rel no]-acc
nagusameta.
comforted.
‘Naomi comforted most students when they were crying.’

(18) Naomi-ga [[dono-gakusei-mo naiteiru]-∅ no]-o
N.-nom [[every-student-mo weeping]-rel no]-acc
nagusameta.
comforted.
‘Naomi comforted all the students when they were crying.’

(19) John-un [[taypwupwun-uy haksayng-(tul)-i wu-n]-un
J.-top [[most-gen student-(pl)-nom weep-imprf]-rel
kes]-ul tallayessta.
kes]-acc comforted.
‘John comforted most students when they were crying.’
(20) John-un [[motun haksayng-(tul)-i wu-n]-un
J.-top [[every student-(pl)-nom weep-imprf]-rel
kes]-ul tallayessta.
kes]-acc comforted.

‘John comforted *every student* when he/she was crying.’

An additional difficulty with the referential pronoun analysis comes from the fact that, as we saw in the sentences (9), (10), and (13) above, not every IHRC contains a noun phrase that can serve as the referent of *pro*.

Another serious problem with this analysis is a potential violation of Condition C of the Binding Theory, which dictates that a referential expression cannot be bound by a less referential expression (Chomsky 1986, 1995) or that a less referential expression cannot A-bind a more referential one (Lasnik 1991: 19). In the assumed structure (14), the pronominal c-commands the noun phrase that it is co-indexed and co-referential with. Hence, if the intended referent of *pro* is a proper name, as in (15a) and (16a), then the sentence will violate Condition C.8

In view of these facts, we are led to conclude that the referential pronoun analysis of *pro* cannot be maintained or it cannot be applied to all instances of the IHRC construction, to say the least.

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8 This criticism does not apply to other versions of the referential pronoun analysis where *pro* is located outside the DP that contains an IHRC+*kes/no* string, as described in (ii) in footnote 7.
2.3.2. The E-type pronoun analysis

In recent years, several authors have proposed that the pro in (14) can be best analyzed as an E-type pronoun in the sense of Evans (1980) (Hoshi 1996, Shimoyama 1999, Matsuda 2002, M. Kim 2004b).9

According to Evans, pronouns that are co-indexed with a quantifier can be divided into two categories: bound variables and E-type pronouns. A bound variable is illustrated by he in (21) and an E-type pronoun is illustrated by they in (22).

(21) [Every congressman], thinks that he, is smart.

(22) Few congressmen admire Kennedy and they are very junior.

(Evans 1980: 339)

E-type pronouns differ from bound variables in two respects. First, unlike bound variables, E-type pronouns need not be c-commanded by QPs that occur in the same clause. Second, while bound variables are not referential, as their antecedents do not refer to specific entities, E-type pronouns are interpreted in such a way that they refer to the object(s) that “satisfy the predicate in the antecedent clause and thereby make that clause true” (p. 340).

Despite these interpretive characteristics, however, E-type pronouns cannot be analyzed as referential pronouns; for instance, in (22), the E-type pronoun they is anaphorically linked to the QP few congressmen, but the QP does not refer, so they

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9 For a recent discussion of E-type pronouns, see Elbourne 2001 and 2003.
cannot be analyzed as co-referential with it. If it were, then we should be able to paraphrase the sentence as (23), but the two sentences do not mean the same.

(23) **Few congressmen** admire Kennedy and **few congressmen** are very junior.

Note further that *they* in (23) cannot be analyzed as a bound variable either, despite the fact that it is co-indexed with a QP. This is because bound variables must be c-commanded by their antecedents but, in this sentence, the pronoun *they* and its QP antecedent are not in the same clause and, hence, they do not enter into a c-command relation.

The *pro* that occurs in the IHRC construction anaphorically linked to the internal head noun parallels E-type pronouns such as *they* in (22) in several ways. First, as Hoshi (1995, 1996) and Shimoyama (1999) note, it can be co-indexed with a QP, as mentioned above, but it cannot be analyzed as a pronoun that is co-referential with the QP or as a variable that is bound by the QP. To see this, consider (24), where *pro* is interpreted as being co-indexed with the QP *kukkii-o juk-ko* ‘ten cookies’.


‘Yoko put ten **cookies** in the refrigerator and Taroo brought them to the party.’

(adapted from Shimoyama 2002: 96, (4))
In this sentence, **pro** is “felt” to be anaphorically linked to *kukkii-o juk-ko*. But it cannot be analyzed as co-referential with the QP, because, as mentioned above, QPs do not refer. But the **pro** cannot be analyzed as a bound variable either, because, being buried inside the embedded clause, the QP *kukkii-o juk-ko* does not c-command it.

Another parallel between **pro** and an E-type pronoun is that both exhibit a maximality effect in the sense of Sells (1986), which is considered a characteristic of a definite description. To illustrate, consider sentences (23) and (24). In these sentences, the pronouns *they* and **pro** are interpreted in such a way that they refer to all the congressmen who admire Kennedy and all the cookies that Yoko put in the refrigerator, respectively.

Further support for an E-type pronoun analysis of *no/kes* comes from the fact that they both instantiate the so-called “split antecedent” phenomenon, where a discourse anaphor or pronominal is anaphorically linked to two discontinuous and disjoint noun phrases (Demirdache 1991: 118).

To illustrate, consider first sentences (25) and (26). In (25), the relative pronoun *who* is interpreted as anaphorically linked to both *a man* and *a woman* at the same time, as the plural feature on the verb *were* shows. Similarly, in (26), the E-type pronoun *them* in the matrix clause, refers to both *a wife* and *a donkey* in the preceding *if*-clause.

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10 Shimoyama (1999) offers additional arguments for an E-type analysis of **pro** (more specifically, *no* in her analysis) by pointing to the fact that it can be semantically linked to *wh*-elements (pp. 157-159), as shown in (i).

(i) Ken-wa [[Sue-ga nani-o katta-∅]-no]-o sutemasita-ka?  
K.-top [[S.-nom what-acc buy-rel]-no]-acc threw.away-Q?  
Lit.: ‘What is such that Sue bought it and Ken threw it away?’

11 That **pro** instantiates a split-antecedent phenomenon was noted first by Kuroda (1976), but to my knowledge, it was C. Kitagawa (2003) who first pointed out that this property is shared by the head of non-restrictive relative clauses. As we shall see momentarily, however, C. Kitagawa does not take this parallel as support for an E-type pronoun analysis of **pro**.
(25) A man$_i$ entered the room and a woman$_j$ went out, who$_{i,j}$ were quite similar.

(Demirdache 1991: 118; indices are mine.)

(26) If a man has a wife$_i$ who owns a donkey$_i$, he always loves them$_{i,j}$.

(Elbourne 2001: 280; indices are mine.)

The behavior exhibited by who and them in the above sentences is paralleled by the behavior of pro. As we saw in Chapter 1 (Section 1.2.1.2), when an IHRC contains more than one potential candidate for the internal head, the IHRC+$kes/no$ string can receive at least three readings, in one of which the internal head refers to the plural entity that consists of the potential candidates. When transposed into the present analysis, this means that pro can be anaphorically related to two discontinuous noun phrases. For convenience, a relevant example is repeated as (27), where pro is co-indexed with both neko ‘a/the cat’ and nezumi ‘a/the mouse’.

(27) John-wa [[neko$_i$-ga nezumi$_j$-o oikake-tei-ta-∅]-pro$_{i,j}$ no]-o
    John-top [[cat-nom mouse-acc chase-prog-past-rel]-pro no]-acc
    (hutarito-mo) tukamaeta.
    (two-also) caught.

‘A/the cat was chasing a/the mouse and John caught them both.’

Taken together, these parallels seem to provide rather compelling arguments for an E-type pronoun analysis of pro over the referential pronoun analysis. C. Kitagawa
(2003) contends, however, that the E-type pronoun analysis of pro cannot be applied to every instantiation of the IHRC construction. The basis for this claim comes from the fact that, according to Evans (1980), E-type pronouns are defined as pronominals that are anaphorically linked to QPs, but, pro can be linked to ordinary noun phrases, as we saw in (27), for instance. C. Kitagawa claims that when pro is linked to a non-quantificational NP, it should be analyzed as a phonologically null reflexive (or a pro), and the IHRC should be analyzed as a non-restrictive relative clause. The motivation for treating IHRCs as non-restrictive relatives comes from the fact that elements inside non-restrictive relatives are not subject to Condition C of the Binding Theory (whatever is responsible for this phenomenon), as discussed above in Section 2.3.1.

C. Kitagawa further claims that, when the internal head is a wh-interrogative, as illustrated in (28), pro should be analyzed as a D category that is co-indexed with the invisible [+WH] feature on the internal head, which presumably raises at LF to the Specifier position of the DP containing the IHRC+no string.

(28) Sensei-wa [[Ken-ga nani-o mottekita] no]-o
     teacher-top [[K.-nom what-acc brought] no]-acc
toriagensita ka?
     confiscated Q?

‘What, brought by Ken, did the teacher confiscate?’

(C. Kitagawa 2003: (11))
As a way of accommodating the diverse manifestations of the IHRC construction, C. Kitagawa offers a three-way sub-classification of the IHRC construction in Japanese (and, by extension, in Korean), as given in (29). In this classification, depending on the semantic features of the internal head (e.g., [+WH], [+Quantificational]), different elements are assumed to occur in an IHRC-external position, i.e., +Wh, pro, and E.

(29) **Three-way sub-classification of the IHRC construction:**

a. **Operator-oriented IHRCs:** the internal head has [+WH] feature (e.g., (28)):

\[
[\text{DP OP}_1 [\text{CP } [t_1 [\text{IP } \ldots (\text{Wh}_i) \ldots ])] [\text{D } +\text{Wh}_i]]
\]

b. **Standard IHRCs:** the internal head is a referential expression (e.g., (27)):

\[
[\text{NP } [\text{IP } \ldots \text{NP}_i \ldots ]][\text{NP pro}_i]]
\]

c. **E-type pronoun IHRCs:** the internal head is a QP (e.g., (24)):

\[
[\text{NP } [\text{IP QP}_i [\text{IP } \ldots t_i \ldots ]][\text{N'} E_i]]
\]

The three-way classification proposed by C. Kitagawa appears attractive, as it can keep things neat and tidy, enabling us to predict a particular set of behaviors for each sub-type of the IHRC construction. This analysis is also appealing from a typological point of view, because the IHRC construction seems to come in a great variety across languages, as discussed in Culy 1990, Basilico 1996, Watanabe 2003b, and Grosu 2002, among others.

In this study, however, I show that by adopting a version of E-type pronoun analysis of pro, we can derive the correct interpretations of all the instances of the IHRC construction in a uniform way and thus there is no need to posit a multiple sub-
classification of IHRCs. Given the direction we are headed, it will be necessary that we take a closer look at the existing E-type pronoun analyses of pro. Hence, in the next section, I offer a somewhat detailed review of two existing E-type pronouns analyses.

2.4. A detailed review of two versions of the E-type pronoun analysis

In this section, I evaluate two existing E-type pronouns analyses, namely, Hoshi 1995 and Shimoyama 1999, with respect to the distinctive properties of the IHRC construction. In so doing, I identify the set of assumptions that my analysis will build on and the set of problems that it will attempt to resolve. I begin this section with Hoshi’s analysis, as Hoshi was the first to note the E-type pronoun-like behavior with the pro that occurs in the IHRC construction.

2.4.1. A traditional Cooperian E-type pronoun analysis: Hoshi 1995

Hoshi (1995) proposes a version of the traditional Cooperian E-type pronoun analysis for the IHRC construction. Hence, I first offer a brief introduction to the Cooper’s (1979) original E-type pronoun analysis, thereby setting the stage for discussing Hoshi’s analysis.

2.4.1.1. A brief introduction to Cooper’s E-type pronoun analysis

Cooper (1979) treats E-type pronouns as definite descriptions in the sense of Russell (1905). That is, they are quantificational elements and they contain some-

12 Matsuda (2002) also offers an E-type pronoun analysis of the Japanese IHRC construction based on Shimoyama’s (1999) analysis. I have also proposed a few accounts of the IHRC construction (e.g., M. Kim 2004b, 2004c). I discuss parts of these accounts in Chapter 6.
property denoting expressions that consist entirely of free variables. Cooper claims that
the values of the relevant free variables are determined by the “context of use.” Applying
this idea to Geach’s (1962) famous donkey-sentences such as (30), Cooper offers (31) as
the denotation for the E-type pronoun it.

(30) Every man who owns a donkey beats it.

(31) \[ [it] = \lambda K \exists x [\forall y [S(u_o)(y) \leftrightarrow y = x] & K(y)] \], where \( K \) ranges over properties, \( x \),
\( y \), \( u_o \) over individuals, and \( S \) over relations.

In (31), \( u_o \) and \( S \) are free variables. Cooper assumes that \( u_o \) gets bound by the NP every
man who owns a donkey and the value of \( S \) is determined by the discourse context. When
the free variables receive these interpretations, the pronoun it in (30) gets interpreted as
denoting the characteristic set of the unique entity that stands in the (contextually salient)
relation \( S \) to the entity \( u_o \).\(^{14}\) That is, it has the semantics of a generalized quantifier of type
\(<<e, t>,t>\), where \( e \) is a type for individuals and \( t \) is a type for truth-values.

When we quantify-in the denotation of every man who owns a donkey, we obtain
(32a) as the translation of (30) and (32b) as its reduced form, which is produced by
applying \( \lambda \)-conversion to (32a).\(^{15}\)

---

\(^{13}\) In fact, Cooper himself calls E-type pronouns “the pronoun of laziness.” But the exact label of these
pronouns is not so important to the present discussion and hence I keep using the label “E-type pronouns”.

\(^{14}\) In this denotation, the uniqueness component comes from “\( \exists x [\forall y [S(u_o)(y) \leftrightarrow y = x]] \)”, which can be
read as: for some \( x \), for any \( y \), if \( y \) has the property of \( S(u_o) \), then \( y \) must be \( x \). This ensures that there will
be only one entity that has the property denoted by \( S(u_o) \).

\(^{15}\) Here, the symbol ‘*’ is defined as a relation between two individuals (see Dowty et al. 1981).
(32)  

a. $\lambda K \forall \exists \land \exists v[\text{man'}(u) \land \text{own'}(u, v) \rightarrow K(u)](\forall \exists x[\forall y[[\text{\textsc{S}}(u_o)](y) \leftrightarrow y = x] \land \text{beat'}(u_o, x)])$

b. $\forall \exists \land \exists v[\text{man'}(u) \land \text{own'}(u, v) \rightarrow \exists x[\forall y[[\text{\textsc{S}}(u_o)](y) \leftrightarrow y = x] \land \text{beat'}(u, x)]]$

(32b) can be read as: for any individual $u$, if $u$ is a man and there is some individual $v$ such that $v$ is a donkey and $v$ is owned by $u$, then there is some unique individual $x$ such that $x$ bears the relation $\text{\textsc{S}}$ to $u$ and $u$ beats $x$.

Given the discourse context set up by the content of the relative clause in (30), it is possible to assign the relation ‘owned by’ as the value of the variable $\text{\textsc{S}}$. When $\text{\textsc{S}}$ receives this reading, the sentence gets interpreted as: for any individual $u$, if $u$ is a man and there is some individual $v$ such as $v$ is a donkey owned by $u$, then there is some unique individual $x$ such that $x$ is owned by $u$ and $u$ beats $x$.

The derived reading for (30) yields the anaphoric interpretation of the pronoun $it$. Furthermore, it captures the fact that the value of $it$ co-varies with the value of the variable bound by the QP every man.

With this much in mind as the background, let us now turn to Hoshi’s application of Cooper’s E-type pronoun analysis to the IHRC construction in Japanese.

2.4.1.2. Hoshi’s E-type pronoun analysis of the IHRC construction

Hoshi posits that the IHRC+$no$ string is an NP which is base-generated in an argument position of the matrix clause and which is headed by a phonologically empty argument. This empty category selects for a CP which is headed by the morpheme $no$,
which he analyzes as a “nominalizing complementizer”. This idea is depicted in (33), where [e] represents an empty category, and NP2 corresponds to the internal head, and CP corresponds to the IHRC in our terminology.

(33)  

\[
\begin{array}{c}
\text{VP} \\
\text{NP}_1 \\
\text{CP} \\
\text{IP} \\
\end{array}
\]

\[
\begin{array}{c}
\text{V} \\
\text{N} \\
[e] \\
\text{C} \\
\text{no} \\
\end{array}
\]

…NP₂…

Turning now to the semantics of the IHRC construction, Hoshi proposes that the complementizer no is an identity function over truth-values (p. 141). Regarding the semantics of the empty category [e] in (33), Hoshi proposes that it denotes “the set of characteristics of the unique entity which stands in the relation \( T \) to the proposition \( p \)” (which is denoted by the embedded clause) (p. 142). This idea is formally represented in (34).

\[
[[e]] = \lambda K \exists y[\forall z[\sim T(p)](z) \leftrightarrow z = y] \land K(y)
\]

where \( K \) ranges over properties, \( y \) and \( z \) over individuals, \( T \) over relations, and \( p \) over propositions.
It is important to note that the denotation of the empty category given in (34) differs slightly from the semantics of an E-type pronoun in Cooper’s system: just like the free variable $S$ in Cooper’s analysis, the variable $T$ in (34) also denotes a salient relation in the discourse context, but, unlike $S$, it denotes a relation that holds between a proposition and a predicate of individuals, rather than a relation that holds between a contextually salient individual and a predicate of individuals. Hoshi stipulates that the value of $T$ is determined by “the relevant semantico-pragmatic information coming from the embedded clause and the matrix clause (p. 142).” As we shall see below, this departure from Cooper’s E-type pronoun analysis has an important empirical consequence.

Another assumption that Hoshi makes to get the semantics to work is that, when the null pronoun’s denotation given in (34) combines with the denotation of the CP which consists of the IHRC and $no$, $\lambda$-abstraction occurs over the propositional variable $p$ inside the denotation of the null pronoun. Hence, when the pronoun and the CP are combined, we obtain (35), which denotes a function from a set of possible worlds to a function from a set of individuals to truth-values.

\[
(35) \lambda p \lambda y [\forall z ([\text{T}(p)](z) \leftrightarrow z = y) \& K(y)]
\]

When applied to a Japanese sentence given in (36), the interpretive system proposed by Hoshi yields (37) as its logical structure.
In essence, what (37) says is that sentence (36) will be true if and only if ‘there is some unique entity $y$ such that $y$ bears the relation $T$ to the proposition ‘there is some orange $x$ such that Mary put $x$ on the table’ and John picked up $y$.’

The truth-conditions in (37) are derived via the computational process given in (39), based on the LF structure in (38).\(^{16}\) (In this derivation process, the application of the assignment function $g$ to the interpretation of each item is suppressed. What this means is that, for any expression $\alpha$, $[\alpha]$ should be read as $[[\alpha]^g]$.)

---

\(^{16}\) Hoshi does not offer the LF structure for (36), but I offer it here for expository convenience. Note that I took the liberty of departing from the original proposal by assuming that QPs undergo LF raising to a position where it can be interpreted. In addition, following Heim and Kratzer (1998), I assume that the index of the moved noun phrase is interpreted as a lambda abstractor over the variable it is a co-indexed with (see Chapter 1 Section 1.4). Furthermore, the LF structure given in (38) does not reflect the fact that Hoshi adopts the VP-internal subject hypothesis.
(38) The LF structure of (36):

\[
\begin{array}{c}
\text{IP}_1^{**} \\
\text{NP}_1 \\
\quad \text{CP} \\
\quad \quad \text{N} \\
\quad \quad \quad [e] \\
\quad \quad \text{IP}_2 \\
\quad \quad \quad \text{C} \\
\quad \quad \quad \quad \text{no} \\
\end{array}
\]

Mary-ga teeburu-no

Ue-ni orenzi-o oitekureta

‘Mary put an orange on the table’

\textit{tenitotta}

‘picked up’

(39) The derivation of the truth-conditions:

\[
[[\text{IP}_2]] = \exists x [\text{orange}(x) \& \text{put.on.the table}(x)(\text{Mary})]
\]

\[
[[\text{CP}]] = [[\text{no}]][[[\text{IP}]])
\]

\[
= \lambda p[\exists x [\text{orange}(x) \& \text{put.on.the table}(x)(\text{Mary})]] = (\text{via } \lambda\text{-reduction})
\]

\[
= \exists x [\text{orange}(x) \& \text{put.on.the table}(x)(\text{Mary})]
\]

\[
[[e]] = \lambda K\exists y[\forall z[\forall T(p)] \leftrightarrow z = y] \& K(y)]
\]
[[NP₁]] = [[e]][[[CP]]]

= λpλK∃y[∀z[⌜∀x[orange(x) & put.on.the table(x)(Mary)](z) ↔ z = y] & K(y)](∃x[orange(x) & put.on.the table(x)(Mary)])(z) = (via λ-reduction)

= λK∃y[∀z[⌜∀x[orange(x) & put.on.the table(x)(Mary)](z) ↔ z = y] & K(y)]

[[VP]] = λy[picked.up(t₁)(y)]

[[IP₁]] = [[VP]] ([[John]])

= λy[picked.up(t₁)(y)](John) = (via λ-reduction)

= [picked.up(t₁)(John)]

[[IP₁⁺]] = λt₁[picked.up(t₁)(John)] = (via predicate abstraction)

[[IP₁++] = [[NP₁]][[[IP₁⁺]]]

= λK∃y∀z[⌜∀x[orange(x) & put.on.the table(x)(Mary)](z) ↔ z = y] & K(y)](λt₁[picked.up(t₁)(John)]) = (via λ-reduction)

= ∃y∀z[⌜∀x[orange(x) & put.on.the table(x)(Mary)](z) ↔ z = y] & λt₁[picked.up(t₁)(John)(y)] = (via λ-reduction)

= ∃y∀z[⌜∀x[orange(x) & put.on.the table(x)(Mary)](z) ↔ z = y] & picked.up(y)(John)]
The truth-conditions derived in (39) seem to match native speakers’ intuitions about the meaning of the sentence, suggesting that the interpretive system proposed by Hoshi is on the right track. This proposal has several other merits as well.

First, by treating the empty category inside the IHRC+no string as a pronominal definite description, it captures the maximality effect exhibited by the IHRC construction; that is, it refers to the unique entity that has a salient property.

Second, by postulating the free relational variable \( T \) inside the denotation of the empty category, this analysis captures the context-dependency of the internal head.

Third, this analysis can capture the Relevancy Condition proposed by Kuroda, which is a pragmatic condition that dictates that the IHRC’s content be pragmatically relevant to the matrix clause’s content (though this point is not noted by Hoshi). This welcome result comes about because the denotation of the empty category will saturate one of the arguments of the matrix predicate and thus the salient relation that holds between the pronoun and the embedded clause’s content will be transmitted to the content of the matrix clause, ultimately making the embedded clause’s content stand in a pragmatically salient (and hence relevant) relation to the matrix clause’s content.

Finally, the interpretive system provided by Hoshi can derive the correct interpretations for sentences that instantiate all the three sub-types of the IHRC construction in C. Kitagawa’s classification (on the condition that the value of the salient property denoted by the relation between the two free variables \( S \) and \( u \) can be determined in a more constrained way). We already know that Hoshi’s system can derive the interpretations of sentences instantiating the standard IHRC construction in C. Kitagawa’s classification, because sentence (36) is one of those sentences. But this
system can also derive the interpretation of the other two sub-types, namely, the operator-oriented IHRCs, which essentially refer to IHRCs whose semantic heads are wh-words, and the (pure) E-type IHRCs, which refer to IHRCs whose semantic heads are QPs.

To see how Hoshi’s system derives the interpretation of operator-oriented sentences, consider first (40), which is repeated from (28) above.

(40)  Sensei-wa [[Ken-ga nani-o mottekita] no]-o
teacher-top [[K.-nom what-acc brought] no]-acc
toriagemasita ka?
confiscated Q?
‘What, brought by Ken, did the teacher confiscate?’

According to Karttunen (1977), a question denotes the set of propositions of a certain shape that are true answers to that question (cf. Hamblin 1973). Hence, under this analysis, sentence (41) can be translated as (42).

(41)  Who did John catch?

(42)  \( \lambda p. \exists x \in D_e[p = \lambda w.\text{catch}(x)(\text{John})(w)] \), where \( p \) ranges over propositions, \( x \) over individuals, and \( w \) over worlds.

Roughly speaking, what (42) says is that (41) denotes a set which contains, for each person that John catches, the proposition \( p \) that, in a given world \( w \), John catches him in
w. So if John happened to catch Bill and Sam, then (41) will denote a set containing only the two propositions expressed by *John caught Bill* and *John caught Sam*.

If we apply Karttunen’s treatment of questions to a somewhat simpler version of sentence (40) such as (43), then we obtain (44) as its interpretation.

(43) Sensei-wa  nani-o  toriagemasita  ka?
    teacher-top  what-acc  confiscated  Q?
    ‘What, brought by Ken, did the teacher confiscate?’

(44)  \[ \lambda p. \exists x \in D_e[p = \lambda w.\text{confiscate}(x)(\text{the teacher})(w)] \]

Turning now to the semantics of (40), this sentence differs from (43) in two ways. One difference is that (40) is a complex sentence where one sentence is embedded within another and the matrix clause contains a definite description whose content comes from the embedded clause. Given this, in order to derive the interpretation of (40) based on (43), we need to add to (44) the interpretations of the embedded clause and the pronominal definite description (pro). In Hoshi’s interpretive system, the definite description takes widest scope in the sentence. Hence, when we apply this system to (40), coupled with Karttunen’s treatment of questions, we obtain something like (45) as the interpretation of the sentence. (Note that the world variable is added to the embedded clause’s denotation.)
The denotation of (40) under Hoshi’s analysis:

\[ \lambda p. \exists x \in D_p \exists w \forall y \forall z [v T(\exists u[\text{thing}(u) \& \text{bring}(u)(\text{Sue})(w)])(z) \leftrightarrow z = y] \& \text{confiscate}(y)(\text{the teacher})(w) \].

(45) denotes the set containing all true propositions expressed by (41). That is, it picks out, for each object \( x \), the proposition \( p \) that, in a given world \( w \), there is some unique entity \( y \) such that \( y \) stands in the \( T \) relation to the proposition that ‘there is some object \( x \) such that Sue brought \( x \) in \( w \)’ and the teacher confiscated \( y \) in \( w \).

This interpretation seems compatible with native speakers’ intuitions about the meaning of the sentence. Hence, we can conclude that Hoshi’s system can derive correct interpretations for sentences instantiating the operator-oriented IHRC construction in the sense of C. Kitagawa.

Let us now see whether Hoshi’s system can also derive the correct interpretations for “typical” E-type pronoun IHRCs in C. Kitagawa’s classification. To this end, consider first sentence (46). In this sentence, the definite description denoted by \([e]\) is anaphorically linked to the universal QP \( \text{donno kukkii} \) ‘every cookie’.

(46)  Taroo-wa  [[Yoko-ga  reezooko-ni  \( \text{donno kukkii-o} \)

T.-top  [[Y.-nom  refrigerator-loc  \( \text{every cookie-acc} \)

irete-oita-∅]  no \([e]\)-o  paatii-ni  motte  itta.

put-aux-rel]  no \([\_]\)-acc  party-to  brought.

‘Yoko put every cookie in the refrigerator and Taroo brought all of them to the party.’
In Hoshi’s system, (46) will receive the following interpretation:

(47)  The denotation of (46) under Hoshi’s analysis:

$$\exists y \forall z [\forall x [\text{cookie}(x) \rightarrow \text{put.in.the.fridge}(x)(\text{Yoko})](z) \leftrightarrow z = y] \land \text{bring.to.the.party}(y)(\text{Taroo})$$

This formula reads as: there is some unique entity $y$ such that $y$ stands in the $T$ relation to
the proposition ‘for every $x$, if $x$ is a cookie, then Yoko put $x$ in the fridge’ and Taroo
brought $y$ to the party.

The derived denotation of (46) seems to capture the meaning of the sentence. Thus, we can conclude that Hoshi’s system can derive the interpretations of E-type IHRCs in C. Kitagawa’s typology.

In light of the foregoing discussion, we can say that Hoshi’s E-type treatment of the IHRC construction can derive the correct interpretation of the IHRC construction while capturing many of the challenging properties of the internal head. Given this, it is tempting to adopt this analysis as a proper semantic treatment of the IHRC construction. Under scrutiny, however, this analysis turns out to have at least three empirical problems.

First, in Hoshi’s analysis, $\text{pro}$ is treated as a generalized quantifier and hence it is expected to interact with other scope-bearing elements in the sentence. But this quantificational treatment of $\text{pro}$ can generate incorrect interpretations for some sentences. To illustrate, consider (48).
Under Hoshi’s analysis, this sentence contains two quantificational elements, namely, the definite description denoted by the object DP that contains an IHRC and the QP *dono gakusei* ‘every student’ which plays the role of the matrix subject. These two quantificational expressions both have the semantics of a generalized quantifier over entities. Hence, depending on the relative scope between them, different readings can come about. If the matrix object DP, i.e., the IHRC+*no* string, takes scope over the matrix subject by raising to the matrix clause’s IP, then Reading 1 in (49) comes about. On the other hand, if the matrix subject takes scope over the matrix object by raising above the object that has already undergone LF-movement, then we obtain Reading 2 given in (50).

(49) **Reading 1**: matrix object (the definite description) >> matrix subject (the QP)

There is some unique *y* such that it bears the relation *T* to the proposition ‘there is some *z* such that *z* is a term paper and the cardinality of *z* is three and Taroo wrote *z* this semester’ and for all *x*, if *x* is a student, *x* read *y* this morning.

(Formally: $\exists y [\forall z [\exists k [\text{paper}(k) \land |k| = 3 \land \text{write.this.semester}(k)(\text{Taroo})](z) \leftrightarrow z = y] \land \forall x [\text{student}(x) \rightarrow \text{read.this.morning}(y)(x)]]$)
Reading 2: matrix subject >> matrix object

For every $x$, if $x$ is a student, there is some unique $y$ such that $y$ bears the relation $T$ to the proposition ‘there is some $z$ such that $z$ is a term paper and the cardinality of $z$ is three and Taroo wrote $z$ this semester,’ and $x$ read $y$ this morning.

(Formally: $\forall x[\text{student}(x) \rightarrow \exists y[\forall z[[\forall x[\text{paper}(x) \& |k| = 3 \& \text{write.this.semester}(x)(\text{Taroo})]](z) \leftrightarrow z = y] \& \text{read.this.morning}(y)(x)])$

Given the availability of these two readings, it is predicted that sentence (48) will be true either in a context where Taroo wrote only three papers and every student in the quantification domain read those three papers (Reading 1) or in a context where Taroo wrote several papers and every student read three different papers—that is, in the latter context, the set of three papers co-varies with the choice of the student in the quantification domain (Reading 2). Contrary to this prediction, however, native speakers judge that this sentence describes only the second context. That is, it can only have the reading where the definite description takes widest scope in the sentence.

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17 I thank Mako Hirotani, Makoto Kadowaki, Shigeto Kawahara, Koichiro Nakamura, and Taka Shinya for the judgments.

18 The corresponding Korean sentence given in (i) below also shows the same semantic behavior: it will be verified if and only if Chelswu wrote only three papers this semester and every student in the quantification domain read those three papers this morning.

(i) Enu haksayng-ina [NP Chelswu-ka ipen hakki-ey nonmwun-ul every student-indet [C.-nom this semester-loc paper-acc sey-kay ssu-∅]-n kes]-ul onul achim-ey lkessta. three-cl write-prf]-rel kes]-acc this morning-loc read.

‘Chelswu wrote three term papers this semester and every student read them this morning.’
The next problem with Hoshi’s proposal is that it fails to account for the split-antecedent phenomenon exhibited by the IHRC construction, which was illustrated above in (27) and is repeated below in (51).

(51) John-wa [[neko]-ga nezumi-o oikake-tei-ta-∅]-pro
John-top [[cat-nom mouse-acc chase-prog-past-rel]-pro
no]-o (hutarito-mo) tukamaeta.
no]-acc (two-also) caught.

‘A/the cat was chasing a/the mouse and John caught them both.’

In Hoshi’s system, this sentence is translated as: there exists some unique entity \( y \) such that \( y \) stands in the \( T \) relation to the proposition that ‘there was a cat chasing a mouse’ and John caught \( y \). But this interpretation does not seem to derive the reading where John caught both the cat and the mouse at the same time, because it is pragmatically anomalous to assert that there exists some unique, single entity that is both the cat and the mouse at the same time. What we want instead is something like: there exists the plural entity that consists of the unique entities that stand in some salient relation \( T \) to the content of the embedded clause. Hence, I conclude that the E-type pronoun analysis proposed by Hoshi needs amendment to accommodate the split-antecedent phenomenon.

The last empirical inadequacy of Hoshi’s analysis is that, as Hoshi himself points out, it cannot account for the contrast between the following pair of Japanese sentences,
which differ sharply with respect to their acceptability despite the fact that the embedded clauses convey nearly identical information and the matrix clauses are string-identical.¹⁹

(52) Yamada-san-wa [[otonari-no musukosan-ga wakai Y.-hon-top [[next.door-gen son-nom young oyomesan-o morratta]-∅ no]-o tyoonai-no bride-acc got]-rel comp]-acc neighborhood-gen huzinkai-ni kanyuusiyootosita.

women’s club-dat tried to talk into joining.

‘The next door neighbor’s son got a young bride and Ms. Yamada tried to talk her (= the young bride) into joining the women’s club in the neighborhood.’

(Hoshi 1995: 151, (70))

¹⁹ The Korean IHRC construction patterns in the same way, as shown in (i) and (ii).


join-comp persuaded.

‘The next door neighbor’s son got a young bride and the old lady persuaded her (= the young bride) to join the women’s club in the neighborhood.’


join-comp persuaded.

Intended: ‘The next door neighbor’s son recently got married and the old lady persuaded her (= his wife) to join the women’s club in the neighborhood.’
Hoshi attributes this problem to the so-called “formal link” problem presented by E-type pronouns, which was discussed first by Evans (1977) and later by authors like Kadmon (1987) and Heim (1990) (pp. 149-150). This problem refers to the phenomenon where E-type pronouns seem to be “licensed” only when they have a linguistically represented antecedent in the preceding discourse. To illustrate, consider the following paradigms from English:

(54)a. John has a wife and she hates him.

b.*John is married and she hates him.

(Evans 1977: 532, my emphasis)
In the above paradigms, the contrast between the (a) and the (b) sentences shows that, while uttering “John has a wife” gives enough “saliency” to John’s wife, rendering it referable by the E-type pronoun *she* in the following sentence, uttering “John is married” does not, despite the fact that this utterance conveys similar information to the other. This suggests that making some property salient in the discourse is not sufficient to license an E-type pronoun. In other words, the salient property must be expressed linguistically (in the form of an NP) in the preceding sentence.

This “licensing condition” on E-type pronouns presents a problem to the standard E-type pronoun analysis, because E-type pronouns are supposed to denote the set of characteristics of the unique entity which stands in a contextually salient relation to a contextually salient entity and hence they are expected to be licensed when(ever) contextual saliency is established for their potential referents.20

If the same licensing condition holds for the definite description in the IHRC construction, then it will also present a problem for Hoshi’s (1995) analysis, because his analysis also hinges on the assumption that the value of a definite description is restricted by a salient property that is provided by the content of the embedded clause. Since uttering the embedded clause of (53) will make the relation ‘being marred to’ salient, it should be possible for us to interpret the definite description as referring to the unique

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entity that stands in ‘being married to’ relation to the proposition denoted by the embedded clause. Furthermore, this relation does not seem so different from ‘being a wife of’, which comes about by uttering the embedded clause of (52). Hence, under Hoshi’s analysis, the two sentences are predicted to have the same degree of acceptability, contrary to fact.

This shortcoming of Hoshi’s analysis suggests that postulating too many free variables inside the denotation of the definite description is not a desirable line to pursue. That is, we need a formal device that can restrict the possible value of the salient property of the definite description. Given the striking parallel between the definite description that occurs in the IHRC construction and typical E-type pronouns, one might suspect that they might be subject to the same constraint and hence resolving the formal linking problem presented by one of them will shed light on the other. I believe that this conjecture is basically on the right track, especially when we approach the phenomenon from a broader perspective. I will show in Chapter 5, however, that the two types of definite descriptions are subject to slightly different licensing conditions. In the meantime, though, I turn to reviewing a slightly different E-type treatment of the IHRC construction, namely, Shimoyama 1999.

2.4.2. An amended E-type pronoun analysis of the IHRC construction: Shimoyama 1999

Shimoyama (1999) offers a slightly different E-type analysis from Hoshi by adopting Heim and Kratzer’s (1998) rendition of Cooper’s (1979) E-type pronoun theory. In what follows, I first briefly outline Heim and Kratzer’s E-type pronoun analysis and
then discuss Shimoyama’s application of this analysis to the Japanese IHRC construction (and, by extension, to the Korean IHRC).

2.4.2.1. A brief introduction to Heim and Kratzer’s E-type pronoun analysis

The primary goal of Heim and Kratzer’s (1998; henceforth H&K) E-type pronoun analysis is to derive correct interpretations for typical donkey-sentences such as (56), where the value of the E-type pronoun *it* co-varies with the selection of the farmer in the quantificational domain (pp. 290-293).

(56) Every farmer who owns a donkey beats *it*.

H&K capture this co-variance relation between *it* and *every farmer* by postulating that E-type pronouns consist of a definite article and a predicate which in turn consists of two types of free variables, namely, *R* and *pro*. This idea is schematically represented in (57). Here, the numbers 7 and 1 represent indices.

(57) [the \([R <7, e, e, t>, pro <1, e>]\)]

In the above structure, *R* is a salient two-place relation variable and its value is determined by context (via the assignment function \(g_c\)), where context refers to both the context set up by the content of a sentence and the non-linguistic discourse context. On the other hand, *pro* denotes a variable which can be bound by a salient QP in the context.
When applied to sentence (56), this system yields something like (58) as the value of $R$, namely, the relation ‘donkey owned by’ which holds between two individuals. Put in more informal terms, the assignment function $g$ takes the index 7 and returns a two-place relation ‘donkey owned by’ that holds between individuals $x$ and $y$.

(58)  \[ g_c: = [7 \rightarrow \lambda x \in D_c. \lambda y \in D_c. \text{y is a donkey that x owns}] \]

On the other hand, in H&K’s system, $pro$ in (56) gets bound by the noun phrase every farmer who owns a donkey, because it is presumably the most salient QP in the context. This binding relation will make the value of $pro$ co-vary with the assignment of the farmer in the quantification domain. When we assign these values to $R$ and $pro$, we obtain (59) as the truth-conditions of (56), where the highlighted part corresponds to the value of the E-type pronoun $it$ in the sentence.

(59)  For every individual $x$, if $x$ is a farmer and there is some $y$ such that $y$ is a donkey and $x$ owns $y$, then $x$ beats the donkey owned by $x$.

With this much as the background, let us now turn to Shimoyama’s application of H&K’s E-type pronoun analysis to IHRC sentences in Japanese.
2.4.2.2. Shimoyama’s E-type treatment of the IHRC construction

Shimoyama (1999) employs H&K’s E-type pronoun analysis to derive correct interpretations for Japanese sentences such as (60). The motivation for adopting this analysis comes from the fact that, in (60), the value of the IHRC+ string seems to co-vary with the value of the variable denoted by the subject of the embedding clause dono gakusei-mo ‘every student’, paralleling the relation between it and every farmer in (56).

\[(60)\] Dono gakusei\textsubscript{i}-mo [soitu\textsubscript{1}-ga kongakki peepaa-o
Which student-mo [she/he-nom this semester term.paper-acc
kaita-no]-o kesa teisyutusita.
wrote-no]-acc this morning turned\textsubscript{i}

‘Every student wrote a term paper/term papers this semester and submitted it/them this morning.’

Given the striking parallel between (56) and (60), Shimoyama hypothesizes that the IHRC+ string contains an anaphoric element which can be best analyzed as an E-type pronoun in H&K’s system. Shimoyama claims that what would be spelled out as the in English E-type pronouns is spelled out as no in the Japanese IHRC construction. Following Link’s (1983) treatment of definite descriptions, Shimoyama proposes that no denotes a function that takes a salient property and maps it onto the maximal individual that satisfies that property. That is, unlike Hoshi, she does not treat definite descriptions as generalized quantifiers; instead, she treats them as functions of type \(<<e, t>, e>\), where

\[21\] This sentence is adapted from Shimoyama’s (14) (p. 164). The original example contains another quantifier san-bon ‘three-classifier’ in the embedded clause. But, to keep matters simple, I removed this QP, because its presence or absence in the sentence is immaterial to present discussion.
e is a type for individuals and t is a type for truth-values. This proposal is formally represented in (61).

\[(61) \quad [[no]] \in D \ll [e, t, e]\]

\[[no]](f)\) denotes the maximal individual \(a\) such that \(f(a) = 1\).

(Shimoyama 1999: 167)

To derive the semantics of the IHRC construction in a compositional manner, Shimoyama assumes that IHRC+\(no\) string occurs in an argument position. She further posits that \(no\) is a nominalizer which is base-generated under D, heading the DP that contains the IHRC+\(no\) string and taking a phonologically null NP as its sister, which in turn consists of two unpronounced elements, namely, the head noun N and its DP sister. In addition, it is assumed that the IHRC is base-generated in the specifier position of the DP, rather than as a complement to \(no\) (Compare with Hoshi’s (1995) structure).

These structural assumptions are represented in tree diagram (62), which corresponds to the syntactic structure of the VP of sentence (60) under Shimoyama’s analysis. This diagram shows that the unpronounced head noun that occurs inside the null NP sister of \(no\) is interpreted as a free variable \(R\) and the unpronounced DP that occurs next to this head noun is interpreted as a free variable \(pro\) in H&K’s proposal.
When applied to sentence (60), Shimoyama’s proposal can produce (63) as the value for $R$, namely, the two-place relation ‘term paper written by’. Shimoyama assumes that the individual variable $x$ that occurs inside (63) gets bound by the universal quantifier *dono gakusei*, which occurs as the subject of the matrix clause, because it is presumably the most salient QP in the discourse context.

(63) $g_c = [7 \rightarrow \lambda x \in D_c. \lambda y \in D_c. y \text{ is term papers that } x \text{ wrote this semester}]$
When we assign (63) to $R$ as its value, and combine it with the proposed denotation of *no*, we obtain (64) as the interpretation of the definite description that occurs in the object position of sentence (60).

(64) The maximal individual that satisfies the property of being term papers written by $x$ this semester

(Shimoyama 1999: 168)

Shimoyama derives the semantics of the entire sentence by assuming that, just as appositive clauses are interpreted in Demirdache 1991, the IHRC raises at LF and adjoins to the matrix clause, and in this raised position, the IHRC’s denotation combines with the matrix clause’s denotation via the logical connective ‘&’. 22 Under this analysis, we obtain (65) as the LF structure of (60), and (67) as its truth-conditions. This LF structure reflects the raising of the IHRC followed by the raising of the matrix subject. It also shows that Shimoyama adopts the VP-internal subject hypothesis, which is proposed or endorsed by Fukui and Speas (1986), Kuroda (1988), Koopman and Sportiche (1991), among others.

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22 Shimoyama employs Demirdache’s (1991) treatment of appositive clauses to derive the non-restrictive interpretation of an IHRC with respect to the internal head, but she does not treat IHRCs as appositives.
(65) The LF structure of (60) (Based on Shimoyama’s (39)):

```
IP_{1***}
  /\   /
 /   /  \   /
|   |   |   |
DP  IP_{1**} IP_{1*}
      /\   /\   /
     /   /  \  /
    |   |   |  |
  Dono gakusei-mo pro_{4} kongakki peepaa-o kaita
  'every student' 'he_{4} wrote papers this semester'

CP_{1}
  /\   /
 /   /  \   /
|   |   |   |
VP  VP   VP
   /\ /\ /\ /
  /   /  \  /
 |   |   |  |
 t_{4} V' ta
 past
   /
  /\   /
 /   /  \   /
|   |   |   |
DP  DP   DP
    /\ /\ /\ /
   /   /  \  /
  t_{i} D' D'
     /
     /\   /
    /   /  \   /
   |   |   |   |
  teisyutusi 'submit'

NP
   /
  /\   /
 /   /  \   /
|   |   |   |
N'  N'   N'
    /\ /\ /\ /
   /   /  \  /
  |   |   |  |
 pro_{, <4, e>} R_{, <9, <e, e, t, d>>}
```

(66) The truth-conditions of (60):

‘For every x, if x is a student, then x wrote y this semester and y is a term paper (or term papers) and this morning x submitted the maximal individual z such that z is the term paper(s) that x wrote this semester.’
These truth-conditions are compatible with native speakers’ intuitions about the meaning of the sentence. They also seem able to capture the co-variance relation that holds between the term-paper(s) and the selection of the student in the quantification domain, as desired. Furthermore, they reflect the maximality interpretation of the definite description that occurs in the IHRC construction.

Shimoyama’s E-type pronoun analysis also has a couple of additional welcome results as well. First, unlike Hoshi’s proposal, it does not generate the non-existent reading for (60) where the definite description takes scope over the universal quantifier subject of the matrix clause. This is because, under this analysis, definite descriptions are analyzed as referential expressions, rather than as generalized quantifiers and, hence, they are not expected to interact with scope-bearing elements.

Second, by positing LF-raising of the IHRC, Shimoyama’s analysis provides a way of capturing other aspects of the IHRC construction such as the tight semantic relation that holds between the content of the embedded clause and that of the matrix clause in a more or less compositional manner.\(^{23}\)

Despite these merits, however, this analysis encounters several non-trivial empirical problems. First, as Shimoyama herself points out (Shimoyama 1999: 171), this system cannot capture the fact that the descriptive content of the definite description that occurs in the IHRC construction comes exclusively from the embedded clause’s content and never from the discourse context. To illustrate, consider discourse (67), which consists of two sentences, the second of which instantiates the IHRC construction.

\(^{23}\) This point will be discussed further in Chapter 3, where I review the existing accounts of the semantic relation between the embedded clause and the matrix clause of the IHRC construction.
In Shimoyama’s system, interpreting the pronominal definite description that occurs in the IHRC construction involves recovering a contextually salient property which will restrict the pronoun’s denotation (this property corresponds to the internal head’s denotation in our earlier terminology). Since any one-place relation that is salient in the discourse can, in principle, restrict the pronominal definite description’s denotation, it should be possible to postulate that what is recovered from the context set up by (67) is a property of ‘being bought by Hanako’. If so, then the definite description that occurs in the object position of the second sentence in (67) should refer to the maximal entity that has the property of being bought by Hanako. That is, it can be interpreted as ‘what Hanako bought.’ Hence, the definite description is expected to refer to the plural entity that consists of the three books that Hanako bought and brought and the newspapers that she bought and brought. According to our intuitions, however, this is not what the
definite description refers to; it refers only to the newspapers that Hanako bought and brought, as the English translation suggests.\textsuperscript{24,25}

Another challenge that confronts Shimoyama’s analysis concerns its assumptions about the interpretation of the free individual \textit{pro} that is postulated inside the denotation of the definite description. In this analysis, \textit{pro} can be bound by the universal quantifier subject of the matrix clause, because it can be bound by any contextually salient quantifier. (In fact, it is tacitly assumed that it will be almost always bound by the quantificational subject of the matrix clause, despite the fact that it is a free variable.) But this binding possibility can produce incorrect truth-conditions for some sentences.

To illustrate, consider (68). This sentence minimally differs from (60) in that a referential expression \textit{Taroo} occurs as the subject of the embedded clause, in lieu of a pronoun \textit{soitu} ‘he/she’, which can be interpreted as a variable bound by the QP subject of the matrix clause.

\begin{tabular}{l}
\textbf{68} & \\
\textit{Dono} & \textit{sensei-mo} & \textit{[Taro-ga kongakki peepaa-o} \\
\textit{Every} & \textit{teacher-mo} & \textit{[T.-nom this semester term paper-acc} \\
& & \textit{kaita-∅]-no]-o kesa yonda.} \\
& & wrote-rel]-nml]-acc this morning read.
\end{tabular}

‘\textit{Taro} wrote a term paper/papers this semester and \textit{every teacher} read them (= the term papers written by \textit{Taro}).’

\textsuperscript{24} This problem may not arise in Hoshi’s system, because it stipulates that the values of the free variables \textit{T} and \textit{p} will be provided only by the embedded clause’s content.

\textsuperscript{25} Shimoyama analyzes the problem presented by (67) as an instantiation of the formal link problem of E-type pronouns. However, I show in Chapter 5 that the definite description that occurs in the IHRC construction is subject to a rather different licensing condition from typical E-type pronouns.
Although (68) differs from (60), the interpretive system proposed by Shimoyama does not necessarily differentiate the two sentences: just as in (60), we can assign the two-place relation ‘term paper written by’ as the value for the free variable $R$ in (68). In addition, we can also assume that the individual variable pro is bound by the QP subject of the matrix clause, namely, dono sensei-mo ‘every teacher.’ Hence, we can obtain (69) as its truth-conditions. These truth-values are derived based on the LF-structure given in (70) via the computation process spelled out in (71).

(69) **The truth-conditions of (68):**

For every $x$, if $x$ is a teacher, then there is some $y$ such that $y$ is a term-paper (term-papers) and Taro wrote $y$ this semester and this morning $x$ read the maximal individual $z$ such that $z$ is a term-paper (or term-papers) that $x$ wrote this semester.
The LF structure of (68):²⁶

²⁶ Shimoyama (1999, 2002) assumes that, unlike the trace of the raised QP subject, the trace of the raised IHRC has no semantic contribution and hence is not interpreted. As we shall in Chapters 5 and 6, however, interpreting this trace has an important consequence for capturing some of the most recalcitrant properties of pro.
(71) The computation of the truth-conditions of (68):\(^{27}\)

\[
[[DP_1]] = [[no]][[[NP]]] = \sigma z[\text{term.paper}(z) \& \text{write.this.semester}(z)(t_4)]
\]

\[
[[V']] = [[V]][[[DP]]]
= \lambda x \lambda y[\text{read.this.morning}(x)(y)](\sigma z[\text{term.paper}(z) \& \text{write.this.semester}(z)(t_4)])
= \lambda y[\text{read.this.morning}(\sigma z[\text{term.paper}(z) \& \text{write.this.semester}(z)(t_4))](y)]
\]

\[
[[VP]] = [[V']][[[t_4]]]
= \lambda y[\text{read.this.morning}(\sigma z[\text{term.paper}(z) \& \text{write.this.semester}(z)(t_4))](y)](t_4)
= \text{read.this.morning}(\sigma z[\text{term.paper}(z) \& \text{write.this.semester}(z)(t_4))](t_4)
\]

\[
[[IP_1]] = \exists y[\text{read.this.morning}(\sigma y[\text{term.paper}(y) \& \text{write.this.semester}(y)(t_4))](t_4)]
\]

\[
([[IP_1]*]) = (\text{via logical connective} \&)
\]

\[^{27}\text{Here, the symbol `\sigma` represents Link's (1983) sum operator, which is responsible for the maximality or uniqueness interpretation of the definite description.}\]
\[ [[\text{IP}_1]] = [[\text{CP}_1]] \]
\[ = \exists z [\text{term.papers}(z) \land \text{write.this.semester}(z)(\text{Taro})] \land \]
\[ \exists y [\text{read.this.morning}(\sigma y [\text{term.paper}(y) \land \text{write.this.semester}(y)(t_4)])(t_4)] \]
\[ = \text{(via predicate abstraction over } t_4) \]

\[ [[\text{IP}_{1**}]] = \lambda t_4 \exists z [\text{term.papers}(z) \land \text{write.this.semester}(z)(\text{Taro})] \land \]
\[ \exists y [\text{read.this.morning}(\sigma y [\text{term.paper}(y) \land \text{write.this.semester}(y)(t_4)])(t_4)] \]

\[ [[\text{DP}_2]] = \lambda P \forall x [\text{teacher}(x) \to P(x)] \]

\[ [[\text{IP}_4]] = [[\text{DP}_4]]([[\text{IP}_3]]) \]
\[ = \lambda P \forall x [\text{teacher}(x) \to P(x)] (\lambda x \exists z [\text{term.papers}(z) \land \]
\[ \text{write.this.semester}(z)(\text{Taro})] \land \exists y [\text{read.this.morning}(\sigma y [\text{term.paper}(y) \land \]
\[ \text{write.this.semester}(y)(x)])(x)]) \]
\[ = \forall x [\text{teacher}(x) \to \exists z [\text{term.papers}(z) \land \text{write.this.semester}(z)(\text{Taro})] \land \]
\[ \exists y [\text{read.this.morning}(\sigma y [\text{term.paper}(y) \land \]
\[ \text{write.this.semester}(y)(x)])(x))] \]
\[ = \forall x [\text{teacher}(x) \to \exists z [\text{term.papers}(z) \land \text{write.this.semester}(z)(\text{Taro})] \land \]
\[ \exists y [\text{read.this.morning}(\sigma y [\text{term.paper}(y) \land \text{write.this.semester}(y)(x)])(x)] \]

The truth-conditions derived in (71) will make (68) felicitous if and only if every teacher in the quantification domain read the term-paper that he or she wrote this semester and the reading event occurred this morning. According to our intuition,
however, the sentence means that every teacher read the paper(s) that Taro wrote, not the one(s) that he/she wrote.

Why then was it possible for Shimoyama’s system to derive intuitively correct truth-conditions for sentence (60)? The system could derive the correction interpretation for (60) because, in that sentence, the subject of the embedded clause is a pronoun and hence we could interpret it as a variable bound by the universal quantifier subject of the matrix clause.28

The last empirical challenge for Shimoyama’s analysis comes from sentences that instantiate the so-called split-antecedent phenomenon, which is illustrated by (27), where the definite description is interpreted as anaphorically linked to two discontinuous noun phrases. For ease of reference, the relevant example is repeated below as (72).

(72) John-wa [[neko\_l\_ga nezumi\_j\_o oikake-tei-ta-∅]-pro\_r\_j
John-top [[cat-nom mouse-acc chase-prog-past-rel]-pro
no\_l\_o (hutarito-mo) tukamaeta.
no\_l\_acc (two-also) caught.

‘A/the cat was chasing a/the mouse and John caught them both.’

In Shimoyama’s system, the definite description that occurs in the object position of this sentence will be translated as something like: ‘the maximal entity that has a salient

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28 Hoshi’s system does not run into this problem, because it will produce (i) as the truth-conditions for sentence (68) and they are compatible with native speakers’ intuitions about the meaning of the sentence.

(i) The truth-conditions of (68) derived by Hoshi’s proposal:
‘For every x such that, if x is a teacher, then there is some unique y such that y bears the relation T to the proposition ‘there is some z such that z is a paper and Taro wrote z this semester’ and x read y this morning.’
property in the discourse context.’ But, given the intended reading of the sentence, we want the definite description to refer to ‘the plural, maximal entity which has a cat and a mouse as its atoms’. Since Shimoyama’s system relies crucially on the recoverability of the right property from context, what matters most in capturing this property of the IHRC construction is whether the context can provide the property of individuals that can yield such an interpretation. Even if we could derive the property of being a cat and a mouse, however, the derived property will not produce the desired interpretation of the definite description, as it will make the definite description mean something like ‘the maximal entity that has the property of being a cat and a mouse (at the same time)’, rather than ‘the plural individual which has two atoms, namely, the cat and the mouse, which participated in the event described by the embedded clause’.

2.4.3. Conclusion

In the preceding two subsections, I reviewed two representative E-type pronoun analyses of the IHRC construction: Hoshi 1995 and Shimoyama 1999. Hoshi’s analysis is based on Cooper’s (1979) treatment of E-type pronouns in English and Shimoyama’s analysis is based on Heim and Kratzer’s (1998) rendition of Cooper’s original analysis.

The two E-type pronoun analyses of the IHRC construction are similar in that they both postulate two free variables inside the denotation of the definite description. Furthermore, they are both potentially capable of deriving correct interpretations for all the three types of the IHRC construction in C. Kitagawa’s (2003) classification (on the condition that the free variables’ values are properly constrained).²⁹

²⁹ In fact, I did not illustrate this for Shimoyama’s analysis, but it should work just as well as Hoshi’s analysis in dealing with IHRCs with different types of internal heads.
There are, however, at least two crucial differences between them: First, while Hoshi adopts Russell’s (1905) view of definite descriptions and thus treats definite descriptions as (generalized) quantifiers, Shimoyama treats them as referring expressions by following Link (1983). Second, while Hoshi’s analysis stipulates that the free property variable inside the denotation of the definite description will come only from the embedded clause’s content, Shimoyama’s analysis posits that the free variable’s value is determined entirely by the discourse context.

We saw that these two differences have several important consequences. First, a quantifier analysis of definite descriptions can yield incorrect readings for sentences that contain quantificational elements such as universal quantifiers. Second, leaving the salient property that restricts the denotation of the definite description unconstrained can encounter greater empirical challenges.

These results have at least two important implications for us. First, they suggest that taking a non-quantificational analysis of definite descriptions, following Shimoyama, will be more desirable. Second, they show that we need a formal device to restrict the range of possible values of the definite description, along the lines of Hoshi.

Despite these valuable lessons, the two E-type pronoun analyses of the IHRC construction left two non-trivial problems unresolved. One concerns the formal linking problem—that is, how to establish a formal link between the semantics of the definite description and its referent (or the internal head); the other concerns the split-antecedent phenomenon—that is, how to derive the plural entity reading for the definite description when it is anaphorically linked to more than one noun phrase.
2.5 Summary

In this chapter, I discussed three existing analyses of the IHRC construction which are concerned primarily with accounting for the problems presented by the internal head’s properties: (i) the LF-head raising analysis, (ii) the referential pronoun analysis, and (iii) the E-type pronoun analysis.

The LF-head raising analysis hypothesizes that the internal head raises at LF to a position where it can be accessed by the matrix predicate. On the other hand, the referential pronoun analysis and the E-type pronoun analysis posit that the internal head stays in its base-position at LF but it gets nonetheless accessed by the matrix predicate via a pronominal (pro) mediator which is co-indexed with it. But the two types of pronominal analyses differ from each other in that, while the referential pronoun analysis treats pro as an ordinary referential pronoun, the E-type pronoun analysis treats it as a disguised definite description whose descriptive content is provided by a contextually salient property.

I showed that among the three analyses, the E-type pronoun analysis is the most promising line to pursue. I further demonstrated that a proper E-type pronoun analysis can (potentially) derive correct interpretations for all the three sub-types of the IHRC construction in C. Kitagawa’s (2003) typology and hence can offer a uniform account of the IHRC construction.

I reviewed two versions of the E-type pronoun analysis of the IHRC construction in detail and showed that they can both capture the uniqueness or maximality interpretation of the definite description and its semantic variability. I also showed, however, that they both fail to capture the full spectrum of facts. For instance, they
cannot account for the constraints on the construal of the definite description, which are known as the formal linking problem. In addition, they fail to accommodate the split-antecedent phenomenon, as they cannot derive a plural entity reading of the definite description.
CHAPTER 3
EXISTING ANALYSES OF THE IHRC’S PROPERTIES

3.1. Introduction

In this chapter, I examine three existing analyses of the IHRC construction that are concerned primarily with the properties of the IHRC and the problems they present to a formal semantic analysis of the construction: (i) Kuroda’s (1976; 1992) discourse-pragmatically oriented analysis; (ii) Y. Kim’s (2002) less pragmatic and more semantic rendition of Kuroda’s analysis; (iii) Fuji’s (1998) more syntactic and semantic analysis.

The basic criteria for evaluating these analyses will be whether they can account for why the embedded clause’s content bears a tight semantic relation to the matrix clause’s content, despite the fact that it is base-generated inside a complex noun phrase that receives either a structural or a lexical case from the matrix predicate, and why this relation can vary depending on a variety of factors yet within a delimited range. As we proceed, I will add additional criteria for reviewing the existing analyses by uncovering further properties of the IHRC construction.

In the next three sections (i.e., Sections 3.1, 3.2, and 3.3), I offer a detailed review of each of the three analyses, beginning with Kuroda’s pragmatically oriented analysis and moving towards more semantically oriented analyses, namely, Y. Kim 2002 and Fuji 1998. In the last section (i.e., Section 3.4), I briefly discuss the lessons we learn from these analyses, that is, what their strengths and weaknesses tell us about a proper semantic treatment of the IHRC construction.

In his seminal work on the Japanese IHRC construction in the 1970’s, Yuki Kuroda observes that, unlike an EHRC, the content of an IHRC bears a tight semantic relation to the content of the matrix clause (Kuroda 1976-77, reproduced in Kuroda 1992: Ch. 3). Based on this observation, Kuroda proposes the Relevancy Condition, given in (1), as a necessary pragmatic condition on the IHRC construction in Japanese (and, by extension, in Korean). (Note that Kuroda calls an IHRC in our terminology a pivot-independent relative clause.)


For a pivot-independent relative clause [i.e. an IHRC, MJK] to be acceptable, it is necessary that it be interpreted pragmatically in such a way as to be directly relevant to the pragmatic content of its matrix clause.

Although Kuroda does not offer a precise definition of “relevancy”, he discusses extensively the ways in which the Relevancy Condition can be satisfied. First, he shows that a sentence containing an IHRC can be acceptable if the embedded clause describes an event that is interpreted as simultaneous with the time reference of the matrix clause (Kuroda 1992: 148). For ease of reference, I will call this condition the Simultaneity Condition, following Fuji (1998). To see the effect of this condition, compare (2) and (3).¹

¹Kuroda illustrates his points by using Japanese sentences, but I offer corresponding Korean sentences instead with a bit more fine-grained glosses than his original examples. Furthermore, in translating these sentences into English, I use a coordinated structure, because I believe that this structure comes relatively
According to Kuroda, the contrast between the two sentences arises because, unlike (2), the embedded clause of (3) describes an event whose time is not cotemporaneous with the event described by the matrix clause.

It is important to note that the ungrammaticality or unacceptability of (3) is not due to the ineffability of the intended meaning, as the sentence can be perfectly acceptable if the IHRC is changed into an EHRC, as shown in (4). This suggests that there is some sort of clash between the intended meaning and the IHRC construction itself.

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close to capturing native speakers’ intuitions about the meanings of sentences instantiating the IHRC construction.
Kuroda stresses that the Simultaneity Condition is not a necessary precondition for the IHRC construction to be acceptable by pointing out that a sentence can be interpreted even if the events described by the embedded and the matrix clauses have not necessarily occurred at the same time. For instance, a sentence can be judged acceptable if the event described by the embedded clause involves the same physical location as the event described by the matrix clause (p. 149). For ease of reference, I will call this constraint the Co-locationality Condition, again following Fuji (1998).

To illustrate how the Co-locationality Condition can override the Simultaneity Condition, consider (5).

(4) John-un [[e_i ece thakca-wi-ey iss-te]-un
J.-top [[_ yesterday table-top-loc exist-past.imprf]-rel
sakwa]-lul onul cip-e tul-ess-ta.
apple]-acc today grasp-comp lift-pst-decl.

‘Today John picked up the apple that was on the table yesterday.’

(5) John-un [[Mary-ka ece sakwa-lul thakca-ey
J.-top [[M.-nom yesterday apple-acc table-loc
noh-a twu-[∅]-n kes]-ul onul mek-ess-ta.
put-comp aux-prf]-rel kes]-acc today eat-pst-decl.

‘Mary put an apple on the table yesterday and John ate it today.’

(adapted from Kuroda’s (9), p. 148)
According to Kuroda, a sentence like (5) is judged acceptable despite the fact that the embedded event occurred at some time yesterday and the embedding event occurred at some time today, because the two events share the same physical location. That is, the apple that Mary put on the table stayed in the same location when John came along and picked it up.

It is again important to note that, just like the Simultaneity Condition, satisfying the Co-locationality Condition is not sufficient for a sentence to be judged acceptable: To illustrate, compare (6) and (7). The two sentences differ sharply in terms of acceptability despite the fact that they are alike with respect to the degree to which they satisfy the Simultaneity or the Co-locationality Condition.

(6)  John-j-un  [[Bill-i  ku-j-lul  kongkyek-ha-lye-ko
     J.-top  [[B.-nom  he-acc  attack-do-intend-comp
     chac-a  o-∅]-n  kes]-ul  tayli-e  nwuphi-ess-ta.
     visit-comp  come-prf]-rel  kes]-acc  hit-conj  floor-pst-decl.

‘Bill came to attack John and John floored him (= Bill).’

(adapted from Kuroda 1992: 151, (18))
According to Kuroda, the contrast between (6) and (7) arises because, while we can interpret (6) in such a way that the embedded clause’s content is “purposively” or “motivationally” related to the matrix clause’s content, such an interpretation is not available for (7). That is, our awareness of someone approaching us to attack gives us the motivation to floor and hold down the attacker, but having someone come and visit us from a remote place does not (necessarily) do so.

On the basis of the contrast between (6) and (7), along with sentences like (2) and (5), Kuroda suggests that, for a sentence instantiating the IHRC construction to be acceptable, the two events described by the embedded clause and the matrix clause must constitute a superordinate event either in the physical world or in the consciousness of a protagonist of the event described by the matrix sentence (1992: 151). In other words, “relevancy” between two eventualities can be established not only in the physical domain but also in the epistemic or psychological domain.
There is no doubt that Kuroda’s analysis offers genuine insights into the factors that govern the interpretability of the IHRC construction in Japanese and Korean. Furthermore, it offers an intuitively appealing explanation of why the semantic relation between an IHRC and the matrix clause varies depending on the discourse context, as we saw in Chapter 1.

In addition, this analysis can accommodate the fact that the acceptability of a sentence can vary depending on the discourse context, because relevancy is an essentially pragmatic notion. For instance, as mentioned above, sentence (7) is usually judged unacceptable, but it can be judged acceptable if it is uttered in a context where the discourse participants know that John has a mental problem which makes him rather violent at times and today he was in a really bad mood when Bill came to visit him. Given this contextual information, we can interpret the sentence by assigning an adversative relation to the embedded and the matrix clauses’ contents. In view of the Relevancy Condition, this improved acceptability or interpretability of (7) is expected, because, in the given discourse context, the embedded clause’s content is more or less pragmatically relevant (although indirectly so) to the matrix clause’s content.²

Despite these merits, we cannot adopt this purely pragmatic approach as a proper treatment of the IHRC construction, because it is rather unsatisfactory on several grounds.

² The fact that the acceptability of (7) can vary depending on the discourse context raises the question of exactly what is the balance between grammatical factors and language users’ inferences in deciding the acceptability of a sentence containing an IHRC. This is an important but rather complicated issue. Hence, I defer discussing it until Chapter 4.

Note that this issue has also been discussed in great detail in Stump 1985, which concerns the semantics of the absolute construction in English (e.g., Walking home in the dark, John bumped into a tree).
First, this analysis does not address nor explain the fundamental question of why the IHRC construction is subject to the Relevancy Condition, when the EHRC construction is not.

Second, it does not provide us with a principled way of determining the acceptability of sentences containing an IHRC. For instance, it does not tell us when a sentence has to satisfy both the Simultaneity Condition and the Co-locationality Condition and when it need not and why.

Third, despite its generality, the Relevancy Condition suffers from factual challenges. For example, it fails to account for the contrast between (8) and (9). Suppose that both sentences were uttered in the following context: John and Mary had a verbal argument and Mary won the argument. John got really upset that he lost the fight. So he did something to make Mary unhappy.

(8) John-un onul [[Mary-ka ece inhyeng-ul J.-top today [[M.-nom yesterday doll-acc

mantu-∅]-un kes]-ul nayta peliessta.

make-prf]-rel kes]-acc took out and threw away.

‘Mary made a doll yesterday and John took it out and threw it away today.’
The contrast between (8) and (9) in terms of their grammaticality (and also acceptability) presents a problem for an analysis that relies solely on the Relevancy Condition, because although the embedded clauses describe slightly different events, the two sentences do not seem to differ much in view of the sub-conditions of the Relevancy Condition that Kuroda identifies and discusses.

First, both sentences violate the Simultaneity Condition, because the events described by the embedded clauses occurred one day before the events described by the matrix clause.

Second, they score the same with respect to the Co-locationality Condition because it is not clear (or even relevant) whether the two events described by the embedded and the matrix clauses involve the same physical location or not.

Third, in the given discourse context, the two sentences are not so different from each other with respect to whether the embedded clause’s content is “motivationally” or “purposively” related to the matrix clause’s content.
Again, we cannot attribute the ungrammaticality of (9) to the inexpressibility of the intended meaning, as the sentence is perfectly grammatical with an EHRC, as shown in (10).

(10) John-un onul [[Mary-ka ece e_i J.-top today [[M.-nom yesterday __ kaci-ko nol-∅]-un inhyeng]-ul nayta peliessta. have-comp play-prf]-rel doll]-acc took out and threw away.

‘John took out and threw away the doll that Mary played with yesterday.’

What is then responsible for the contrast between (8) and (9)? I claim that the contrast arises because there is a rather intricate temporal restriction on the IHRC construction and the former conforms to it but the latter does not. To be more specific, for a sentence instantiating the IHRC construction, the embedded clause must describe an eventuality that temporally intersects with the eventuality described by the matrix clause, and, while (8) fits in with this description, (9) does not. Determining the presence or absence of temporal intersection between the two eventualities described by the embedded and the matrix clauses is a rather complicated phenomenon, which involves discussion of both the lexical and grammatical aspect of the embedded clause, and the lexical semantics of the matrix predicate. Hence, I defer discussing it in detail until Chapter 4.
In light of these problems, we are led to conclude that the Relevancy Condition alone cannot capture the full range of semantic and pragmatic properties of the IHRC with respect to the matrix clause’s content.

In recent literature, attempts have been made to improve on Kuroda’s Relevancy Condition. In the next two subsections, I review two of these attempts: Y. Kim 2002 and Fuji 1998. We begin with Y. Kim’s analysis, for it is more in keeping with the spirit of Kuroda’s proposal.

3.3. A more semantic analysis: Y. Kim 2002

Yong-Beom Kim attempts to recapture Kuroda’s Relevancy Condition in more explicit and formal terms, by refining the notion “relevancy”. He claims that relevancy can be restated as a set of meaningful relations between two events described by the embedded and the matrix clauses, and it can be established by satisfying the following condition, which is a reformulation of Kuroda’s original Relevancy Condition in (1).

(11) **Revised Relevancy Condition (Y. Kim 2002: 558, (40))**:

An event e is relevant to some other event(s) e’, iff

(i) \(<e, e’> \in R_m\), where \(R_m\) is a set of relations retrievable from the background knowledge of the discourse participants,

(ii) the predicates denoting e and e’ share arguments which are pragmatically conspicuous w.r.t. \(r_m\) (\(r_m \in R_m\)), and

(iii) the speaker is attuned to \(r_m\).
According to Y. Kim, the types of “pragmatically conspicuous arguments” that are shared by the two events can vary according to the aspectual properties of the embedded verb: If the embedded verb is an activity verb in Vendler (1967)/Dowty (1979) type classification, then the pragmatically conspicuous argument will be the spatio-temporal argument in the sense of Kratzer (1995). Roughly speaking, what this means is that the two events described by the embedded and the matrix clauses must share the time and the location. On the other hand, if the embedded verb is an achievement or an accomplishment verb, then the prominent argument will be the “resultant theme”, which Y. Kim defines as an object that results from the culmination of the embedded event. Hence, in this case, the two events need not share the spatio-temporal arguments (pp. 556-8).

Y. Kim’s analysis is attractive in several ways. First, by defining relevancy as a “binding relation or some type of argument sharing” between two events, it offers a more explicit description of the phenomenon.

Second, it shows that the acceptability of the IHRC construction is not only governed by pragmatic factors but also by grammatical factors such as the lexical aspect of the embedded verb.

Third, it overcomes some of the most serious difficulties of the original Relevancy Condition. For instance, by making a connection between the acceptability of the IHRC construction and the embedded predicate’s lexical aspect, it provides a way of accounting for the contrast between sentences like (8) and (9), which are repeated below.
(8) John-un onul [[Mary-ka ece inhyeng-ul
J.-top today [[M.-nom yesterday doll-acc
mantu-∅]-un kes]-ul nayta peliessta.
make-prf-rel kes]-acc took out and threw away.

‘Mary made a doll yesterday and John took it out and threw it away today.’

(9) *John-un onul [[Mary-ka ece inhyeng-ul
J.-top today [[M.-nom yesterday doll-acc
kaci-ko nol-∅]-un kes]-ul nayta peliessta.
have-comp play-prf-rel kes]-acc took out and threw away.

Intended: ‘Mary played with a doll yesterday and John took it out and
threw it away today.’

Under Y. Kim’s analysis, the contrast between the two sentences follows from the fact
that the embedded verb of (8) is an accomplishment verb, while that of (9) is an activity
verb. Recall that, in this analysis, when the embedded verb is an activity verb, the
sentence can be acceptable only when the spatio-temporal argument of the IHRC is
bound by the spatio-temporal argument of the matrix clause. That is, the embedded event
should be cotemporaneous with the matrix event. But, in (9), the two events differ in
terms of their time references and hence the sentence is predicted to be ungrammatical.
On the other hand, if the embedded contains an accomplishment, as in (8), the two events
need not share the spatio-temporal arguments, because the resultant theme will serve as
the prominent argument that links the two events. Hence, the sentence is predicted to be
acceptable regardless of whether the two events described by the embedded and the matrix clauses are cotemporaneous or not.

Y. Kim’s analysis can, in fact, make fairly systematic predictions about the acceptability or unacceptability of a sentence based on the aspectual properties of the embedded verb. For example, it predicts that, if we change the embedded predicate of (9) from perfect to imperfective, thereby making it describe an on-going event, then the sentence will be judged acceptable, because now the spatio-temporal argument of the embedded predicate bears the same index as that of the matrix predicate. This prediction is borne out, as the grammaticality and acceptability of (12) shows.

(12) John-un onul [[Mary-ka inhyeng-ul kaci-ko J.-top today [[M.-nom doll-acc have-comp
no-n]-un kes]-ul ppayassa-se nayta peliessta.
play-imprf-rel kes]-acc confisticate-conj took and threw away.

‘Today Mary was playing with a doll and John confisticated it from her and threw it away.’

These facts clearly show that the Revised Relevancy Condition overcomes some of the difficulties of the original Relevancy Condition. But it turns out that it has room for improvement as well.

First, just like the original condition, the revised condition is stipulated solely to describe the peculiar properties of the IHRC construction, rather than derived from the principles of grammar.
Furthermore, the Revised Relevancy Condition does not address the more fundamental question of why the lexical aspect of the embedded verb affects the grammaticality of the sentence.

There are empirical challenges as well. First, according to the Revised Relevancy Condition, when the embedded predicate is an activity verb, the IHRC can be acceptable only when the embedded clause describes an on-going event that is simultaneous with the matrix event. But it turns out that this is not necessarily true. When the embedding verb is either a yatanchi- ‘scold’ or a chingchanha- ‘praise’ type verb, the embedded tense or aspect can be progressive, simple past, or perfective. Relevant examples are given in (13).³

(13)a. John-un [[Mary-ka wuntongcang-ul tali-ko
J.-top ] [M.-nom playground-acc run-ko
iss-n]-un ) kes]-ul yatanchi-ess-ta.
cop-imprf]-rel kes]-acc scold-pst-decl.

‘Mary was running in the playground and John scolded her (for that).’

J.-top [M.-nom playground-acc run-prf]-rel kes]-acc

yatanchi-ess-ta.

scold-pst-decl.

‘Mary had run in the playground and John scolded her for that.’

³ There is a slight semantic difference between (13a) and (13b), as suggested by the parentheses around ‘for that’ in the translation of (13a) and their absence in (13b). The first sentence can be judged felicitous even if Mary’s running in the playground may not be the reason why John scolded her. But the second sentence will be judged felicitous only if John scolded Mary because she ran in the playground. I further discuss this semantic difference between the two sentences in Chapter 4 (Section 4.4).
Note that sentence (13b) becomes unacceptable if the matrix verb is changed from *yatanchi-* ‘scold’ to *kkeyan-* ‘hug’, as illustrated in (14).

(14) *John-un [[Mary-ka wuntongcang-ul tali-∅]-n kes]-ul
     J.-top [[M.-nom playground-acc run-prf]-rel kes]-acc
     kkeyan-ess-ta.
     hug-pst-decl.

Intended: ‘Mary ran in the playground and (after that) John hugged her.’

The contrast between (13b) and (14) suggests that the acceptability of the IHRC construction is affected not only by the embedded verb’s lexical aspect but also by the semantics of the matrix predicate.

*Yatanchi-* ‘scold’ type verbs pose yet another challenge for Y. Kim’s analysis. Y. Kim observes that, in the IHRC construction, individual-level predicates in the sense of Carlson (1977) such as *yengliha* ‘be smart’ tend to not occur as the embedded predicate, as illustrated by (15) (But see below).4

(15) *Minho-nun [[Mary-ka *yengliha*-n kes]-ul koylophiessta
    M.-top [[M.-nom smart]-rel kes]-acc bothered.

Intended: ‘Mary is smart and Minho bothered her for that.’

(Adapted from Y. Kim’s (2002) (35a))

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4 This predicate restriction on the IHRC construction is also discussed by C. Lee (2001), Matsuda (2002), and M. Lee (2004), among others. As I show below, however, this restriction does not always hold.
According to Y. Kim, the ungrammaticality of (15) arises for the following reason: in this sentence, the embedded predicate *yengliha-* ‘smart’ is not an accomplishment or an achievement type predicate and hence the only way in which the sentence can be acceptable is to make the embedded clause and the matrix clause share their spatio-temporal arguments. But the embedded predicate and the matrix predicate of this sentence differ in terms of their “levels”. The former is an individual-level predicate and the latter is a stage-level predicate. Hence, the eventualities described by the embedded and the matrix clauses will belong to different spatio-temporal locations, more specifically, a mental domain and a physical domain, respectively (p. 557).

Although this explanation sounds intuitively appealing, it does not apply to the full spectrum of data. When the matrix verb is a *praise*-type verb, for instance, there is no restriction on the “level” of the embedded predicate. That is, when an IHRC is embedded under a *praise*-type verb, the predicate of the embedded clause can be either stage-level or individual-level, as illustrated by (16) and (17).

(16) John-un [[Mary-ka Bill-ul.top-∅]-un kes]-ul
J.-top[[M.-nom B.-acc help-prf]-rel kes]-acc
chingchan-ha-ess-ta.

*praise-do-pst-decl.*

‘Mary helped Bill and John praised her for that.’
(17) John-un [[Mary-ka nwun-i yeppu-∅]-un kes]-ul
    J.-top [[M.-nom eye-nom pretty-imprf]-rel kes]-acc

cchingchan-ha-ess-ta.

praise-do-pst-decl.

‘Mary has pretty eyes and John praised her for that.’

Under Y. Kim’s analysis, the grammaticality of (17) comes as a surprise because, just as in (15), the embedded clause of this sentence contains an individual-level predicate and the matrix clause contains a stage-level predicate and, hence, the eventualities described by the embedded and the matrix clauses are predicted to reside in different spatiotemporal locations.

Why are IHRCs embedded within cchingchanha (‘praise’) -type verbs exempt from the temporal and predicate constraints? I argue that this is because one can praise or scold someone for doing something right now or for having done something in the past. Similarly, one can praise or scold someone for having a transitory property or a semi-permanent property. Hence, when cchingchanha (‘praise’) -type verbs occur as the matrix verb, it does not matter whether the IHRC contains a stage-level predicate or an individual-level predicate.5

The last factual challenge for Y. Kim’s analysis is that, contrary to his claim, there are cases where the embedded verb is an achievement verb but the shared (or “pragmatically prominent”) argument can be an ordinary Theme or an Agent argument.

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5 As I will show in Chapter 4, there is, in fact, a more fundamental reason why IHRCs under ‘praise’-type verbs tend to behave differently from other IHRCs. When these verbs occur as the matrix predicate, we can readily assign a causal interpretation to the eventuality described by the embedded clause with respect to the eventuality described by the matrix clause. Since a causal relation can be established between any types of eventualities, the embedded sentence can have either a stage-level or an individual-level predicate.
rather than a Resultant Theme. This is illustrated by (18). In this sentence, the embedded predicate is an unaccusative verb and hence we can say that the argument that is shared by the embedded and the matrix clause, namely, the guest, bears the role of Theme.

(18) John-un [[sonnim-i yek-ey tochakha-shi-∅]-n kes]-ul
    J.-top [[guest-nom station-loc arrive-hon-prf]-rel kes]-acc
    hotel-lo moshi-ko ka-ess-ta.
    hotel-goal take(hon)-ko go-pst-decl.

‘A/the guest arrived at the station and John took him/her to the hotel.’

What is responsible for the grammaticality of (18)? I argue that the sentence is judged good because what matters in determining the acceptability of the IHRC construction is not whether the IHRC and the matrix clause share some “pragmatically conspicuous arguments”, as Y. Kim claims, but rather whether the embedded clause describes an eventuality that temporally intersects with the matrix clause and whether this eventuality contains a participant which can also participate in the event described by the matrix clause, as I alluded to in Section 3.2.

To verify this proposed generalization, consider (18) again. Although it may appear that the event described by the IHRC occurred earlier than the event described by the matrix clause, the two events, in fact, intersect with each other in terms of their times; in this sentence, the embedded event consists of two components, i.e., (i) the process of the guest arriving at the station and (ii) the state of the guest having arrived at the station, and this state holds at the time of the matrix event. Furthermore, this state contains an
argument which can be shared by the matrix event, namely, the guest. We can therefore correctly predict that the sentence will be acceptable.

The temporal relation between the eventualities described by the embedded and the matrix clauses of (18) is depicted in (19). Here, \( \tau(e_1) \) refers to the runtime of the event of the guest arriving at the station, \( \tau(e_2) \) the runtime of the state of the guest after the culmination of this event, \( \tau(e_3) \) the runtime of the event of John taking the guest to the hotel, and \( t_0 \) the topic time.

\[
\begin{align*}
\tau(e_1) & \quad \tau(e_2) \\
\tau(e_3) & \\
t_0 & \\
\end{align*}
\]

The importance of establishing a certain temporal relation between the embedded and the matrix clauses of the IHRC construction has also been discussed by Fuji (1998) (although he offers a slightly different analysis than what I just outlined). In the next subsection, I thus review Fuji’s analysis and show how it overcomes some of the difficulties of Y. Kim’s analysis as well as the difficulties of Kuroda’s.
3.4. A formal semantic analysis: Fuji 1998

The primary goal of Fuji’s analysis is to reexamine two of the sub-conditions of the Relevancy Condition, namely, the Simultaneity Condition and the Co-locationality Condition, and to derive their effects via a formal semantic mechanism.

Fuji claims that Kuroda’s Simultaneity Condition needs to be restated as the Precedence Adjacency Condition (PAC), which is given in (20).

(20) **Precedence Adjacency Condition (PAC) (Fuji 1998: (12))**:

The event of the IHRC temporally precedes and is adjacent to the event of the main clause.

Fuji further argues that the Co-locationality Condition follows from the PAC and hence can be dispensed with.

In order to derive the effects of the PAC, Fuji proposes a “double-quantifier raising (QR) analysis” within a temporal semantic framework of Discourse Representation Theory (DRT) proposed by Kamp and Reyle (1993). The gist of the proposal is that the IHRC construction exhibits two types of QR: One QR involves the raising of some sort of quantifier inside the semantic head to the IP level of the embedded clause and the other involves the raising of the DP containing the IHRC+no string to the IP level of the matrix clause. For present purposes, what matters is the second QR.

Fuji claims that the raising of the IHRC+no string occurs as a way of resolving a semantic type-mismatch. The idea is that the morpheme no has the semantics of a temporal operator, which corresponds to the temporal connective *as soon as* or
immediately after in English. Hence, the DP that is headed by it, namely, the IHRC+no string, has the semantics of a temporal adverbial and it thus introduces a Discourse Representational Structure (DRS). This DP raises and adjoins to the matrix IP, because it is the closest category that introduces another DRS.

When applied to a Japanese sentence (21), this double-QR analysis produces the LF structure given in (22). Here, ec is used as shorthand for empty category and all the numbers inside the square brackets match those that occur inside the DRSs in (23).

6 Regarding the indexation mechanism adopted for the LF structure (22), Fuji makes several rather complex assumptions, based on the pronominal agreement and proximate binding proposed by Bittner and Hale (1996) and the index percolation proposed by Grimshaw (1991). For details, see the original article.

(21)  Boku-wa  [[onnanoko-ga kotira-ni yattkita-∅]]
      I-top   [[girl-nom here-to came-rel]]
    no]-ni           dekuwasita.
    no]-dat             came.across

‘A girl came here, and immediately afterwards I came across her (here).’

(Fuji 1998: 83, (6))
Turning now to the truth-conditions for (21) derived by this double-QR analysis: according to Fuji, the LF structure (22) generates three DRSs, namely, K1, K2, and K3, which are introduced by IP10, no, and the lower IP1, respectively. These DRSs combine with each other via dynamic conjunction, yielding a larger DRS, as depicted in (23). This larger DRS will be true if the truth-conditions given in (24) are met.
(23) **The semantic computation for (21) (Fuji 1998: 85, (19))**:  

a. The DRS for (21) based on the LF structure (22)

\[
\begin{array}{|c|}
\hline
x_1, t_{10}, e_{10} \\
[1] \text{girl}(x_1) \\
[2] t_{10} < t_0 \\
[3] \text{come.here}'(e_{10}) \quad \text{K2} \\
[4] T(e_{10}) \subseteq t_{10} \\
\hline
\end{array} \quad \begin{array}{|c|}
\hline
e_1 \\
[5] e_{10} \supseteq e_1 \\
\hline
\end{array} \quad \begin{array}{|c|}
\hline
x_1, t_1 \\
[6] x_2 = i \\
[7] t_1 < t_0 \\
[8] \text{come.across}'(e_1)(x_1)(t_1) \\
[9] T(e_1) \subseteq t_1 \\
\hline
\end{array} \quad \text{K1} \quad \text{K3}
\]

b. The schematic diagram of the relevant situation

\[
\begin{array}{|c|c|c|}
\hline
T(e_{10}) & T(e_1) & \\
\hline
| & | & t_{10} \quad t_1 \quad t_0 \\
\hline
\end{array}
\]

(24) **The truth-conditions of (21) (based on Fuji 1998: 84):**

(i) There is an individual \(x_1\), a time period \(t_{10}\), and an event \(e_{10}\) such that \(t_{10}\) precedes the speech time \(t_0[2]\), \(e_{10}\) is an event of \(x_1\)’s coming *here*[3], where \(x_1\) is a girl[1], and the time of \(e_{10}\) is included in \(t_{10}[4]\);  
(ii) there is an event \(e_1\) such that the event \(e_{10}\) is anterior and adjacent to \(e_1[5]\);  
(iii) there is an individual \(x_2\), a time period \(t_1\) such that \(x_2\) is the speaker[6], \(t_1\) precedes the speech time \(t_0[7]\), \(e_1\) is an event of \(x_2\)’s coming across \(x_1[8]\), and the time of \(e_1\) is included in \(t_1[9]\).
The double-QR analysis proposed by Fuji provides a more explanatory account of the IHRC construction than Kuroda’s and Y. Kim’s analyses.

First, it derives, rather than stipulates, the effects of the Simultaneity Condition in Kuroda’s analysis by treating the IHRC as some sort of temporal quantifier headed by *no*.

Second, by utilizing the co-indexation mechanism of the DRT, this account ensures that the two events described by the embedded and the matrix clauses will share arguments (or event participants).

Third, by motivating an LF-raising of an IHRC, it resolves one of the syntax-semantics mismatch problems presented by the IHRC construction, namely, the discrepancy between the surface position of an IHRC and the position in which it seems interpreted. It also accounts for why the content of an IHRC does not restrict that of the internal head. This is precisely because an IHRC has the semantics of a temporal adverbial modifier of the matrix clause.

Fourth, this analysis gives us a way of explaining why IHRCs but not EHRCs are subject to the PAC. This is because EHRCs are not headed by *no* (or *kes* in Korean).

The temporal semantic analysis proposed by Fuji also overcomes some of the difficulties of Kuroda’s Relevancy Condition-based analysis and those of Y. Kim’s Revised Relevancy Condition-based analysis.

First, this analysis can offer a principled way of accounting for the acceptability difference between sentences that differ only in terms of the embedded aspect. To illustrate, consider the sentences in (25) and (26), which are Fuji’s (20a) and (20b) respectively. (Note that the glosses and translations are slightly modified.)
(25) *John-wa kesa [Mary-ga kinoo ringo-o
J.-top this.morning [M.-nom yesterday apple-acc
sara-no ue-ni oita-∅] no]-o totta.
plate-gen top-on put-rel det]-acc picked.up

Intended: ‘Mary put an apple on a plate yesterday and after that John picked it up this morning.’

(26) John-wa kesa [Mary-ga kinoo ringo-o
J.-top this.morning [M.-nom yesterday apple-acc
sara-no ue-ni oita-oita] no]-o totta.
plate-gen top-on put-prf det]-acc picked.up

‘Mary had put an apple on a plate yesterday and after that John picked it up this morning.’

The contrast between the above sentences was, to my knowledge, discussed first by Kuroda (1976-77, 1992: chapter 3). According to Kuroda, sentence (26) is judged acceptable because we can assign a “purposive” relation to the two events expressed by the IHRC and the matrix clause by interpreting the sentence as something like ‘Mary put the apple on a plate with the awareness that the effect of her act would later be beneficial for John in some way or other’; sentence (25) is judged unacceptable, however, because no such purposive relation can be assigned to the embedded clause’s content with respect to the matrix clause’s content (let alone other pragmatically relevant relations.) Although Kuroda’s explanation of the contrast between (25) and (26) sounds appealing on an
intuitive level, it does not generalize to other cases and hence, from a theoretical point of view, it is not fully satisfactory.

Fuji offers a more precise and satisfactory account on both intuitive and theoretical levels. He contends that the contrast between the two sentences arises because the embedded clauses have a different tense/aspect. The embedded tense/aspect of (25) is simple past and hence the embedded clause describes a past event which does not temporally adjoin to the event described by the matrix clause. On the other hand, the tense/aspect of (26) is pluperfect (although he did not use this term) and thus the embedded clause describes a result state in the sense of Kamp and Reyle (1993) and this state temporally precedes and adjoins to the matrix event time.

The temporal relation that holds between the two events described by the embedded and the matrix clauses of (26) is depicted in diagram (27), where $e_{10}$ refers to the event of Mary putting the apple on a plate, $e_{20}$ the result state of the apple being on the plate, and $e_{1}$ the event of John picking up the apple from the plate.

(27) **Temporal relation between the events described by (26) (Fuji 1998: (21b))**:

![Temporal relation diagram](attachment:temporal_relation_diagram.png)
Finally, Fuji’s analysis provides a formal tool with which we can predict the acceptability of sentences instantiating the IHRC construction in Japanese and Korean. For instance, we now can readily deal with the grammaticality of (18), which is problematic under Y. Kim’s analysis. In light of Fuji’s analysis, this sentence is expected to be grammatical, because the embedded clause describes an event whose time precedes and adjoins to the event described by the matrix clause. That is, the embedded clause can be interpreted as an immediately after clause.

Given all these welcome results, there is no doubt that Fuji’s formal semantic analysis of the IHRC construction is more promising than the more discourse-pragmatic analyses proposed by Kuroda (1976-77; 1992) and Y. Kim (2002).

There are, however, at least two problems with this analysis. One problem is that it assigns too specific interpretations to an IHRC with respective to the matrix clause’s content, namely, a temporal precedence and adjacency. Consequently, it cannot readily deal with cases where the embedded clause does not necessarily stand in a temporal precedence and adjacency relation to the matrix clause’s content. To illustrate, consider (28) and (29).
(28) **precedence without immediate adjacency:**

| John-un | [[Mary-ka | sip-nyen-cen-ey | swul-ul | mantul-∅]-un |
| J.-top | [[M.-nom | ten-year-before-loc | liquor-acc | make-prf]-rel |
| kes]-ul | onul | mashi-ess-ta. |
| kes]-acc | today | drink-pst-decl. |

‘Mary made liquor ten years ago and John drank it today.’

(29) **causation without temporal adjacency:**

| John-un | [[Bill-i | cinancwu-ey | kesicmal-ul | ha-∅]-n |
| J.-top | [[B.-nom | last week | lie-acc | do-prf]-rel |
| kes]-ul | onul | yatanchi-ess-ta. |
| kes]-acc | today | scold-pst-decl. |

‘Bill told a lie last week and John scolded him for that today.’

Sentence (28) presents a problem for Fuji’s analysis, because it is judged grammatical despite the fact that there is a long interval between the events described by the embedded and the matrix clauses, making them temporally non-adjacent to each other.

Sentence (29) presents at least two problems. First, the event described by the embedded clause is not temporally adjacent to the event described by the matrix clause. Second, the embedded clause receives a causal interpretation with respect to the matrix
clause’s content but, under Fuji’s analysis, an IHRC can be interpreted only as an ‘immediately after’ or as a ‘as soon as’ clause.\(^7\)

Sentences (28-29) show that the relation that can hold between the two events described by the embedded and the matrix clauses of the IHRC construction cannot be reduced to a temporal precedence and adjacency relation, contra Fuji’s claim. Therefore, we need a more flexible semantic analysis of the IHRC construction than Fuji’s which allows for the interpretation of an IHRC to vary depending on the discourse context and grammatical factors such as the embedded predicate’s aspectual properties and matrix predicate’s semantics.

The last problem with the double QR-analysis concerns the relation between the Co-locationality Condition and the PAC.\(^8\) Fuji claims that the former is merely a side-effect of the latter and hence the two conditions can be subsumed under a single condition. But there are cases where the sentence is judged acceptable even if only one of the two conditions is satisfied. For instance, sentences (30) and (31) can be acceptable despite the fact that the embedded event does not involve the same physical location as the matrix event.

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\(^7\) A similar problem arises with sentences where the embedded clause contains an individual-level predicate such as (17) above, repeated below as (i), because they also forces the IHRC to receive a causal interpretation with respect to the matrix clause’s content.

(i)  John-un [[Mary-ka nwun-i yeppu-∅]-un kes]-ul chingchan-ha-ess-ta. praise-do-pst-decl. ‘Mary has pretty eyes and John praised her for that.’

\(^8\) Fuji’s analysis is also subject to another criticism, which concerns the claim that the internal head noun raises at LF and adjoins to the IP level of the embedded clause. But this problem was already pointed out in Chapter 2 (Section 2.2), where I discussed the difficulty of LF head-raising analyses. Hence I do not repeat it here.
(30) **Context:** A thief broke into a bank and stole money. Then he rapidly left the bank and went to the nearby park. But the police were already waiting for him in the park. So the thief got arrested immediately after he got to the park.

\[
\text{Kyengchal-un} \quad [(\text{totwuk-i unhayng-ese} \quad \text{ton-ul})
\text{Police-top} \quad [(\text{thief-nom bank-loc} \quad \text{money-acc})
\text{hwumchi-∅]-n} \quad \text{kes]-ul} \quad \text{kongwon-ese} \quad \text{chephoha-ess-ta)}.
\text{steal-prf]-rel} \quad \text{kes]-acc} \quad \text{park-loc} \quad \text{arrest-pst-decl}.
\]

‘The thief stole money at the bank and the police caught him in the nearby park.’

(31) **Context:** John has a teenaged daughter named Mary. Mary has this bad habit of shoplifting. One day John went to the mall with Mary and he happened to spot her stealing a doll at the shop. So he came home and scolded her for that.

\[
\text{John-un} \quad [(\text{Mary-ka sangeem-eyse} \quad \text{inhyeng-ul})
\text{J.-top} \quad [(\text{M.-nom store-loc} \quad \text{doll-acc})
\text{hwumchi-∅]-n} \quad \text{kes]-acc} \quad \text{cip-eyse} \quad \text{yatanchi-ess-ta)}.
\text{steal-prf]-rel} \quad \text{kes]-ul} \quad \text{house-loc} \quad \text{scold-pst-decl}.
\]

‘Mary stole a doll at the store and John scolded Mary at home.’

The existence of sentences like (30) and (31) clearly shows that the Co-locationality Condition cannot be considered a mere side effect of the Simultaneity Condition or the PAC in Fuji’s analysis. This raises the question of exactly what the relation between the two requirements is. In other words, what determines which requirement should be satisfied when and why?
3.5. Summary and conclusion

In this chapter, I discussed three existing studies of the IHRC construction which take slightly different approaches to the problems presented by the IHRC construction. In so doing, I explored which solutions work better for which problems.

First, Kuroda’s (1976: 1992) analysis imposes an extra-grammatical or pragmatic condition, namely, the Relevancy Condition on the IHRC construction, as a way to account for why the embedded clause’s interpretation relative to the matrix clause’s content can vary depending on the discourse context. We saw that this analysis can explain why and how pragmatic factors affect the acceptability of sentences instantiating the IHRC construction.

Second, Y. Kim (2002) provides a more explicit and formal rendition of Kuroda’s analysis by defining “relevancy” as a set of meaningful relations that can hold between two events described by the embedded and the matrix clauses. I showed that this analysis has at least two merits. First, it gives us a way of capturing the limited variability of an IHRC’s interpretation with respect to the matrix clause’s content, because the relations that can hold between two events are most likely to form a finite set. Furthermore, this analysis helps us to see that the interpretation of the IHRC construction is affected not only by pragmatic factors but also by grammatical factors such as the lexical aspect of the embedded predicate.

Finally, Fuji (1998) offers the most formal account of the IHRC construction among the three, which derives some of the effects of the Relevancy Condition in a compositional manner. This analysis points to the importance of establishing a temporal relation between the two events described by the embedded and the matrix clauses. It also
shows that the interpretability of the IHRC construction is governed by principles of grammar, rather than by purely pragmatic factors.

We saw that despite their merits, each of the three approaches has several problems. Of them, the most notable are as follows: First, Kuroda’s purely pragmatic approach cannot does not have much to say as to why grammatical factors such as lexical aspect play an important role in determining the acceptability of a sentence instantiating the IHRC construction. Second, Y. Kim’s analysis cannot explain why the matrix verb’s semantics affects the grammaticality of a sentence. Third, Fuji’s analysis confronts the challenge that an IHRC can receive a wider range of interpretations than a temporal precedence and adjacency relation. This analysis also has difficulty accounting for why the Co-locationality Condition cannot be subsumed under the Simultaneity Condition.

Taken together, these findings suggest that we need a constrained but still flexible semantic analysis of the IHRC construction which incorporates a variety of factors such as the aspect of the embedded predicate, the semantics of the matrix predicate, and the discourse context. Now the challenge is how to develop such an analysis.

We now know that there is a way to derive the tight semantic relation between the embedded and matrix clauses via a formal mechanism. But we also know that it is not easy to develop a formal semantic system which leaves enough room for pragmatics to come into play. Furthermore, we still need to identify the factors that affect the interpretability of the IHRC construction and determine which factor stems from where; more specifically, whether it comes from semantics or from pragmatics.

In the next three chapters, I develop a new formal semantic analysis which builds on the insights of the existing analyses, but which overcomes their difficulties. In Chapter
4, I sort out the set of conditions that govern the interpretability or acceptability of sentences instantiating the IHRC construction. In Chapter 5, I outline the syntactic structure the new semantic analysis will build on. In Chapter 6, I propose a more constrained but flexible interpretive system that derives the effects of these conditions in a compositional manner based on the syntactic structure presented in Chapter 5.
4.1. Introduction

In this chapter, I reexamine the constraints that are known to be imposed on the IHRC construction such as the formal linking problem and the Relevancy Condition. In so doing, I aim to clarify and re-characterize the factors that govern the grammaticality or acceptability of sentences instantiating the construction.

I argue that the formal linking problem is not about how to establish a link between the pronominal definite description that occurs in the IHRC construction (henceforth pro) and an overtly realized noun phrase that can serve as its antecedent; rather, it is about how to connect the pronoun’s denotation with the event structure of the embedded clause. I also argue that the Relevancy Condition is essentially about ensuring that the embedded clause describes a state that is either temporally or causally related to the eventuality described by the matrix clause. In addition, I show that the acceptability of a sentence can vary depending on what kind of state the embedded clause describes and what kind of relation it bears to the eventuality described by the matrix clause.

This chapter proceeds as follows: In Section 4.2, I examine how the formal linking problem has been characterized in the literature. I show that pro is subject to different licensing conditions from typical E-type pronouns (or definite descriptions). Elaborating on Shimoyama’s (2002) conjecture, I argue that, while E-type pronouns can be licensed by any noun phrase, pro can be licensed only by noun phrases that receive a thematic role directly from a sentential predicate.
In Section 4.3, I show that there is yet another condition on the IHRC construction: the embedded clause must describe a state that temporally intersects with the eventuality described by the matrix clause and, furthermore, this state must contain the referent of pro. In this context, I discuss the importance of the aspect of the embedded clause in interpreting the IHRC construction. Following Parsons (1990), I assume that depending on its lexical and grammatical aspect, a sentence can describe a target state, a resultant state, or an in-progress state and these states have different argument structures.

In Section 4.4, I aim to show that the acceptability of a sentence can vary according to whether the embedded clause describes a temporary state or a semi-permanent state and whether a cause-result relation can be readily established between the eventualities described by the embedded and the matrix clauses. In so doing, I discuss why the predicate restriction on the embedded clause, which was observed by authors like Y. Kim (2002), does not hold for all instantiations of the IHRC construction. That is, why the embedded clause can have an individual-level predicate in the sense of Carlson (1977) when the matrix predicate is a praise-type verb (see Chapter 3, Section 3). I argue that this is because when the matrix verb is a praise-type verb, a causal interpretation can be readily assigned to the embedded clause with respect to the matrix clause’s content. In this section, I also show that IHRCs which embed temporary state descriptions and those which embed permanent state description exhibit have different truth-conditions, paralleling the difference between weak and strong free adjuncts (or absolutes) in the sense of Sump (1985). On the basis of this parallel, I claim that just like free adjuncts, IHRCs need to be divided into two sub-types: weak and strong IHRCs.
Section 4.5 closes the chapter, offering a new set of conditions that have emerged from the discussions in the preceding sections. Here, I allude to the line of analysis I will pursue in the next two chapters as a way of deriving the effects of these conditions via a formal interpretive system.

4.2. A closer look at the formal linking problem

The problem of formal linking refers to the phenomenon that definite descriptions, including E-type pronouns, are subject to special grammatical restrictions despite the fact that they are considered discourse anaphora. For instance, as we saw in Chapter 2 (Section 2.4.1.2), E-type pronouns seem to require that their potential antecedents be overtly realized in the preceding discourse (in the form of an NP). This was illustrated by the contrast between the sentences in (1).

(1) a. John has a wife and she hates him.
   b.*John is married and she hates him.

(Evans 1977: 532, emphasis mine)

As discussed in Chapter 2, the difficulty of construing she in (1b) as referring to John’s wife presents a problem for the standard analysis of E-type pronouns (e.g., Cooper 1979, Heim and Kratzer 1998), because it assumes that the value of an E-type pronoun is contextually determined by recovering a salient property.

Hoshi (1995) and Shimoyama (1999) have observed that a similar generalization holds of pro. On the basis of this observation, both authors have suggested that pro also
requires to be formally linked to its potential referent. However, what Hoshi (1995) and Shimoyama (1999) characterize as the formal linking problem presented by \textit{pro} differs from the formal linking problem presented by E-type pronouns. Furthermore, what they describe as the formal linking problem of \textit{pro} does not refer to the same phenomena, even if we restrict our attention to the IHRC construction. Hence, there is a need to clarify what is involved in licensing \textit{pro}.

In what follows, I first discuss exactly what the two authors mean by the formal linking problem. I then show that \textit{pro} shows a different semantic behavior from typical E-type pronouns and hence the standard treatment of E-type pronouns cannot be applied directly to \textit{pro}.

4.2.1. Shimoyama’s (1999) characterization of the formal linking problem

For Shimoyama (1999), the formal linking problem refers to a locality constraint imposed on the interpretation of \textit{pro}. As discussed in Chapter 2 (Section 2.4.2.2), Shimoyama observes that \textit{pro} cannot refer to individuals whose properties are not provided by the content of the preceding IHRC. Shimoyama illustrates this point by offering the following discourse in Japanese, where the second sentence instantiates the IHRC construction.
In this discourse, pro cannot refer to the three books that Hanako bought and brought or the plural entity that consists of the three books and the newspapers that she bought and brought. The fixed interpretation of pro presents a problem to Shimoyama’s E-type pronoun analysis because, under this analysis, the pronoun is a discourse-anaphor and hence it is expected to refer to any salient entity in the context. In (2), the books that Hanako bought and brought are made prominent by uttering the first sentence and, given our knowledge of the world, it is possible to imagine that Taro shelved them (= the newspapers). Even so, pro can only be construed as referring to the newspapers.

The existence of this locality condition on the interpretation of pro seems real, because even if we manipulate the context in such a way that it is pragmatically anomalous to assign a certain value to pro, the pronoun exhibits the same interpretive
behavior as in (2). To see this, consider (3).\(^1\) Suppose that this discourse occurs in the following context: John and Mary are married. John hates shopping, so Mary does most of the shopping. Today Mary bought bread and clothes for John and brought them home. Now it is John’s turn to arrange them.\(^2\)

- (3) Kyoo Mary-ga John-ni fuku-o kat-te ki-ta.
  

  ‘Today Mary bought and brought home clothes for John.’

- John-wa Mary-ga pan-mo kat-te kita-∅ no-o

- J.-top M.-nom bread-also buy-comp come-rel no-acc
tansu-ni ire-ta.
closet -loc put-pst-decl.

  ‘Mary also bought and brought home bread and John put it (= the bread) in the closet.’

In this discourse, despite the pragmatic anomaly it induces, the only construal available for pro is the one where it refers to the bread that Mary bought and brought. If pro were indeed a discourse-oriented anaphor, it should be possible for it to be construed as referring to the clothes for John that Mary bought and brought. But this interpretation is not available, suggesting that pro’s value is not determined entirely by pragmatic factors.

Consider now discourse (4), where both the first and the second conjuncts of the sentences contain an IHRC.

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\(^1\) I thank Makoto Kadowaki for providing the Japanese data.

\(^2\) I am grateful to Chris Potts for suggesting this kind of anti-pragmatic scenario.
Given our world knowledge, the content of this discourse is also pragmatically odd, since one would not normally put bread inside the closet while putting clothes on the kitchen table. This implausibility, however, does not affect the interpretation of the two occurrences of pro in this discourse. The pro that occurs in the first conjunct can be construed only as referring to the bread that Mary bought and brought and the pro in the second conjunct only as referring to the clothes, despite the fact that the reversed construals make more sense in the actual world. What this shows is that the descriptive content of pro can be provided only by the closest or immediately preceding IHRC.

We see an identical behavior with the corresponding Korean sentences. First, consider (5). This discourse shows that the pro that occurs in the second sentence can be construed only as referring to bread that Mary bought and brought home, despite the anti-pragmatic effect this construal induces.
‘Today Mary bought and brought home John’s clothes. Mary also bought and brought bread and John put it (= the bread) in the closet.’

Consider now (6). This discourse illustrates that the content of pro can be supplied only by the closest IHRC’s content even if a more pragmatically plausible construal is available from the content of the other IHRC in the structure.

‘John put the bread that Mary bought and brought home in the closet and the clothes that Bill bought and brought home in the pantry.’
The construal pattern of pro illustrated in discourses (3-6) clearly shows that the definite description indeed requires a local licenser. That is, the salient property that restricts the denotation of the pronoun must come from the content of the immediately preceding IHRC. Hence, we can conclude that what Shimoyama characterizes as the formal linking problem of pro is valid.

Shimoyama leaves one important point to be clarified, however. She contends that the locality condition imposed on pro also holds for typical E-type pronouns in English and, hence, whatever solution one can offer for the formal linking problem presented by E-type pronouns can also carry over to the formal linking problem presented by pro and vice versa (p. 172). But it turns out that the locality condition we observed to hold for pro does not apply to E-type pronouns. Unlike pro, E-type pronouns can be licensed by properties that are not necessarily provided by the immediately preceding sentence.

To see this, consider (7) and (8), which are from English and Korean, respectively. In each discourse, the third sentence contains two E-type pronouns, namely, they and him, and kutul and ku, respectively. As their construals show, these pronouns can be interpreted as referring to entities which are introduced by non-adjacent sentences.

(7) Most congressmen admire Kerry. Tomorrow is the election day. I hope that they (= the congressmen who admire Kerry) will vote for him (= Kerry).
(8) Taypwupwun-uy kwunhoyuywon-tul-i Kheyli-lul
most-gen congressman-pl-nom Kerry-acc
conkyengha-n-ta.
admire-imprf-decl.
‘Most congressmen admire Kerry.’
Nayil-un senke-il-i-ta.
tomorrow-top election-day-cop-decl.
‘Tomorrow is the election day.’
Na-nun ku-tul-i ku-lul wihay thwuphyo-ha-ess-umyen
I-top he-pl-nom he-acc for vote-do-pst-cond
cohkeyss-ta.
feel.happy-decl.
‘I will be happy if they (= the congressmen who admire Kerry) will vote for him (= Kerry).’

The difference between the behavior of pro in (2-6) and that of the E-type pronouns in (7-8) shows that pro has a smaller licensing domain than a typical E-type pronoun. That is, the former can be licensed only “locally” by a salient property provided by the preceding IHRC, while the latter can be licensed “globally” as well as locally. Therefore, we can conclude that the formal linking problems presented by the two types of definite descriptions need slightly different solutions.
4.2.2. Hoshi’s (1995) characterization of the formal linking problem

As discussed in Chapter 2 (Section 2.4.2), for Hoshi (1995), the formal linking problem refers to the phenomenon that \textit{pro} cannot be licensed unless its antecedent is overtly realized in the preceding IHRC (p. 151). Relevant data are repeated below.\(^3\)

(9)a. \textsc{Yamada-san-wa} \quad [[\text{otonari-no} \quad \text{musukosan-ga} \quad \text{wakai}]

Y.-hon-top \quad [[\text{next.door-gen} \quad \text{son-nom} \quad \text{young}]

\text{oyomesasn-o} \quad \text{morratta]} \quad \text{no]-o} \quad \text{tyoonai-no}

\text{bride-acc} \quad \text{got} \quad \text{comp]-acc} \quad \text{neighborhood-gen}

\text{huzinkai-ni} \quad \text{kanyuusiyootosita}.

women’s club-dat \quad \text{tried to talk into joining}.

‘The next door neighbor’s son got a young bride and Ms. Yamada tried to talk her (= the young bride) into joining the women’s club in the neighborhood.’

b. *\textsc{Yamada-san-wa} \quad [[\text{otonari-no} \quad \text{musukosan-ga} \quad \text{kekkonsita}]

Y.-hon-top \quad [[\text{next.door-gen} \quad \text{son-nom} \quad \text{got.married}]

\text{no]-o} \quad \text{tyoonai-no} \quad \text{huzinkai-ni}

\text{comp]-acc} \quad \text{neighborhood-gen} \quad \text{women’s club-dat}

\text{kanyuusiyootosita}.

\text{tried to talk into joining}.

Intended: ‘The next door neighbor’s son got married and Ms. Yamada tried to talk her (= his wife) into joining the women’s club in the neighborhood.’

(Hoshi 1995: 151, (70- 71))

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\(^3\) Both (9a) and (9b) are judged acceptable on the reading where \textit{pro} refers to Ms. Yamada’s neighbor’s son.
As I discussed in Chapter 2, the contrast between the two sentences in (9) challenges Hoshi’s analysis (in fact, any existing E-type pronoun analysis). This is because, under this analysis, interpreting pro involves recovering a salient relation between a proposition and an entity and, in the above paradigm, the embedded clauses of the sentences provide quite similar binary relations, namely, ‘being a young wife of’ and ‘being married to’, respectively. Since these relations can both make pro refer to the wife of the son of Ms. Yamada’s neighbor, the two sentences are expected to be grammatical on the intended readings. However, only (9a) is judged grammatical, suggesting that having the embedded clause provide a salient property is not sufficient for pro to be licensed.

Hoshi notes that the semantic behavior of pro resembles that of typical E-type pronouns in that E-type pronouns also require overtly realized antecedents, as we saw in (1). On the basis of this parallel, Hoshi suggests that pro is subject to the same kind of licensing condition as E-type pronouns (although he notes in passing that pro seems to require a more local licenser than E-type pronouns (p. 149)).

But this analysis is not valid for at least two reasons. First, pro can be licensed even in a context where its potential antecedent is absent in the immediately preceding IHRC. For instance, sentence (10) below, which is from Chung and Kim 2003, can be judged acceptable on the reading where pro refers to something dirty, despite the fact that the embedded clause does not contain a noun phrase that can serve as its antecedent such as telewun kes ‘dirty stuff’ or ttay ‘dirt’.

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4 But Hoshi does not offer the data that illustrate the difference between pro and E-type pronouns.
(10) ?John-un [[paci-ka telewe-ci]-n kes]-ul
   J.-top [[pants-nom get.dirty-comp]-rel.prf kes]-acc
takkanay-ess-ta.
wipe.out-pst-decl.

Lit.: ‘John’s pants got dirty and John wiped the dirt from his pants.’

(adapted from Chung and Kim’s (2003) (40); the judgment is theirs.)

Notice that typical E-type pronouns cannot be licensed in similar environments, as the examples from English and Korean in (11) and (12) show.

(11) John’s pants got dirty. */#So he wiped it (= the dirty stuff) out.

   J.-gen pants-nom getdirty.
   ‘John’s pants got dirty.’

*/#Kulayse ku-nun kukes-ul takkanayssta.
So he-top it-acc wiped.out.

Intended: ‘So he wiped it (= the dirty stuff) out.’

5 The matrix verb takkanay- ‘wipe out’ in (10) is not one of those verbs that instantiate the spray/load type valency alternation phenomenon (e.g. load the truck with hay vs. load the hay onto the truck.). That is, this verb cannot select for pants as its arguments, as the ungrammaticality of (i) shows.

(i) *John-un ku paci-lul tak-a-nay-ess-ta.
   J.-top that pants-acc wipe-comp-out-pst-decl.
   Intended: ‘John wiped the pants (to make them clean).’

Hence, the translation given for (10) in the text is the only reading available. I thank Marcel den Dikken for raising this question (personal communication).
Another challenge for Hoshi’s analysis is that there are cases where pro cannot be licensed even though its potential antecedent is overtly expressed in the preceding IHRC. For instance, as Shimoyama (2002) points out, pro cannot be anaphorically linked to a noun phrase that is embedded inside another noun phrase. To see this, compare (13a) and (13b). These examples show that, while pro can be linked to a noun phrase that occurs as the object of a verb bearing accusative case, it cannot be linked to a noun phrase that occurs inside another noun phrase bearing genitive case.

(13)a. [[enu namca-na ]caki anay]-lul sonnim-kkey
[[every man-Q ]self wife]-acc guest-dat.hon
sokayha-Ø]-n kes]-ul sonnim-i cwuksi
introduce-prf]-rel kes]-acc gueste-nom immediately
chingchanhayssta.

‘Every man introduced his wife to the guest and he praised her immediately.’

b. *[[[Enu namca-na ]caki anay]-uy kimpap]-ul sonnim-kkey
[[Every man-Q ]self wife]-gen sushi]-acc guest-dat.hon
taycepha-Ø]-n kes]-ul sonnim-i cwuksi
serve-prf]-rel kes]-acc guest-nom immediately
chingchanhayssta.

Intended: ‘Every man served the guest’s wife’s sushi and he praised her immediately’.

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Shimoyama also observes that this restriction on pro does not carry over to typical E-type pronouns. They can be anaphorically linked to any noun phrase, regardless of whether they are embedded inside another noun phrase or not, as the following paradigms from English and Korean illustrate.

(14)a. Every man introduced \([_{\text{DP}1 \text{ his } \text{ wife}}] \) to the guest and the guest praised her immediately.

b. Every man served \([_{\text{DP}2 \text{ his wife's}]} \text{ sushi}] \) to the guest and the guest praised her immediately.

(15)a. Enu namca-na \([_{\text{DP}1 \text{ caki anay i}}]-lul \) sonnim-kkey

Every man-Q \([ \text{ self wife]-acc} \) guest-dat.hon.
sokayhassy-ko sonnim-i kunye-lul cwuksi
introduced-comp guest-nom she-acc immediately
chingchanhayssta.

praised.

‘Every man introduced his wife to the guest and immediately after that the guest praised her.’
b. Enu namca-na [DP2 [DP1kaki anay]-uy kimpap-ul sonnim-kkey
Every man-Q [ [ self wife]-gen sushi]-acc guest-to

taycephayss-ko sonnim-i kunye-lul cwuksi
serve-comp guest-nom she-acc immediately

chingchanhayssta.

praised.

‘Every man served his wife’s sushi to the guest and immediately after that the
guest praised her.’

We can confirm Shimoyama’s observation by considering (16). This sentence
shows that pro cannot be anaphorically linked to a noun phrase that is a part of a
conjoined noun phrase.

(16) John-un [([DP3 [DP1Mary]-wa [DP2 Bill]]-i hamkkey
J.-top [[ M.-and [ B.]-nom together

nol-ko iss-n]-un kes]-ul koylophi-ess-ta.

play-comp cop-imprf]-rel kes]-acc bother-pst-decl.

Possible reading: ‘Mary and Bill were playing (together) and John bothered

both of them.’

Impossible reading: ‘Mary and Bill were playing (together) and John bothered

(only) her or him.’
Again, typical E-type pronouns or definite descriptions in English and Korean show different behaviors. Consider (17) and (18).

(17) \[ \text{DP}_3 [\text{DP}_1 \text{Mary}_i] \text{ and } [\text{DP}_2 \text{Bill}_j] \] were playing together and John bothered her\_i/him\_j/them\_i\_j.

(18) [\text{DP}_3 [\text{DP}_1 \text{Mary}_i]-\text{wa} [\text{DP}_2 \text{Bill}_j]-\text{i} \text{ hamkkey nol-ko iss-n]-un}
[ [ \text{M.}-\text{and} [ \text{B.}]-\text{nom} \text{ together play-comp cop]-rel.imprf}
tey John-i ku nacamay/yeccaay/ay-tul-ul koylophiessta.
time Jon-nom that male.kid/female.kid/kid-pl-acc bothered.

‘Mary and Bill were playing together and John bothered her\_i/him\_j/them\_i\_j.’

Taken together, this set of facts clearly shows that \text{pro} is subject to different licensing conditions than typical E-type pronouns or definite descriptions. Now the question that arises is: what is the licensing condition on \text{pro}? In the next subsection, I offer an answer to this question by substantiating Shimoyama’s (2002) conjecture.

4.2.3. What is the licensing condition of the definite description?

Based on the contrast between paradigms such as (13) and (14-15), Shimoyama (2002) speculates that \text{pro} differs from E-type pronouns in that, in order for it to be licensed, its referent must bear a thematic role that is assigned directly by the predicate of the embedded sentence (p. 143). On this analysis, sentence (13b) is ungrammatical because the referent of \text{pro} receives its thematic role from the head noun of the noun
phrase which embeds it, rather than from the predicate of the sentence. By the same reasoning, sentence (16) is ungrammatical on the reading where pro refers to either Mary or Bill because, on this interpretation, the referent of pro receive its thematic role from a conjunction, not from a sentential predicate.

We can test the validity of Shimoyama’s conjecture by evaluating it against a wider range of data. Consider first sentence (19).

(19) John-un [[Maryi-ka ku alumtawun yepaywu_k-ekey
J.-top [[M.-nom that beautiful actress-dat
Sue_j-lul sokayha-ko iss-n]-un kes]-ul
S.-acc introduce-comp cop-imprf]-rel kes]-acc
(takaka-se) kkyeanassta.
(approach-and) hugged.

‘Mary_i was introducing Sue_j to the beautiful actress_k and John hugged her.’

As indicated in the English translation, pro can receive at least three construals in this sentence. First, it can be readily construed as referring to the Agent, namely, Mary. In fact, this is the most salient reading in a neutral context. But it is possible to make Sue salient enough to serve as pro’s referent. Furthermore, we can think of a context where pro can refer to the Goal argument, namely, the beautiful actress. Suppose that this sentence was uttered in the following context: John has a big crush on some actress.

Today John happened to see his friend Mary giving flowers to this actress in front of a

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6 The pro in this sentence can receive yet another reading where it refers to the plural entity that consists of the Agent, Theme, and the Goal.
So he approached them and hugged the actress as if it was an accident. When situated in this context, the sentence can readily receive the interpretation where Bill hugged the actress, not Mary or Sue.

Consider now (20). This sentence shows that pro can be readily construed as referring to an Experiencer argument, namely, Mary.

(20) **Construal with an Experiencer:**

**Context:** John comforted Mary while she was feeling sad.

```
John-un [[Mary-ka sulph-e ha-ko iss-n]-un kes]-ul
Mary-top [[M.-nom feel.sad-e do-ko cop-imprf]-rel kes]-acc
wiloheitssta.
```

comforted.

‘Mary was feeling sad and John comforted her.’

Finally, consider (21-23). These sentences show that pro can also be interpreted as referring to arguments that bear the Concomitant, Instrument, and Location roles.
(21) **Construal with a Concomitant:**

*Context:* Mary isn’t ticklish at all, so it’s no fun to try and tickle her. Bill is, on the other hand, a lot of fun to tickle; he’s so ticklish that once he starts giggling from a tickle, it can last for several minutes.

John-un [[Mary-ka wuntongcan-eyse Bill-kwa nol-ko
J.-top [[M.-nom play.ground-loc B.-with play-comp
iss-n]-un kes]-ul kancilephie-se o-pwun-tongan
cop-imprf]-rel kes]-acc tickle-and five-minute-period
wus-key-ha-ess-ta.
laugh-comp-do-pst-decl.

‘Mary was playing with **Bill** in the playground and John (came along) and tickled **him** to laugh for five minutes.’

(22) **Construal with an Instrument:**

*Context:* Mary was working on a sculpture by using a really sharp knife. John thought it was too dangerous for her to keep using the knife. So he took it away from her.

John-un [[Mary-ka khal-lo cokak-ul mantul-ko
J.-top [[M.-nom knife-with sculpture-acc make-comp
iss-n]-un kes]-ul ppayassassta.
cop-imprf]-rel kes]-acc took.away.

‘Mary was making the sculpture with a **knife** and John took it away from her.’
(23)  **Construal with a Location:**

**Context:** There was an important meeting going on in a building and terrorists blew up the building.

\[
\text{Theylepem-tul-i} \quad \text{[ku kenmwul-eyse} \quad \text{cwungyohan hoyuy-ka} \\
\text{Terrorist-PL-nom} \quad \text{[that building-loc} \quad \text{important meeting-nom} \\
yelli-ko \quad \text{iss-n]-un} \quad \text{kes]-ul} \quad \text{phokphahayssta} \\
take.place-comp \quad \text{cop-imprf]-rel} \quad \text{kes]-acc} \quad \text{blew up.}
\]

‘An important meeting was taking place in a building and the terrorists blew it up’

The fact that pro can be anaphorically linked to noun phrases that bear a variety of thematic roles suggest that Shimoyama’s conjecture is on the right track.

Further support for Shimoyama’s hypothesis comes from the fact that noun phrases that bear the role of Benefactive cannot readily make a good referent for pro, unless the predicate of the sentence selects for them. To see this, compare (24) and (25). Assume that both sentences were uttered in the context where Mary was wrapping a present for the beautiful actress that John greatly admires.
(24)  

\[
\text{John-un [[Mary-ka ku alumtawun yepaywu-ekey J.-top [M.-nom that beautiful actress-dat senmwul-ul ssa-∅ cwuko-ko iss-n]-un kes-ul present-acc wrap-conj give-comp cop-imprf]-rel kes]-acc (takaka-se) kkyeanassta. (approach-and) hugged.}
\]

‘Mary was wrapping a present for the beautiful actress and John approached them and hugged the actress.’

(25)  

\[
\text{*John-un [[Mary-ka ku alumtawun yepaywu-lul wihay J.-top [M.-nom that beautiful actress-acc for senmwul-ul ssa-ko iss-n]-un kes-ul present-acc wrap-comp cop-imprf]-rel kes]-acc (takaka-se) kkyeanassta. (approach-and) hugged.}
\]

Intended: ‘Mary was wrapping a present for the beautiful actress and John approached and hugged the actress.’

In (24), it is possible to construe pro as referring to the beautiful actress because, here, the embedded predicate is a ditransitive verb which assigns the Goal role to the actress. On the other hand, sentence (25) cannot be judged grammatical on the reading where pro refers to the beautiful actress because, here, the embedded predicate is not a ditransitive verb and hence the actress does not bear a thematic role in the event described by the
embedded clause. Note that this sentence will not be judged grammatical even if the discourse participants know that the actress was present in the scene where Mary was wrapping the present for her. The contrast between (24) and (25) shows that receiving a thematic role directly from the embedded predicate is important for a noun phrase to serve as a potential antecedent of pro, as Shimoyama hypothesizes.

If we adopt Shimoyama’s line of analysis, then we can readily deal with problematic sentences such as (10), where pro is licensed despite the fact that its licenser is not overtly expressed in the embedded clause. In this sentence, the embedded clause describes the complex eventuality where an event of something dirty getting onto John’s pants occurred and, consequently, the state of the pants being dirty (with this dirty stuff) came about. Our intuitions tell us that this dirty stuff bears some role in the eventuality described by the embedded clause; for instance, one can say that the dirty stuff bears the role of Instrument because it is what made John’s clothes dirty (in this case, John’s pants bears the role of Theme). Alternatively, one can say that it bears the role of Theme because it is what got onto John’s pants (in this case, John’s pants play the role of Location). Whichever the name of the role is, there is no doubt that the referent of pro receives a thematic role from the predicate of the embedded clause. It is therefore possible for speakers of Korean to accommodate this sentence on the intended reading.

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7 See Jackendoff (1983, 1987) and Dowty (1991) for further discussion on implicit thematic role bearers. I thank Chris Potts for pointing out the relevance of these works.

8 Although it is not directly related to our present discussion, it is important to note that J.-H. Yoon (1993) claims that interpreting the EHRC construction in Korean (and, by extension, in Japanese) involves establishing a salient relation between the external head and the event described by the embedded clause. Given this, one might hypothesize that establishing some relation between the semantic head of a relative clause and the content of the embedded clause is important in interpreting relative clause constructions in Korean (and Japanese) in general. Even if this hypothesis proves to be correct, however, it cannot mean that every type of relative clause construction in Korean has the same semantics. As we saw in Chapter 1, the EHRC construction is not subject to the same kind of restriction as the IHRC construction. I leave
Adopting Shimoyama’s suggestion also enables us to give a uniform account of typical internally-headed relatives and the so-called change relatives in the sense of Tonosaki (1993: 154). Change relatives have the same form as typical IHRCs but authors like C. Kitagawa (2003) treat them separately from typical IHRCs on the grounds that they do not contain an internal head, i.e., a noun phrase that can be interpreted as co-referential with pro.⁹ To illustrate, consider (26) and (27). Our intuitions tell us that what John ate in these sentences are dried persimmons and cooked fish, respectively, but the embedded clauses do not contain noun phrases that refer to them. (Note that the noun hongsi in Korean refers to a very ripe and soft red persimmon and there is a separate word for a dried persimmon, namely, kockam. So the pro in (26) cannot be co-indexed with hongsi.)

(26) John-un [[Mary-ka hongsi-lul mal-li]-n
J.-top [[M.-nom ripe.persimmon-acc dried-cau]-rel.prf
kes]-ul mek-ess-ta.
kes]-acc eat-pst-decl.

‘Mary dried a ripe persimmon and John ate it.’

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⁹ In fact, C. Kitagawa also maintains that the relative clause inside the Korean sentence (10) above instantiates a change relative, rather than a typical IHRC, for it does not contain an internal head. In so doing, he attempts to resolve the problem (10) presents for the referential pronoun analysis of pro—that is, the fact that the sentence lacks a potential referential for the pronoun.
But, on the analysis suggested by Shimoyama, change relatives are no different from typical IHRCs. In the above sentences, the referents of pro bear thematic roles in the eventualities described by the embedded clauses because the embedded sentences instantiate the causative-inchoative construction, as the English glosses of the embedded predicate indicate. That is, the embedded verbs are transitive verbs that are derived from a related adjective with the “cause to become ADJ” meaning (Parsons 1990: 120). Hence, in these sentences, the referent of pro, in fact, bears the role of resultant theme in the sense of Y. Kim (2002), i.e., an entity which is in a beginning state that results from the culmination of the event described by the embedded clause (p. 556-7). We can see this more clearly by considering the logical structures of the embedded clauses of (26) and (27), which are given in (28) and (29), respectively. These structures can be read as ‘Mary causes the ripe persimmon to BECOME dried’ and ‘Mary causes the raw fish to BECOME cooked,’ respectively.

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10 I thank Rudy Troike for pointing out the causative-inchoative meanings of the embedded clauses in (26-27).

11 These logical structures are based on Parsons’ (1990) a treatment of causative-inchoatives (pp. 121-123). See also Dowty (1979) for a similar treatment of causatives.
The logical structure of the embedded clause of (26):
\[\exists e [\text{Cul}(e) \& \text{dry}(e) \& \text{Agent}(\text{Mary})(e) \& \exists e' \exists x [\text{Cul}(e') \& \text{Theme}(x)(e) \& \text{ripe}_\text{persimmon}(x) \& \text{CAUSE}(e, e') \& \exists s [\text{Being-dried}(s) \& \text{Theme}(x)(s) \& \text{Hold}(s) \& \text{BECOME}(e', s)]]] \]

The logical structure of the embedded clause of (27):
\[\exists e [\text{Cul}(e) \& \text{cook}(e) \& \text{Agent}(\text{Mary})(e) \& \exists e' \exists x [\text{Cul}(e') \& \text{Theme}(x)(e) \& \text{raw}_\text{fish}(x) \& \text{CAUSE}(e, e') \& \exists s [\text{Being-cooked}(s) \& \text{Theme}(x)(s) \& \text{Hold}(s) \& \text{BECOME}(e', s)]]] \]

Given the foregoing discussion, it seems that we can subsume change relatives under the rubric of IHRCs without having to posit a separate category for them.

4.2.4. Conclusion

In this section, I showed that the pronominal definite description that occurs in the IHRC construction, i.e., \textit{pro}, is subject to different licensing conditions from typical E-type pronouns. While E-type pronouns seem to require their potential antecedents to be overtly realized in the preceding discourse in the form of NP, \textit{pro} requires its referent to bear a thematic role which is assigned by the predicate of the embedded clause. These findings lead us to conclude that, despite the parallels noted in the literature, the standard E-type pronoun analysis cannot be directly applied to \textit{pro}. They also suggest that the formal linking problem presented by \textit{pro} is not about establishing a formal link between the pronoun and a noun phrase that is overtly realized in the embedded clause; it is rather
about how to establish a formal link between the semantics of *pro* and the event structure of the embedded clause.

### 4.3. A constraint on the event structure of the embedded clause

In this section, I show that making the referent of *pro* bear a thematic role in the eventuality described by the embedded clause is not sufficient for it to be licensed; the embedded clause’s event structure also affects the interpretability of the pronoun and, consequently, the acceptability of the entire sentence that contains an IHRC.

To illustrate this, compare (30) and (31), which are repeated from Chapter 3 (Section 3.3). In both sentences, *pro* is intended to refer to the doll and this entity bears a thematic role which is assigned by the embedded predicate, namely, Theme and Instrument (or Theme), respectively. Hence, we can say that both sentences satisfy the licensing condition on *pro* that we explored in the preceding section, elaborating on Shimoyama’s (2002) conjecture. Much to our surprise, however, only (30) is judged acceptable.

make-prf]-rel kes]-acc took out and threw away.

‘Mary made a doll yesterday and John took it out and threw it away today.’
In Chapter 3, I suggested that the contrast between the two sentences arises due to a temporal restriction on the embedded clause of the IHRC construction. In this section, I spell out this restriction. I argue that a sentence instantiating the IHRC construction must satisfy two conditions: (i) the embedded clause must describe a state that temporally intersects with the eventuality described by the matrix clause, and (ii) this state must contain the referent of pro.

In view of this constraint, the contrast between (30) and (31) arises because, unlike the former, the embedded clause of the latter does not describe a state that temporally intersects with the eventuality described by the matrix clause. This difference is essentially due to the aspectual properties of the embedded clause, both lexical and grammatical. In both sentences, the aspect of the embedded clause is perfect. That is, the event time precedes the topic (or reference) time. But the two sentences differ from each other in that the embedded predicate of (30) is telic while that of (31) is atelic. Hence, only the former describes an event with a clear terminal point. When the aspect of a sentence is perfect, the aspectual property of the verb matters, because, according to
Parsons (1990), depending on its aspect, a sentence can describe a different type of state which bears a different temporal relation to the topic time.

Parsons contends that a sentence with perfect aspect can describe two types of states, namely, a resultant state and a target state. A resultant state comes about regardless of the aspectual properties of the predicate and this state holds true of the event forever after. For instance, the sentence *Mary has run* describes the state of Mary having run and this state holds permanently ever after the culmination of the event. On the other hand, a target state comes about only when the sentence has a telic predicate, because, by definition, a target state describes the state of the incremental Theme or the direct object of the verb immediately after the culmination of the event described by the predicate. A target state also differs from a resultant state in that it holds only for a temporary period of time.\(^{12}\) For instance, if the event of John throwing a ball onto the roof culminates, then there arises a target state where the ball is on top of the roof. This state holds only temporarily because the ball can be removed from the roof (p. 234-5).

If we apply Parsons’ analysis to sentences (30) and (31) while adding a few assumptions, we can explain why only the former satisfies the conditions I proposed above. First, under Parsons’ analysis of perfect sentences, we can say that the embedded clause of (32) describes not only a resultant state but also a target state, because its predicate is telic. Suppose that we can assume (possibly diverging from Parsons) that resultant states hold for the Agent argument and target states hold for the Theme argument. Under this assumption, the two states described by the embedded clause of (32) can be treated as the states of the Agent and the Theme: that is, the resultant state describes the state of Mary having made a doll and the target state describes the state of

\(^{12}\) Kamp and Reyle (1993) call this state *a result state.*
the doll after Mary’s doll-making event culminated. Since both states temporally intersect with the matrix event, we can say that the embedded clause of this sentence provides two potential referents for pro, namely, Mary and the doll. Hence, the sentence is predicted to be ambiguous. But, in this sentence, the matrix verb selects for a non-human object. Hence, pro is forced to be interpreted as referring to the doll, rather than Mary.

Turning now to sentence (31), in this sentence, the embedded predicate is atelic and hence the embedded clause describes only a resultant state, namely, the state of Mary having played with a doll. Since this state contains Mary, the sentence is predicted to be interpretable only when pro is construed as referring to Mary. But the matrix verb of this sentence is seeking a non-human object. Hence, the sentence cannot be interpreted.

The proposed analysis predicts that (31) will become interpretable if the matrix verb changes into something that selects for a human-denoting NP. This prediction is borne out. The sentence indeed becomes interpretable when the matrix verb changes from nayta peli- ‘throw out’ to chingchangha- ‘praise’ and thereby forces pro to be interpreted as referring to Mary, as shown in (32).


‘Yesterday Mary played with a doll and today John praised her for that.’
The proposed analysis also correctly predicts that, if the embedded aspect of (31) is changed from perfect to progressive, then the sentence will become grammatical on the reading where pro refers to the doll, as illustrated in (33).

(33) John-un onul [[Mary-ka inhyeng-ul kaci-ko J.-top today [[M.-nom doll-acc have-comp
    nol-ko iss-nu]-un kes]-ul ppayassa-se
    play-comp cop-mprf]-rel kes]-acc confisticate-conj
    nayta peliessta.

took out and threw away.

‘Today Mary was playing with a doll and John took it (= the doll) from her forcefully and threw it away.’

The above sentence is predicted to be interpreted on the reading where pro is construed as the doll, because, according to Parsons, a sentence with progressive aspect describes an “in-progress state”, which holds while the event is in progress (p. 234). Since an in-progress state describes the state of all the event participants while the event is in progress, we can infer that it contains all the arguments of the sentential predicate. Thus, a sentence containing a progressive IHRC is expected to be interpretable regardless of what pro refers to (as long as the intended interpretation is pragmatically permissible).
Further support for the present analysis comes from the ambiguity of (34) below. In this sentence, the matrix verb selects for a non-human object and the embedded clause contains two non-human event participants, namely, the sculpture and the knife, which bear the Theme and the Instrument roles, respectively. Since the embedded aspect is progressive, we can assume with Parsons that the embedded clause describes an in-progress state. We can assume further that this state contains all the event participants including the sculpture and the knife. Hence we predict the sentence to be acceptable regardless of whether pro is construed as referring to the sculpture or the knife, as the English translation suggests.

(34) John-un [[Mary-ka khal-lo cokak-ul mantul-ko
J.-top [[M.-nom knife-with sculpture-acc make-comp
iss-n]-un kes]-ul ppayass-ase peliessta.
cop-imprf]-rel kes]-acc take.away-and threw away.

‘Mary was making a sculpture with a knife and John took the sculpture from her and threw it away.’

Or: ‘Mary was making a sculpture with a knife and John took the knife from her and threw it away.’

The present analysis also predicts that the ambiguity of (34) will disappear if the embedded aspect changes from progressive to perfect. This is because the embedded predicate is telic and, hence, if the embedded aspect is perfect, then the embedded clause will describe both a resultant state and a target state, which describe the state of the Agent
and the state of the Theme, respectively. So the sentence is predicted to be grammatical if \textit{pro} refers to either Mary or the doll. But since the matrix verb selects for a non-human object, \textit{pro} will be construed as referring to the doll. This prediction is again borne out, as illustrated by (35). This sentence can receive only one reading, as its English translation shows.

(35)  John-un  [[Mary-ka  khal-lo       cokak-ul
       J.-top       [[M.-nom  knife-with   sculpture-acc

\textbf{mantul-∅}-un       kes]-ul     ppayass-ase   peliessta.
\textbf{make-prf}-rel       kes]-acc       take.away-and   threw away.

Possible reading: \textquote{Mary (had) \textbf{made} a sculpture with a knife and John took \textbf{the sculpture} away from her.}'

Impossible reading: \textquote{Mary (had) \textbf{made} a sculpture with a knife and John took \textbf{the knife} away from her.}'

Taken together, these facts suggest that the set of conditions I offered above are indeed operative in interpreting the IHRC construction. That is, in order for a sentence instantiating the IHRC construction to be interpretable, (i) the embedded clause must describe a state that temporally intersects with the eventuality described by the matrix clause and (ii) this state must contain the intended referent of \textit{pro}.  

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4.4. Weak vs. strong IHRCs and their parallels to weak and strong free adjuncts

In this section, I show that there is an intricate relation between the kind of state the embedded clause describes and the semantic relation that holds between the eventualities described by the embedded and the matrix clauses. In addition, I show that the truth-conditions of a sentence instantiating the IHRC construction can vary according to whether the embedded clause describes a temporary state or a permanent state. Based on the semantic differences between sentences embedding a temporary state description and those embedding a permanent state description, I draw a parallel between the IHRC construction and the free adjunct construction in English.

4.4.1. What counts as a temporary state or a permanent state?

As a preliminary, let me first outline what counts as a temporary state and what counts as a permanent state. To begin with temporary states, I assume that they can be denoted by at least three different types of predicates.

First, temporary states can be described by stage-level predicates in the sense of Carlson (1977) such as sulphu- ‘be sad’ and paykophu- ‘hungry’, because these predicates describe spatio-temporal slices of an individual. Second, in-progress states in the sense of Parsons (1990) can be classified as temporary states, because they hold while the event described by the sentence is in progress or development. In other words, they will not hold if the event is fully developed. Third, by similar reasoning, target states in the sense of Parsons can also be counted as temporary states, because they may cease to hold after the culmination of the event described by the clause.
As for permanent states, I assume that there are at least two types of predicates that describe them. First, individual-level predicates in the sense of Carlson (1977) describe permanent states of individuals. Second, resultant states in the sense of Parsons (1990) can be considered as descriptions of permanent states. It is, however, important to note that, in the present analysis, resultant states have a slightly different meaning: they are descriptions of the Agent argument after an event is over, rather than descriptions of the event itself. Hence, in actuality, resultant states may not necessarily hold forever after the culmination of an event. Put another way, they may hold only during the lifetime of an Agent argument.\(^\text{13}\) Hence, we can say that resultant states are in fact semi-permanent. But this fine-grained distinction is not so crucial for present purposes. Hence I will continue to treat resultant states as permanent state descriptions.

In sum, I offer the following as the taxonomy of states I will assume in this study:

(36) **Table 1. The taxonomy of states:**

<table>
<thead>
<tr>
<th>Temporary states</th>
<th>Permanent states</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Stage-level predicates</td>
<td>a. Individual-level predicates</td>
</tr>
<tr>
<td>b. In-progress states</td>
<td>b. Resultant-states</td>
</tr>
<tr>
<td>c. Target-states</td>
<td></td>
</tr>
</tbody>
</table>

4.4.2. Differences between temporary state and permanent state descriptions

Let me now illustrate how the semantic relation that holds between the contents of embedded and the matrix clauses can affect what kind of state the embedded clause can

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\(^{13}\) I thank Angelika Kratzer for pointing out this consequence of treating resultant states as descriptions of Agents.
describe. Descriptively speaking, the embedded clause can describe a permanent state only when a causal interpretation can be readily assigned to the IHRC with respect to the eventuality described by the matrix clause. To see this, consider (37) and (38). In these paradigms, the sentences are identical except for the matrix predicate and yet they differ sharply in terms of their acceptability.

(37)a. *John-un Mary-ka wuntongcang-ul yel-pen
     J.-top M.-nom playground-acc ten-times
talli-∅-n kes-ul mwul-ul cwuessta.
run-prf-rel kes-acc water-acc gave.

Intended: ‘Mary ran on the playground ten times and John gave her water when she was done with it.’

b. John-un Mary-ka wuntongcang-ul yel-pen
     J.-top M.-nom playground-acc ten-times
talli-∅-n kes-ul sang-ul cwuessta.
run-prf-rel kes-acc prize-acc gave.

‘Mary ran on the playground ten times and John gave her a prize for that.’

(38)a. *John-un Mary-ka yengliha-∅-n kes-ul
     J.-top M.-nom smart-imprf-rel kes-acc

koylophiessta.

bothered.

Intended: ‘Mary is smart and John pinched her.’
J.-top M.-nom smart-imprf-rel kes-acc envied.

‘Mary is smart and John envied her for that.’

Notice that we cannot attribute the contrast between the two sentences in each paradigm to the violation of the conditions I proposed in the previous section. In (37), the embedded clauses of both sentences describe a resultant state, as they have perfect aspect with an atelic predicate, and this state contains the intended referent of pro, namely, Mary. Hence, both sentences meet the proposed conditions. A similar picture obtains for the sentences in (38). Here, the embedded clauses describe the state of Mary being smart and, again, this state contains the intended referent of pro, namely, Mary. Therefore, according the two conditions I proposed above, the two sentences are predicted to be equally acceptable, contrary to fact.

What is then responsible for the contrast between the sentences in (37) and (38)? I argue that the sentences differ in their acceptability because, while the matrix predicates of the (b) sentences readily induce a causal interpretation for the IHRC with respect to the matrix clause’s content, the matrix predicates of the (a) sentences do not. That is, while sang-ul cwu– ‘give a prize to’ and sikiha- ‘feel jealous’ intrinsically carry a cause-result interpretation, mwul-ul cwu ‘give water to’ and koylophi- ‘bother’ do not.

The availability of a cause-result interpretation matters here because the embedded clause of each sentence describes a permanent state and a sentence expressing a permanent state can be interpreted only when a cause-result relation can be readily
established between the eventualities described by the embedded clause and the matrix clause. To illustrate this restriction, consider the following English sentences:

(39)a. *When John is handsome, I feel jealous of him
   b. Because John is handsome, I feel jealous of him.

Sentence (39a) is plain ungrammatical, because a permanent state description ‘John being handsome’ cannot be temporally related to the eventuality of ‘me feeling jealous.’ In contrast, sentence (39b) is grammatical because the state of John being handsome can be causally related to the event of me feeling jealous.

Notice that when the embedded (or subordinate) clause contains a predicate that describes a temporary state, the embedded clause’s content can be related to the matrix clause’s content either temporally or causally, as we can see in (40).

(40)a. When John left, I cried
   b. Because John left, I cried.

A natural question that arises at this point is: what makes the embedded clause of a sentence receive a causal interpretation relative to the matrix clause’s content? We already saw in (37) and (38) that the lexical semantics of the matrix predicate can suggest a causal relation. I now want to point out that the content of the embedded clause can also induce such a reading. For instance, as Kuroda (1976; 1992) observes, if the embedded clause’s content is “motivationally” or “purposively” related to the matrix clause’s
content, a cause-result relation can be readily assigned to the contents of the two clauses (even if the matrix predicate does not necessarily induce such a relation). This can be illustrated by (41).

(41) John-un [[Bill-i ku_j-lul kongkyek-ha-lye-ko
J.-top [[B.-nom he-acc attack-do-intend-comp
chac-a o-∅]-n kes]-ul ttayli-e nwuphi-ess-ta.
visit-comp come-prf]-rel kes]-acc hit-conj lay.down-pst-decl.

‘Bill came to attack John and John floored him (= Bill).’
(Adapted from Kuroda 1992: 151, (18))

Further evidence that the embedded clause’s content can affect the availability of a causal interpretation for an IHRC comes from the contrast between sentences in (42-43).

(42a) ??John-un [[Mary-ka inhyeng-ul akki-n]-un kes]-ul
J.-top [[M.-nom doll-acc care.for-imprf]-rel kes]-acc
peli-ess-ta.

threw.away-pst-decl.

Intended: ‘Mary cares for a doll and John threw it away.’

b.(?)John-un [[Mary-ka inhyeng-ul kkumccikhi-to
J.-top [[M.-nom doll-acc intensely
akkí-n]-un kes]-ul peli-ess-ta.
care.for-imprf]-rel kes]-acc threw.away-pst-decl.
‘Mary cares for a doll very much and John threw it away.’

(43)a. ??/*Ku kkayngtan-un [[Sam-i cocik-uy pimil-ul that mafia-top [[S.-nom group-gen secret-acc nwuselha-∅]-n kes]-ul cwukyessta.
reveal-prf]-rel kes]-acc killed.
Intended: ‘Sam revealed a secret of the mafia and they (= the mafia members) killed him for that.’

reveal-prf]-rel kes]-acc killed.
‘Sam revealed a top secret of the mafia and they (= the mafia members) killed him for that.’

The above paradigms show that we can induce a causal relation by changing the content of the embedded clause—for instance, by adding the linguistic material that will make the embedded clause’s content more “motivationally” related to the matrix clause’s content in the sense of Kuroda (1976; 1992).

The fact that the acceptability of a sentence can vary depending on how readily the embedded clause’s content can induce a causal relation between the eventualities described by the embedded and the matrix clauses suggests that the inferences of language users play an important role in interpreting sentences that instantiate the IHRC construction in Korean and Japanese. This raises the question of exactly how pragmatic
factors interact with grammatical factors in interpreting the IHRC construction. Given the scope of this study, I cannot offer a fully satisfactory answer to this question. But it seems that, for a sentence to be judged acceptable, it must satisfy the two conditions I proposed in the preceding section as a basic requirement, and the discourse participants should be able to assign either a temporal or a causal relation based on the matrix predicate’s semantics and the embedded clause’s content with respect to the matrix clause’s content. I suspect that if a ‘praise’-type verb occurs as the matrix predicate, the sentence will always receive a causal interpretation and hence the speakers’ judgments on the sentence will not vary greatly. However, if the matrix verb is a ‘catch’-type verb, then the embedded clause’s content is most likely to serve as a the most crucial determinant. In that case, there will be a wider range of variability across speakers on the acceptability of the sentence, because the speakers will have to rely more heavily on extra-grammatical factors such as their world knowledge and cultural background.

Let me now show how the truth-conditions of a sentence can vary depending on the kind of state the embedded clause describes. Again, if the embedded clause describes a temporary state that temporally intersects with the eventuality described by the matrix clause, then the IHRC can be ambiguous between a because clause and a while clause even if the matrix predicate is a chingchanha- ‘praise’ type verb and hence the IHRC can readily receive a causal interpretation relative to the matrix clause’s content. In contrast, if the embedded clause describes a permanent state, then the IHRC can receive only a causal interpretation.

To see this, compare (44) and (45), which are identical except for the embedded clause aspect. In (44), the aspect of the embedded clause is progressive and hence the
embedded clause describes an in-progress state in the sense of Parsons (1990), which is a temporary state. On the other hand, in (45), the embedded aspect is perfect and, since the embedded predicate is atelic, the embedded clause describes only one state, namely, the resultant state of Mary having watched TV without doing her homework.

(44)  John-un  Mary-ka  thelepi-lul  po-ko  iss-n-un
     J.-top  M.-nom  television-acc  watch-comp  cop-imprf-rel
     kes-ul  yatanchi-ess-ta.
     kes-acc  scold-pst-decl.

Reading 1:  ‘Mary was watching television and John scolded her for that.’
Reading 2:  ‘Mary was watching television and John scolded her for doing something else (e.g., for having fought with her younger brother).’

(45)  John-un  Mary-ka  thelepi-lul  po-∅-un  kes-ul
     J.-top  M.-nom  television-acc  watch-prf-rel  kes-acc
     yatanchi-ess-ta.
     scold-pst-decl.

Possible reading:  ‘Mary (had) watched television and John scolded her for that.’

Impossible reading:  ‘Mary (had) watched television and John scolded her for something else (e.g., for having fought with her younger brother).’
As suggested in their English translations, (44) is ambiguous but (45) is not. The former can be true in a context where John scolded Mary because she was watching TV; the sentence can also be felicitous in a context where John scolded Mary because she did something else, say, fighting with her younger brother Bill. What this means is that the IHRC of (44) can be interpreted either as a *because* clause or a *while* clause. We can confirm the availability of the *while* clause-like interpretation by adding to the sentence the linguistic material that specifies the reason for John scolding Mary, as shown in (46).

(46)  John-un Mary-ka thelepi-lul po-ko iss-n-un
     J.-top M.-nom television-acc watch-comp cop-imprf-rel
     kes-acc B.-acc fight-decl-comp scold-pst-decl.

‘Mary was watching television and John scolded her *for having fought with Bill*.‘

Unlike (44), (45) can be felicitous only if John scolded Mary because she watched TV. Hence this sentence becomes infelicitous if we add extra linguistic material that tells us that John scolded Mary for a reason different from her watching TV, as shown in (47).

(47)  #John-un Mary-ka thelepi-lul po-∅-n-un kes-ul
     J.-top M.-nom television-acc watch-prf-rel kes-acc
     Bill-kwa ssawuess-ta-mey yatanchi-ess-ta.
     B.-acc fight-decl-comp scold-pst-decl.

‘Mary *had watched* television and John scolded her *for having fought with Bill*.‘
Under the proposed analysis, the semantic difference between (44) and (45) can be explained as follows: in (44), the embedded aspect is progressive and hence the embedded clause describes an in-progress state. Since an in-progress state is a temporary state, it can be interpreted as standing in either a temporal or a causal relation to the eventuality described by the matrix clause. On the other hand, in (45), the embedded clause has perfect aspect with an atelic predicate and hence it describes a resultant state.\(^\text{14}\) Since a resultant state is a permanent state, it gets interpreted as causally related to the matrix clause’s content.

It is important to note that the semantic differences between IHRCs that embed a temporary state description and those that embed a permanent state description are reminiscent of the differences between weak adjuncts and strong adjuncts in the sense of Stump (1985): Stump observes that free adjuncts exhibit different semantic behaviors depending on whether they contain individual-level (I-level) predicates or stage-level (S-level) predicates in the sense of Carlson (1977). A descriptive generalization he offers is that, while a free adjunct with an S-level predicate interacts with a modal operator, an adverb of quantification, or a generalization operation in the matrix clause, a free adjunct with an I-level predicate does not.

To illustrate, consider the sentences in (48). In these sentences, the matrix clauses contain a modal auxiliary would.

\begin{align*}
\text{(48) a. Being a master of disguise, Bill} & \text{ would fool everyone.} \\
\text{b. Wearing that hat, Bill} & \text{ would fool everyone.}
\end{align*}

\footnote{The embedded clause does not describe a target state, because the predicate is atelic.}
As Stump points out, what is interesting about the two sentences is that, while the free adjunct of the (b) sentence is interpreted as an *if*-conditional, which serves as the first argument of the matrix modal auxiliary, the free adjunct of the (a) sentence does not. The latter is interpreted more like a *because*-clause. Stump attributes this interpretive difference between the two sentences to the fact that the free adjunct of the (a) sentence contains an I-level predicate, whereas that of the (b) sentence contains an S-level predicate.

Consider now the sentences in (49). Here, the two sentences are similar in that their matrix clauses both contain the relative frequency adverb (or an adverb of quantification) *sometimes*, but they are dissimilar in that the free adjunct of the (a) sentence contains an I-level predicate but the free adjunct of the (b) sentence contains an S-level predicate.

(49)  
a. **Being a sailor**, John *sometimes* smokes a pipe.

    b. **Lying on the beach**, John *sometimes* smokes a pipe.

    (Stump 1985: 185, (241); my emphases)

Stump notes that the two sentences in (49) show a semantic difference which is similar to what we observed with the sentences in (48). While the adjunct of (49b) interacts with the frequency adverb by serving as its restrictor, the adjunct of (49a) does not; it is, again, interpreted like a *because*-clause.

Finally, consider the sentences in (50).
Here, again, the free adjuncts in the two sentences receive rather different interpretations. Our intuitions tell us that, while the adjunct of (50a) is interpreted like a because-clause, that of (50b) is interpreted like a whenever-clause. According to Stump, this interpretive difference arises because the matrix clauses of these sentences contain an implicit generalization operator and, while the adjunct of the (b) sentence interacts with it, the adjunct of the (a) sentence does not.

On the basis of these facts, Stump proposes that, depending on their predicate types, free adjuncts be grouped into two types: strong adjuncts and weak adjuncts. The former contain I-level predicates and the latter contain S-level predicates. Given the striking parallel between the IHRC construction and the free adjunct construction with respect to the correlation between the predicate type of the embedded clause and the interpretation of the sentence, I suggest that we adopt Stump’s classification of free adjuncts in our treatment of IHRCs and thus categorize IHRCs into two kinds: weak IHRCs and strong IHRCs. The embedded clauses of weak IHRCs describe temporary states and those of strong IHRCs describe permanent states.

4.5. Summary and conclusion

In this chapter, I reexamined some of the constraints that are known to be imposed on the IHRC construction in Korean and Japanese. In so doing, I clarified the
factors that affect the interpretability of sentences instantiating the construction. First, I showed that there is an intimate connection between the construal of pro and the event structure of the embedded clause. Second, I showed that the interpretability of a sentence is affected by whether the embedded clause describes a temporary state or a permanent state and whether the matrix predicate’s semantics and/or the embedded clause’s content can readily assign a cause-result relation to the eventualities described by the embedded and the matrix clauses. Third, I showed that language users’ inferences play an integral role in interpreting the IHRC construction.

These findings suggest that what is at the heart of the formal problem is how to establish a link between the semantics of pro and the state described by the embedded clause, rather than how to establish a link between the pronoun and a noun phrase that is overtly realized in the preceding IHRC (compare Hoshi 1995 and Shimoyama 1999). They further suggest that the Relevancy Condition is essentially about satisfying the conditions in (49).

(49)  The semantic conditions on the IHRC construction:

(i) The embedded clause describes a state;

(ii) The referent of pro must bear a thematic role in this state;

(iii) This state must bear either a temporal or a causal relation to the eventuality described by the matrix clause.
CHAPTER 5

THE SYNTACTIC STRUCTURE OF THE IHRC CONSTRUCTION

5.1. Introduction

The purpose of this chapter is to outline the syntactic structure of the IHRC construction and to describe the aspects of the syntax that will be crucial to the compositional semantic analysis I will present in the next chapter.

There are three key issues surrounding the syntax of the IHRC construction, which can be addressed in the form of questions, as given in (1).

(1) Three key issues surrounding the syntax of the IHRC construction:

(i) What is the syntactic structure of the IHRC+kes/no string? In particular, what is the syntactic status of kes and no? What is the internal structure of the IHRC?

(ii) What is the overt structure of the IHRC construction? Where is the IHRC+kes/no string generated? In an argument position or an adjunct position?

(iii) What is the LF-structure of the construction? Does any element undergo LF-raising? If so, what moves to where and why?

Regarding the first question, the predominant view in the literature is that the IHRC+kes/no string has a complement-head structure, as opposed to a modifier-modified structure, where kes or no selects for a full clausal complement (for Korean, see, among

On the syntactic status of IHRC+*kes/no* string, there are two opposing views. Under one view, the string is base-generated in an argument position of the matrix clause (e.g., Chung and Kim 2003 for Korean; Hoshi 1995, Fuji 1998, Shimoyama 1999 for Japanese); under the other view, it is base-generated in an adjunct position as a modifier of the matrix VP or IP (e.g., D. Chung 1999; Tsubomoto 1991, Murasugi 1994, Mihara 1994).

Regarding the LF-structure of the IHRC construction, there are also two slightly differing lines of analysis. First, Fuji (1998) posits that the entire IHRC+*no* (or *kes*) string raises at LF to the IP level of the matrix clause. Second, Shimoyama (1999) assumes that only the IHRC raises at LF, leaving the other material inside the IHRC+*no* (or *kes*) string in the base-position.

In this study, I endorse the view that the IHRC+*kes/no* string has a complement-head structure, where an N-level pronoun *kes* or *no* selects for a clausal complement, namely, the IHRC. However, I depart from the existing view in at least two points.

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¹ Authors like Ransom (1988) and Horie (1993a) attribute the lack of agreement among others on the status of *kes* to the fact that the IHRC construction in Korean is still being grammaticalized. That is, *kes* is still undergoing a change from a lexical category to a functional category.
First, I argue that, although \textit{kes/no} is an N head, the IHRC+\textit{kes/no} string is a DP structure, rather than just an NP structure, and the head of this DP hosts the [+definite] feature (compare Chung and Kim 2003). Treating the IHRC+\textit{kes/no} string as a DP is important from a semantic point of view: as we saw in Chapter 2, the string exhibits an E-type pronoun or definite description-like behavior. Hence we want it to have the semantics of a referential expression.

Second, I claim that the IHRC has a truncated syntactic structure whose maximal projection is an Aspect Phrase, rather than a Tense Phrase or an Inflection Phrase. As we shall see in Chapter 6, positing a truncated structure for the IHRC will have an important consequence for capturing the semantic relation that holds between the embedded clause and the matrix clause.

Concerning the syntactic status of the IHRC+\textit{kes/no} string, I adopt the argument analysis as opposed to the adjunct analysis.

Putting these ideas together, I posit (3) as the overt syntactic structure for (2). In (3), Rel corresponds to IHRC in our usual terminology.

\begin{tabular}{l}
(2) & John-un [[Mary-ka kongpwuha-n]-un \textit{kes}-ul chingchanha-Ø-ess-ta.
\end{tabular}

‘Mary was studying and John praised her at that time.’
(3) The overt syntactic structure of (2):
I claim, though, that the LF structure of the IHRC construction is similar to the structure proposed by the proponents of the adjunct analysis. That is, just like a VP modifier, the IHRC is interpreted at a position higher than its surface position by adjoining to one of the verbal projections of the matrix clause at the level of interpretation. I argue that this movement is driven by a semantic type mismatch between the IHRC and \textit{kes/no}.

The proposed idea builds on the existing LF-raising analyses of the IHRC such as Fuji 1998 and Shimoyama 1999. But my analysis differs from them in several important ways.

First, while the existing analyses assume that the IHRC raises all the way up to the IP (or topmost) level of the matrix clause, I argue that it raises only up to the Aspect level. I show that the proposed landing-site of the IHRC enables us to capture the tight semantic relation that holds between the embedded and the matrix clause.

Second, unlike Fuji, I assume with Shimoyama that only the IHRC raises out of the DP that contains the IHRC+\textit{kes/no} string, leaving \textit{kes/no} in its base-position. As we will see below, this departure gives us a way to account for why the IHRC seems to be base-generated inside a noun phrase that is selected by the matrix predicate but it is interpreted like a modifier of the matrix clause.

Third, unlike Shimoyama, I interpret the trace of the raised IHRC as a state variable that combines with the denotation of \textit{pro}. I show in the next chapter that interpreting the trace of the raised IHRC enables us to establish a formal link between the semantics of \textit{pro} and the event structure of the embedded clause and thereby resolve the formal linking problem.
The ideas outlined thus far are schematically represented in (4), which is the LF-structure of (2). Here, J and K are the indices of the raised IHRC and John, respectively, and sj represents the trace of the raised IHRC.

(4) **The LF structure of (2):**

```
TenseP
  |      |      |
  John  Tense''
        |      |
       K   Tense'
          |      |
         AspectP
            |      |
            RelP
                  |      |
                AspectP
                      |      |
                      Rel
                          |      |
                      AspectP4
                                        |      |
                                        Rel
                                            |      |
                                            AspectP4
                                                        |      |
                                                        Aspect4
                                                            |      |
                                                            Imperfect
                                                                |      |
                                                                -n-
```

```
VP4
  |      |      |
  Aspect4
       |      |
       Imperfect
           |      |
           -n-
```

```
Mary-ka
kongpwuha-
```

```
Tense
  |      |
past
```

```
Rel
  |      |
-ess-ta
```

```
J
```

```
AspectP1
```

```
Rel
  |      |
J
```

```
AspectP1
```

```
VP1
  |      |
tk
```

```
V'
```

```
Perfect
  |      |
D
```

```
V
  |      |
chingchanhay-
```

```
DP
  |      |
NP
```

```
N
  |      |
kes
```

```
sj
```

```
[+def]
```
This chapter proceeds as follows. In section 5.2, I provide arguments for the proposed syntactic structure of the IHRC+kes/no string. Here, I first establish the N-level pronominal status of kes and no. I then provide arguments for the Aspect Phrase analysis of the IHRC. In Section 5.3, I discuss the syntactic status of the IHRC+kes/no string with respect to the matrix predicate. I present arguments for the argument analysis over the adjunct analysis. Section 5.4 concerns the LF structure of the IHRC construction. Here, I provide arguments for raising the IHRC to the matrix clause’s Aspect Phrase level. In addition, I briefly outline the composition scheme for deriving the interpretation of the IHRC construction.

In what follows, I assume that the syntactic analysis I offer carries over to the IHRC constructions in Korean and Japanese. Hence, to save space, I will primarily use Korean data unless it is necessary to present Japanese examples.

5.2. The internal structure of the IHRC+kes string

5.2.1. The proposal

Following Chung and Kim (2003), among others, I argue that, while the noun phrase that contains an EHRC and its head noun presumably has a modifier-modified structure, the IHRC+kes string has a complement-head structure, where an N-level category kes selects for an IHRC as its syntactic argument. But I differ from Chung and Kim in two respects.

First, while Chung and Kim analyze the IHRC+kes string as an NP which is headed by a lexical noun kes, I propose that the string is a DP which is headed by the [+definite] feature, which selects for an NP containing the IHRC and kes, as given in (5).
The internal structure of the IHRC+kes string:

```
(5)  The internal structure of the IHRC+kes string:

                  DP
                   
                  /   
                 NP    D
                   
                  /   [+definite]
                 RelP  N
                   
                  /   kkes
                 N

The basis for postulating the feature [+definite] inside the IHRC+kes string comes from the fact that the string always carries a uniqueness or maximality interpretation, as we saw in Chapters 1 and 2. For instance, in (6), what Jinho took to the party is all the cookies that Mila put in the fridge, not just some of them.

```

```
(6)  Jinho-nun  [[Mila-ka  chancang-ey  kwaca-lul  yel-kay
 T.-top        [[M.-nom  fridge-loc  cookie-acc  ten-cl
               neh-e  twu-∅]  kkes]-o  phathi-ey  kaci-e  kassta.
               put-conj  aux-rel]  kkes]-acc  party-to  brought and went.

          ‘Mila put ten cookies in the fridge and Jinho took all of them to the party.’

I take this uniqueness and maximality interpretation of the IHRC+kes string to suggest that the string has the status of a referential expression, rather than that of a property-denoting category. That is, it is of category DP, rather than of NP.

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Second, unlike Chung and Kim, I argue that *kes* is an N-level pronominal rather than a nominal. Although the exact morphosyntactic label of this morpheme is not crucial to the semantic analysis of the IHRC construction, I want to briefly touch on this issue for completeness’s sake.

There are at least two reasons for analyzing *kes* as a pronominal rather than a nominal. First, it can be replaced by a lexical noun, as shown in (7) and (8).

    J.-top [[thief-nom run.away-imprf]-rel *kes*]-acc caught.
    ‘A thief was running away and John caught him.’

b. John-un [[totwuk-i tomangka-n]-un *saken-uy* hayngwica]-lul capassta.
    J.-top [[thief-nom run.away-imprf]-rel *event-gen agent*]-acc caught.
    ‘A thief was running away and John caught the agent of the event of a thief running away.’

    J.-top [[M.-nom *raw* fish-acc cook-prf]-rel *kes*]-acc ate.
    ‘Mary cooked raw fish and John ate it.’

2 Note that pronouns in Korean and Japanese do not necessarily belong to the D category. In other words, they can belong to N-level or N-bar level categories as well (see Fukui 1986, Nogochi 1997, Dechaine and Wülschko 2002).
b. John-un [[Mary-ka \textbf{nal} sayngsen-ul ik-hi-∅]-n
J.-top [[M.-nom \textbf{raw} \textbf{fish}-acc cooked-caus-prf-rel
\textit{kyelkwa}]-lul mekessta.
\textit{result}]-acc ate.

‘Mary cooked \textbf{raw fish} and John ate the \textbf{result}.’

In (7), \textit{kes} is interpreted as referring to the thief. Since the thief plays the role of Agent in the event described by the embedded clause, a lexical noun that denotes the agent of the event of a thief running away can occur in the sentence replacing \textit{kes}. In (8), \textit{kes} is interpreted as referring to the fish which got cooked. Since this fish is the result of the event of cooking (the) raw fish, a noun phrase that means ‘result’ in Korean can occur in lieu of \textit{kes}. This replaceability of \textit{kes} by a variety of lexical noun phrases suggests that it is better analyzed as a pronominal than as a nominal.

The other reason to adopt the proposed analysis is that even though the IHRC+\textit{kes} string is a defining formal characteristic of the IHRC construction, it can also occur in the direct perception construction and the factive construction, as illustrated in (9) and (10), respectively. Notice that these sentences are identical to (7a) above except for the matrix predicate.

(9) John-un [[totwuk-i tomangka-n]-un \textit{kes}]-ul \textit{tulessta}.
J.-top [[thief-nom run.away-imprf]-rel \textit{kes}]-acc \textit{heard}.

‘A/the thief was running away and John heard it (= the sound).’
Given that what is common across the three constructions is the IHRC+kes string (or more accurately, a gapless clause followed by kes), the elements that occur in those constructions are most likely to belong to functional categories than to lexical categories. Hence, it follows that kes is a functional category.

This analysis is supported by the fact that the kes that occurs in the direct perception or the factive construction can be replaced by a lexical noun, just as in the IHRC construction. To illustrate, consider (11-12) in comparison with (9-10).

(11) John-un [[totwuk-i to mangka-n]-un soli]-lul tulessta.
    J.-top [[thief-nom run.away-imprf]-rel sound]-acc heard.

    ‘A/the thief was running away and John heard the sound.’

(12) John-un [[totwuk-i to mangka-n]-un sasil]-ul alassta.
    J.-top [[thief-nom run.away-imprf]-rel fact]-acc knew.

    ‘A/the thief was running away and John knew the fact.’

Given that the kes that occurs in the complements of factive and direct perception verbs can be replaced by lexical nouns, just as in the IHRC construction, we can conclude that it is more likely to be a pronominal than a nominal.
5.2.2. Why not the complementizer or the nominalizer analysis of \( kes \)?

In the literature, there are two alternative analyses to the pronominal analysis.

First, authors like S. Lee (1983), K. Lee (1991), H. Yoon (1991), and Jhang (1994) claim that \( kes \) should be analyzed as a complementizer which heads the clause that occurs as the complement to the matrix predicate. The basis for this claim comes from the fact that the IHRC+\( kes \) string can occur as the complement of factive verbs such as \( al- \) ‘know’ and \( hwuhyo- \) ‘regret’, as shown in (10).

Second, authors like N. Kim (1984) and Jo (2003) propose that \( kes \) should be classified as a nominalizer, on the grounds that it takes clausal material and converts it into a nominal, just like the gerundive suffix \(-ing\) in English.\(^3\)

These two analyses both treat \( kes \) as a functional category that selects for a clausal complement. Hence, they are, in essence, not so different from the pronominal analysis. Furthermore, for present purposes, the exact morphosyntactic status for \( kes \) is not so important, because, what matters in a semantic computation is the semantic type of each node, rather than the syntactic label thereof. Therefore, regardless of whether \( kes \) is a complementizer, nominalizer, or a pronoun, we can always find a way to interpret the sentence by assigning appropriate denotations to its components. In what follows, however, I want to briefly discuss why the pronoun analysis of \( kes \) is empirically more adequate than the complementizer or the nominalizer analysis.

5.2.2.1 Why not the complementizer analysis of \( kes \)?

There are several reasons for adopting the pronominal analysis over the complementizer analysis of \( kes \). Among them, the most crucial reason is that while the

\(^3\) See Shimoyama 1999 and the references cited there for a similar treatment of \( no \) in Japanese.
IHRC+*kes* string can bear a variety of case-markings, regardless of whether it occurs in the IHRC construction, the direct perception construction, or the factive construction, complementizers in Korean such as –*ko* or –*tolok* can never bear case-marking. We already saw above in (7-10) that the IHRC+*kes* string can bear accusative case-marking in all the three constructions, but notice that it can also bear nominative, dative, and genitive cases, as shown in (13), (14), and (15).

(13) IHRC construction

a. John-i [chayksang wi-ey chayk-ul olli-e]
   J.-nom [desk top-loc book-acc lift-comp]
   noh-∅-un kes]-i epeciessta.
   put-prf-rel kes]-nom disappeared.
   ‘John put a book on the desk and it disappeared’

b. John-i [totwuk-i tomangka-n-un kes]-ey tay-ko
   J.-nom [thief-nom run.away-imprf-rel kes]-dat aim.at-comp
   chong-ul ssoassta.
   gun-acc shot.
   ‘A thief was running away and John shot at him.’

c. John-un [kangaci-ka ca-ko iss-n-un kes]-uy
   J.-top [puppy-nom sleep-comp cop-imprf-rel kes]-gen
   meli-lul sstatusessta.
   hair-acc patted.
   ‘A puppy was sleeping and John patted its hair.’
(14) Direct Perception Construction

a. [Mary-ka ttena-n-un kes]-i mellise-to
   M.-nom leave-imprf-rel kes]-nom from a distance-also
   po-i-ess-ta.

see-pass-pst-decl.

‘The event of Mary leaving was seen from a distance as well.’

b. John-un [Mary-ka may il khukey nolayha-n-un
   J.-top [M.-nom every day loudly sing-imprf-rel
   kes]-ey chenglyek-ul ilh-ess-ta.
   kes]-dat hearing-acc lose-pst-decl.

‘John lost his hearing from (the sound of) Mary singing loudly every day.’

c. [ai-tul-i cantipat-ese ttwi-e no-n-un kes]-uy
   child-pl-nom lawn-loc jump-comp play-imprf-rel kes]-gen
   kyengkhwayha-∅-n soli
   pleasant-stat-rel sound

‘the pleasant sound of children jumping and playing on the lawn’

(15) Factive Construction

a. [Mary-ka nay-il ttena-n-un kes]-i John-ekey
   [M.-nom tomorrow leave-imprf-rel kes]-nom J.-dat
   al-li-e ciessta.

know-caus-comp became.

Lit.: ‘(The fact) that Mary is leaving tomorrow became known to John.’
b. John-un [Mary-ka nay-il ttena-n-un kes]-ey
   J.-top [M.-nom tomorrow leave-imprf-rel kes]-dat
   nollassta.

   got surprised.

   ‘John got surprised (by the fact) that Mary is leaving tomorrow.’

c. [Mary-ka Bill-uy sallinca-la-n-un kes]-uy
   [M.-nom B.-gen murderer-decl-imprf-rel kes]-gen
   cwungkyek

   shock

   ‘the shock of the fact that Mary was John’s murderer’

Compare now the above paradigms with (16) and (17). The latter show that typical complement clauses cannot bear any kind of case-marking. Here, the symbol ‘*’ inside the parentheses indicates that the sentence will be grammatical only if what is inside the parentheses is omitted.

(16)a. John-un Mary-ka nay-il ttena-n-ta-ko(-*lul)
   J.-Top M.-nom tomorrow leave-imprf-decl-comp-(acc)
   potoha-ess-ta.

   report-pst-decl.

   ‘John reported that Mary is leaving tomorrow.’
b. Mary-ka nay-il ttena-n-ta-ko(-*ka)
M.-nom tomorrow leave-imprf-decl-comp-(nom)
poto-toy-ess-ta.
report-pass-pst-decl.

‘It was reported that Mary is leaving tomorrow.’


‘John helped Mary to leave tomorrow.’

b. Mary-ka nay-il ttena-tolok(-*i) toy-e-iss-ta
M-nom tomorrow leave-comp(-nom) schedule-pass-exist-decl.

‘Mary is scheduled to leave tomorrow.’

The non-occurrence of case-marking on typical clausal complements immediately rules out the complementizer analysis of *kes*. Hence, although there are additional problems with this analysis, I turn to discussing the difficulties of the nominalizer analysis of *kes*.

5.2.2.2. Why not the nominalizer analysis of *kes*?

Under the nominalizer analysis of *kes*, the IHRC+*kes* string is treated as a DP or an NP. Hence, this analysis correctly predicts that the string will occur bearing various

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4 For instance, *kes* also has an etymological origin which is different from that of typical complementizers such as –*ko* and –*tolok*: while *kes* is a free morpheme which literally means a ‘thing’ or a ‘concrete object’, –*ko* and –*tolok* are bound morphemes with no lexical meanings (M. Kim 2002, Chung and Kim 2003).
case-markings. But there are empirical challenges for this analysis that do not target the pronominal analysis of *kes*.

First, as shown above in (7-8), (11) and (12), *kes* can be replaced by a lexical noun, regardless of whether it occurs in the IHRC construction, the direct perception construction, or the factive construction, but nominalizers in Korean have such property; that is, they cannot be replaced by lexical nouns. To illustrate, consider (18) and (19). The sentences in these paradigms show that the nominalizer –*ki* and –*um* cannot be replaced by a lexical NP.

Lit.: ‘Mary helped with Billy’s doing homework.’


Lit.: ‘Mary helped with Billy’s doing homework.’


---

5 These challenges also confront the complementizer analysis of *kes*. 

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The impossibility of replacing Korean nominalizers by lexical nouns suggests that they have an inherently different status from \textit{kes}.

The next problem with the nominalizer analysis is that, unlike \textit{kes}, which must co-occur with a relative clause, typical nominalizers in Korean can never be preceded by a relative clause marker -\textit{un}, as the following sentences show:

\begin{enumerate}
\item[(20)] Mary-nun  sonyen-uy  swukce-ha-(\textbf{-un})-ki-lul  towassta.
M.-nom   boy-gen  homework-do(\textbf{-rel})-nml-acc  helped.
Lit.: ‘Mary helped with the boy’s his homework.’

\item[(21)] Mary-nun  sonyen-uy  swukce-ha-(\textbf{-un})-um-ul  towassta.
M.-nom   boy-gen  homework-do(\textbf{-rel})-nml-acc  helped.
Lit.: ‘Mary helped with the boy’s his homework.’
\end{enumerate}

These differences between typical Korean nominalizers and \textit{kes} lead us to conclude that the nominalizer analysis of \textit{kes} is hard to maintain.

\textbf{5.2.3. The internal structure of the IHRC}

As far as I am aware, the exact internal structure of the IHRC has received little attention in the literature. But there appears to be an implicit agreement among authors
that it has the structure of a full clause headed by the relative morpheme –\textit{un} in Korean (and \(\emptyset\) in Japanese), as given in (22) (see, for Korean, Jhang 1994, H. Park 1998; for Japanese, see Ito 1986, Watanabe 1992, Hoshi 1995, Fuji 1998, Murasugi 2000).

\begin{equation}
\begin{array}{c}
\text{(22) A widely assumed syntactic structure of the IHRC:} \\
\text{CP} \\
\text{IP} \\
\text{C} \\
\text{-un/\(\emptyset\)}
\end{array}
\end{equation}

In this study, however, I diverge from the prevailing view by proposing that the embedded clause, i.e., the clausal material that occurs preceding the relative marker, consists of a maximal projection that is smaller than a full clause (i.e., a TP or an IP). Although the exact syntactic label of this maximal projection many not be crucial to our semantic analysis, for concreteness, I argue that it is an Aspect Phrase. Under this analysis, the IHRC has the structure where the maximal projection that hosts the relative morpheme selects for an Aspect Phrase, as given in (23).
A new proposed syntactic structure of the IHRC:

\[
\begin{array}{c}
\text{RelP} \\
\text{AspectP} & \text{Rel} \\
\quad & -un/\emptyset \\
\text{VP} & \text{Aspect}
\end{array}
\]

Support for the proposed analysis comes from the following facts. First, as I showed above, the IHRC construction has an apparently identical syntactic form as the factive construction (and as well as the direct perception construction). There is, however, reason to believe that the embedded clause of the IHRC construction is smaller than that of the factive construction. While the embedded clause of the factive construction can tolerate the indicative mood marker –ta, as shown in (24), the embedded clause of the IHRC construction cannot, as shown in (25).


know-pst-decl.

‘A/the thief was running away and John knew it.’

---

6 I defer discussing the syntactic size of the embedded clause of the direct perception construction until Chapter 7, for it does not have a direct bearing on the present discussion.
The contrast between the two sentences suggests that the embedded clause of the IHRC construction is syntactically smaller than that of the factive construction. Given that the indicative mood marker –ta normally occurs at the end of simplex or unembedded clauses, we are led to conclude that while the embedded clause of the factive construction has the syntactic structure of a full clause, the embedded clause of the IHRC construction has a small clause (or truncated) syntactic structure.

Further support for a small clause analysis of the embedded clause of the IHRC construction comes from the fact that, unlike EHRCs, IHRCs cannot have their own temporal references, as I alluded to in Chapter 1. To illustrate, compare (26) and (27). The former instantiates the EHRC construction in Korean and the latter the IHRC construction.

(26) Mary-nun [[John-i e_i ilk-n]-un chayk_i]-ul ilkessta.  

Reading 1: ‘Mary read the book that John was reading at that time.’

Reading 2: ‘Mary read the book that John is reading right now.’

(from S. Sohn 1995: 138, (9b))
(27) Mary-nun [[John-i chayk-ul ilk-n]-un kes]-ul
M.-top [[J.-nom book-acc read-imprf]-rel kes]-acc
ilkessta.
read.

‘John was reading a book (sometime in the past) and Mary read it (together with him at that time).’

Not: ‘John is reading a book right now and Mary read it some time in the past.’

In (26), the time of the embedded clause can be bound by the matrix clause’s event time or the utterance time, as the English translations suggest (see D. Yang 1977, D.-H. An 1980, S. Sohn 1995). In (27), however, the temporal index of the embedded clause can be bound only by the matrix clause’s event time.

I take the contrast between (26) and (27) to suggest that, while EHRCs contain Tense Phrase in their structure, IHRCs do not. However, given that the embedded clause of the IHRC construction can also contain aspectual morphemes such as –n and ∅, I conclude that it must at least contain an Aspect Phrase.

5.3. The syntactic status of the IHRC+kes string in the matrix clause

Another important issue we need to settle is the syntactic status of the IHRC+kes string with respect to the matrix predicate. The existing literature offers two competing analyses. One is called the argument analysis and the other is called the adjunct analysis.

Proponents of the argument analysis posit that the entire IHRC+kes string is base-generated in an argument position; that is, if it occurs bearing accusative case, for
instance, then it occurs in the direct object position of the matrix clause, as given in (28) (see Hoshi 1995, Fuji 1998, Shimoyama 1999, Chung and Kim 2003).

(28)       VP
          /\      \
         /   \   /  \
        DP    V IHRC+kes

The proponents of the adjunct analysis contend, on the other hand, that the IHRC+kes string is some sort of circumstantial secondary predicate of an argument of the matrix predicate, which is realized as a null pronoun (or pro). That is, just like typical secondary predicates, the string is base-generated as adjoined to VP while an argument position of the matrix clause is occupied by pro which is co-indexed with the semantic head of the IHRC (e.g., Tsubomoto 1991, Murasugi 1994, Mihara 1994, Kikuta 2002, D. Chung 1999). This idea is represented in (29), where NP inside XP corresponds to the internal head.

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7 According to Tsubomoto (1991), the IHRC+kes/no string can be adjoined to the IP of the matrix clause if it occurs with nominative case marking on it.
From a semantic point of view, the adjunct analysis seems more appealing than the argument analysis, because it captures native speakers’ intuitions that the content of an IHRC can describe the circumstantial state of the internal head, as the English translations of the following sentences suggest.

(30) John-un Mary-ka wul-ko iss-n-un kes-ul
    J.-top M.-nom cry-comp cop-imprf-rel kes-acc
    wilo-ha-ess-ta.
    comfort-do-pst-decl.
    ‘John comforted Mary while she was crying.’

(31) John-un Mary-ka theybwul-ey sakwa-lul olli-e
    J.-top M.-nom table-loc apple-acc put-comp
    noh-∅-un kes-ul cipetul-ess-ta.
    aux-prf-rel kes-acc pick.up-pst-decl.
    ‘Mary put an apple on the table and John picked it up when it was on the table.’
From a syntactic point of view, however, the adjunct analysis seems less desirable.

One problem with this analysis is that the IHRC+kes string takes a structural case which reflects the thematic role that the pro bears in the matrix clause, as we saw above in (13-15), whereas a typical secondary predicate in Korean does not bear a case that matches the thematic role of the noun phrase that it is predicated of, as shown in (32).

(32)a. Chayk-i chaykcang-ey iss-te-n sangthay-lo(-*ka)
   book-nom bookcase-loc exist-past.imprf-rel state-inst(-nom)
epeci-ess-ta.

   disappear-pst-decl.

   ‘The book disappeared when it was in the state of being in the book case.’

b. John-un koki-lul tel ik-∅-un
   J.-top meat-acc not.yet cooked-prf-rel
   sangthay-lo(-*lul) mek-ess-ta.

   state-inst(-acc) eat-pst-decl.

   ‘John ate the meat when it was in the state of being uncooked.’

Even if we assume, for the sake of argument, that there is some sort of case-matching between the pro argument of the matrix predicate and the secondary predicate in the IHRC construction, the adjunct analysis will still be difficult to maintain for the following reasons:

First, noun phrases that bear thematic roles other than Agent or Theme cannot have a secondary predicate, as observed by Williams (1980). Hence, if there is indeed a
case-matching between a noun phrase and its secondary predicate, then we should not expect to encounter cases where a secondary predicate occurs with comitative, dative, and genitive case-marking. This prediction is borne out, as the impossibility of putting these cases on the secondary predicates in (33) shows.


story-do-pst-decl.

‘John talked with Mary when he (= John) was drunk.’

But not: ‘John talked with Mary when she (= Mary) was drunk.’


state] give-pst-decl.

‘John gave a present to Mary when he (= John) was drunk.’

But not: ‘John gave a present to Mary when she (= Mary) was drunk.’


state] house-goal bring-comp come-pst-decl.

‘John brought Mary’s brother when he (= John/her brother) was drunk.’

But not: ‘John brought Mary’s brother when she (= Mary) was drunk.’
The data given in (33) does not lend support to the secondary predicate analysis of the IHRC+\textit{kes} string, however, because it can occur bearing supposedly impossible cases such as comitative, dative, and genitive, as illustrated in (34).

(34)a. John-un totwuk-i tomangka-n-un \textit{kes-kwa}
J.-top thief-nom run.away-imprf-rel \textit{kes-comt}
machwuchi-ess-ta.
run.into-pst-decl.
Lit.: ‘John got faced with the thief when he (= the thief) was running away.’

b. John-i totwuk-i tomangka-n-un \textit{kes-ey} kochwu kalwu-lul
J.-nom thief-nom run.away-imprf-rel \textit{kes-dat} chilli powder-acc
ppwuli-ess-ta.
spray-pst-decl.
‘John sprayed chilli powder at the thief when he (= the thief) was running away.’

c. John-un kangaci-ka ca-ko iss-n-un \textit{kes-uy}
J.-top puppy-nom sleep-ko exist-imprf-rel \textit{kes-gen}
meli-lul ssutatum-ess-ta.
hair-acc pat-pst-decl.
‘John patted the puppy’s hair when it (= the puppy) was sleeping.’

The next challenge for the adjunct analysis is that whenever passive is allowed, the IHRC+\textit{kes} string that occurs as the direct object of the matrix verb can be promoted to
subject position, as shown in (35-36), but adjuncts do not undergo passivization (Chung and Kim 2003: 11).⁸

     ‘A thief was running away and John caught him.’

b. [Totwuk-i tomangka-te-n kes]-i John-ekey  
   [Thief-nom run.away-past.imprf-rel kes]-nom J.-dat  
   cap-**hi**-ess-ta.  
   catch-pass-pst-decl.  
   ‘A thief was running away and he got caught by John.’

⁸ One might argue that in Korean, passivizability may not be the best diagnostic to test the argumenthood of a noun phrase, because in some constructions, noun phrases that seem to behave like adjuncts can occur bearing accusative case and they can even be “passivized”. For instance, in the so-called external possession construction, noun phrases that stand in a whole-part relation can occur with accusative case, as illustrated in (i), and they can occur bearing nominative case in the corresponding passive sentence, as illustrated in (ii).

(i) John-un Mary-lul phal-ul kancilephi-ess-ta.  
     J.-top M.-acc arm-acc tickle-pst-decl.  
     ‘John tickled Mary on the arm.’

     M.-top arm-nom J.-dat  
     tickle-pass-pst-decl.  
     ‘Mary had her arm tickled by John.’

But the behavior of the noun phrases that occur in the external possession construction may not present a problem for using passivization as the diagnostic to tell arguments from adjuncts, because the predominant view is that the accusative-case marked noun phrases that occur in this construction are in fact all arguments (see J. H.-S. Yoon 1989).
Under the argument analysis of the IHRC+kes string, these problems do not arise.

First, the entire string is expected to bear the case that reflects the thematic role assigned by the matrix predicate, because it is in an argument position.

Second, the IHRC+kes string can bear a variety of cases, both structural and lexical, including comitative, dative and genitive cases, precisely because it is selected either by the matrix predicate or by a relational noun phrase.

Third, the ability of the IHRC+kes string to occur as the subject of a passive sentence also follows from its argument status with respect to the matrix verb.

In view of these facts, I conclude that the argument analysis of the IHRC+kes string is more adequate. However, the argument analysis has difficulty dealing with the syntax-semantics mismatch exhibited by an IHRC. This is because, if the IHRC+kes string is indeed base-generated inside a DP that serves as an argument of the matrix
predicate, then it is not clear why it is “felt” to behave like a modifier of the matrix clause. In the next section, I show that positing an appropriate LF structure resolves this problem.

5.4. The LF structure

In recent years, several authors have claimed that the IHRC+kes/no string is base-generated as an argument of the matrix predicate but either the entire string or a part of it raises at LF and thereby gets interpreted like a modifier of the matrix clause. For instance, as discussed in Chapter 3, Fuji (1998) claims that the entire IHRC+kes/no string undergoes LF movement and thereby raises and adjoins to the maximal projection of the matrix clause. On the other hand, as mentioned in Chapter 2, Shimoyama (1999) assumes that only the IHRC LF-raises to the maximal projection of the matrix clause.

These existing LF-raising analyses can readily deal with the syntax-semantics mismatch problem presented by an IHRC while respecting the empirical aspect of the IHRC construction. This is because the IHRC+kes/no string is syntactically analyzed as an argument of the matrix predicate but it is semantically analyzed as a restrictor of the content of the matrix clause.

Given this advantage, I adopt a version of LF-raising analysis. But I take a slightly different approach from the existing LF-raising analyses.

First, unlike Fuji and Shimoyama, I propose that an IHRC raises only up to the Aspect Phrase of the matrix clause, not all the way up to the highest maximal projection therefore. The basis for this proposal comes from the fact that the eventuality described by the embedded clause bears a temporal relation to the eventuality described by the matrix clause, as discussed in Chapter 4. Further support for this analysis comes from the
fact that the embedded clause has the same temporal reference as the matrix clause, as we saw in (26) and (27). In order for two clauses to bear the same temporal index, they must be under the scope of the same tense operator. Hence, it follows that the IHRC must be interpreted lower than the TP level of the matrix clause.

I depart from Fuji in another important respect: while Fuji argues that the entire DP containing the IHRC+no/kes string raises at LF, I assume with Shimoyama that only the IHRC undergoes LF-raising. That is, the pronominal no/kes is interpreted in its base-position. Making this departure enables us to explain why the IHRC+kes/no string seems to play a dual role, that is, why it seems to serve as an argument of the matrix verb while restricting the content of the matrix clause. Under the proposed analysis, this duality arises because one part of the IHRC+kes/no string serves as an argument of the matrix predicate and the other part serves as a modifier of the matrix clause.

I also diverge from Shimoyama in two crucial aspects. First, while Shimoyama assumes that an IHRC raises because it is interpreted like an independent clause as if it were a non-restrictive relative clause, I posit that it undergoes LF movement to resolve a semantic type mismatch between its denotation and that of kes/no.

Second, unlike Shimoyama, I interpret the trace of the raised IHRC. As we will see in Chapter 6, this departure has an important consequence for resolving the formal linking problem presented by the semantics of the pronominal definite description that occurs in the IHRC construction (which is assumed to be pronounced as kes/no, as the [+definite] feature has no phonological content). In a nutshell, the idea is that our type-driven semantics forces the trace of the raised IHRC to denote a state variable and our assumptions about indices makes this state variable bound by the lambda-operator.
introduced by the index of the raised IHRC. Hence, combining the denotations of the trace and the pronoun *kes/no* establishes an indirect but formal link between the event structure of the embedded clause and the semantics of the pronominal definite description.

Putting these ideas together, I propose (37) as the LF structure of (2). Here, the index J introduces a lambda operator that binds the trace of the raised IHRC, namely, *sj*.

(37) **The LF structure of sentence (2):**
**5.5. Summary**

In this chapter, I presented the syntactic structure of the IHRC construction that I will assume in my compositional semantic analysis of the construction. The proposed analysis consists of three main points.

First, regarding the syntactic structure of the IHRC+ kes/no string, I adopted the complement-head analysis and thus assumed that kes or no is an N-level pronominal that takes a clausal complement, i.e., IHRC. I departed from the existing analysis, however, by proposing (i) that the string is a DP whose head hosts the [+definite] feature, and (ii) that the IHRC has a truncated structure whose maximal projection is an Aspect Phrase.

Second, concerning the syntactic status of the IHRC+ kes/no string, I adopted the argument analysis and thereby argued that this string is generated in an argument of the matrix clause, rather than in an adjunct position.

Third, following Fuji (1998) and Shimoyama (1999), I claimed that the IHRC undergoes LF-raising. But, unlike these authors, I proposed that the IHRC adjoins to the Aspect Phrase of the matrix clause, rather than a Tense Phrase or a Complementizer Phrase and, from this position, it binds the trace which is created in its base position. I suggested that, by interpreting this trace as a state variable that combines with the denotation of its sister, namely, the pronominal kes (or no), we can resolve the formal liking problem presented by the pronominal definite description that occurs in the IHRC construction.
6.1. Introduction

In this chapter, I offer a new semantic analysis of the IHRC construction in Korean and Japanese within an event-based framework. There are two main proposals to this analysis.

First, building on the E-type pronoun analyses proposed by Hoshi (1995) and Shimoyama (1999), I argue that the semantics of this construction is concerned with determining the value of a pronominal definite description (pro), which I assume to be realized as kes in Korean (and no in Japanese) plus the feature [+definite] (see Chapter 5). But I depart from the existing E-type pronoun analyses by proposing that interpreting pro does not involve recovering a property of entities from the discourse context; rather, it involves recovering a salient function that maps a state described by the embedded clause onto the unique entity that bears a thematic relation in that state. In so doing, I capture the limited semantic variability of pro—that is, why a sentence instantiating the IHRC construction can be interpretable as long as the intended referent of pro receives some thematic role from the predicate of the embedded clause, as we saw in Chapter 4.

Second, drawing on the insights of Kuroda (1976; 1992, Ch. 3), Fuji (1998), and Y. Kim (2002), among others, I argue that interpreting the IHRC construction involves establishing a tight semantic relation between the two eventualities described by the embedded and the matrix clauses. Unlike Kuroda and Y. Kim, however, I derive the semantic relation between the eventualities compositionally, rather than by resorting to
extra-grammatical pragmatic conditions such as the Relevancy Condition. I also depart from Fuji in two respects. First, I propose that the semantics of the IHRC can either be temporal or causal, rather than just temporal. Second, I claim that what connects the eventualities described by the embedded and the matrix clauses is the semantics of the relative operator (REL), not the semantics of the morpheme no in Japanese (or kes in Korean). I propose that REL denotes a binary relation between sets of states, and it also ensures that the state described by the embedded clause stands in either a temporal intersection or a causal relation to the state described by the matrix clause.

I show that the proposed analysis derives the effects of the conditions on the IHRC construction I identified in Chapter 4. That is, in order for a sentence instantiating the IHRC construction to be interpretable, the embedded clause must describe a state that temporally intersects with the eventuality described by the matrix clause and this state must contain the referent of pro. I also show that this analysis captures the systematic difference between IHRCs that describe temporary states and those that describe permanent states.

Section 6.2 outlines the ontological assumptions that the new semantic analysis builds on. In Section 6.3, I present new semantics for pro and REL. Here, I also develop a new semantic analysis of aspect, building on the proposals made by W. Klein (1994), Kratzer (1998), and Parsons (1990). Section 6.4 shows that the proposed analysis captures all the distinctive properties of the IHRC construction and derives the effects of the conditions imposed on the construction. Section 6.5 discusses additional welcome results of the proposed analysis. Section 6.6 summarizes and concludes the chapter.
6.2. Preliminaries

In this section, I outline some basic assumptions of the semantic analysis of the
IHRC construction that I will develop in the next section.

First, the model with respect to which the truth of a sentence is evaluated contains
the following members:

(1) **Ontology:**

(i) A domain of entities \( E \)

(ii) A domain of time intervals \( I \)

(iii) A domain of events \( L \): it contains non-stative events such as processes.

(iv) A domain of states \( S \): it contains both temporary and permanent states.

Next, the new analysis employs the following variables and constants:

(2) **Variables and their types and interpretations:**

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>TYPES</th>
<th>INTERPRETATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>( x, y, z )</td>
<td>( E )</td>
<td>An entity</td>
</tr>
<tr>
<td>( e )</td>
<td>( L )</td>
<td>An event</td>
</tr>
<tr>
<td>( s )</td>
<td>( S )</td>
<td>A state</td>
</tr>
<tr>
<td>( t )</td>
<td>( I )</td>
<td>A time interval</td>
</tr>
<tr>
<td>( P, Q )</td>
<td>( &lt;l, t&gt; )</td>
<td>A characteristic function of a set of events</td>
</tr>
<tr>
<td>( M )</td>
<td>( &lt;i, t&gt; )</td>
<td>A characteristic function of a set of times</td>
</tr>
<tr>
<td>( K, L )</td>
<td>( &lt;s, &lt;i, t&gt;&gt; )</td>
<td>A function from states to sets of times</td>
</tr>
</tbody>
</table>
(3) **Constants and their types and interpretations:**

<table>
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<tr>
<th>Constants</th>
<th>Type</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
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<td>John, etc.</td>
<td>E</td>
<td>Entities</td>
</tr>
<tr>
<td><em>tomangka-</em></td>
<td>&lt;e, &lt;l, t&gt;&gt;</td>
<td>A function from entities to sets of events</td>
</tr>
<tr>
<td>‘run away’, etc.</td>
<td>&lt;e, &lt;s, &lt;i, t&gt;&gt;</td>
<td>A function from entities to a function from entities to sets of events</td>
</tr>
<tr>
<td><em>cap-</em>‘catch’, etc.</td>
<td>&lt;e, &lt;e, &lt;l, t&gt;&gt;</td>
<td>A function from entities to a function from states to sets of times</td>
</tr>
<tr>
<td><em>yengliha-</em>‘be smart’, etc.</td>
<td>&lt;e, &lt;s, &lt;i, t&gt;&gt;</td>
<td>A function from entities to a function from states to sets of times</td>
</tr>
</tbody>
</table>

Finally, the following notations are used:

(4) **Semantic notations and their interpretations:**

(i) For time intervals $\alpha$ and $\beta$,

‘$\alpha < \beta$’ means: $\alpha$ is anterior to $\beta$;

‘$\alpha \leq \beta$’ means: $\alpha$ is anterior or identical to $\beta$;

‘$\alpha \subseteq \beta$’ means: $\alpha$ is included in $\beta$.

(ii) $\tau(e)$ stands for the runtime of an event $e$ and $\tau(s)$ for the duration of a state $s$.

(iii) $\lambda$ stands for the lambda operator and $\sigma$ the sum operator in the sense of Link (1983).
6.3. The proposal

6.3.1. A new semantics of the pronominal definite description (pro)

Under the present analysis, the semantics of *pro* consists of two components: (i) the semantics of the N-level pronominal *kes/no* and that of the feature [+definite]. In this section, I first present the denotation of the former and then proceed to the denotation of the latter.

I propose that the semantics of *kes/no* concerns connecting a state to an entity that bears some (salient) thematic role in that state. A formalization of this idea is given in (5).

\[(5) \quad \text{Denotation of } \text{kes/no}:\]

\[[[\text{kes/no}]] = \lambda s. \lambda x [TR(x)(s)], \text{ where } TR \in \{\text{Agent, Theme, Experiencer, Goal, Instrument, Concomitant, Location …}\}. \text{ Undefined if there is no state } s \text{ such that } s \text{ satisfies this description.}\]

Here, \(TR\) is a free variable that ranges over thematic relations. This means that its value is contextually determined. Postulating this free variable inside the denotation of *kes/no* enables us to account for why the referent of *pro* can vary depending on the discourse context, the matrix predicate’s semantics, and various other pragmatic factors.

The basis for this proposal comes from the following sources. First, as I showed in Chapter 4 by elaborating on Shimoyama’s (2002) observation, the referent of *pro* always bears a thematic role in the state described by the embedded clause. Second, thematic roles are standardly assumed to relate eventualities to their participants (Parsons 1990, Landman 2000).
The state variable inside the denotation of \textit{kes/no} given in (5) gets bound by the \(\lambda\)-operator that is introduced by the index which is created by LF-raising the IHRC. This binding relation between the state variable and the denotation of the index of the IHRC ensures that \textbf{pro} will always be construed as referring to an entity that bears a thematic role in the state described by the embedded clause. In other words, it makes the semantics of \textbf{pro} formally linked to the content of the embedded clause. (The composition scheme will be discussed in greater detail in Section 6.3.4.)

With respect to the semantic contribution of the [+definite] feature inside the IHRC+\textit{kes/no} string, I propose that it denotes a function that takes a property of individuals and returns the \textit{unique} individual that has that property. I posit that the uniqueness interpretation is due to the presence of Link’s (1983) sum operator inside the denotation of the [+definite] feature, as given in (6).

(6) \textbf{Denotation of the [+definite] feature:}

\[ [[\text{Det}]] = \lambda P.\sigma x[P(x)] \]

I posit that if \textbf{pro} is anaphorically linked to only one DP, the proposed denotation of \textbf{pro} applies to the denotation of \textit{kes/no}, yielding an entity; on the other hand, if the pronoun is anaphorically linked to more than one discontinuous DP, instantiating the so-called split-antecedent phenomenon, then the free variable \textit{TR} inside the denotation of \textit{kes/no} gets existentially quantified over.\(^1\) As we shall see below, making this assumption

\(^1\) I thank Angelika Kratzer for suggesting this bifurcated approach to the interpretation of \textbf{pro}.     

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has an important consequence for deriving the maximal, plural entity reading of pro, which comes about when the pronoun is anaphorically linked to split-antecedents.

6.3.2. The denotation of the IHRC

I propose that the IHRC denotes a function that takes a state-level denotation of the matrix clause and maps it onto a set of times, which will serve as the argument of the denotation of tense. I claim that the IHRC has this semantics because REL denotes a function from sets of states to a function from sets of states to sets of times and the embedded clause, which consists of an Aspect Phrase, denotes sets of states. Arguments for positing such a denotation for an Aspect Phrase will be provided in Section 6.3.3.

Under this proposal, the embedded clause, which I analyze as an Aspect Phrase (See Chapter 5), denotes a set of states. Hence, the denotation of the IHRC can take the denotation of the embedded clause as its argument, resulting in a function from sets of states to sets of times. This function in turn takes the denotation of the matrix Aspect Phrase as its argument, returning a set of times. Finally, this set of times combines with the denotation of Tense, yielding a truth-value.

Under this proposal, REL plays a dual role. First, it connects the states described by the embedded and the matrix clauses. Second, it relates these states to times. This is because applying the denotation of REL to the states described by the embedded and the matrix clauses yields a set of times that the denotation of Tense applies to, as just described above.

I further claim that there are two types of REL. One selects for a set of temporary states and the other for a set of permanent states. For ease of reference, I will
call these two types of relative operator REL₁ and REL₂, respectively. The basis for this idea comes from the fact that there are truth-conditional differences between sentences that embed temporary state descriptions and those that embed permanent state descriptions, as we saw in Chapter 4. To illustrate, compare (7) and (8), which are repeated from Chapter 4.

(7) John-un Mary-ka thelepi-lul po-ko iss-n-un
    J.-top M.-nom television-acc watch-comp cop-imprf-rel
    kes-ul yatanchi-ess-ta.
    kes-acc scold-pst-decl.

Reading 1: ‘Mary was watching television and John scolded her for that.’
Reading 2: ‘Mary was watching television and John scolded her for doing something else (e.g., for having fought with her younger brother).’

(8) John-un Mary-ka thelepi-lul po-∅-un kes-ul
    J.-top M.-nom television-acc watch-prf-rel kes-acc
    yatanchi-ess-ta.
    scold-pst-decl.

Possible reading: ‘Mary (had) watched television and John scolded her for that.’
Impossible reading: ‘Mary (had) watched television and John scolded her for something else (e.g., for having fought with her younger brother).’
The explanation I offered in Chapter 4 for the semantic difference between the two sentences was as follows: in (7), the embedded aspect is progressive and hence the embedded clause describes an in-progress state. Since this state is a temporary state, it can be either temporally or causally related to the eventuality described by the matrix clause. On the other hand, in (8), the embedded clause has perfect aspect and an atelic predicate and hence it describes a resultant state. Under the present analysis, a resultant state is analyzed as a permanent state. Therefore, the sentence can be interpretable only if the embedded clause’s content gets causally related to the matrix clause’s content. Consequently, unlike (7), the embedded clause of (8) does not receive a temporal clausal modifier -like interpretation.

To capture this semantic difference between sentences like (7) and (8), I propose that the relative clause marker, which is realized as –un in Korean and ∅ in Japanese, has two denotations, namely, REL₁ and REL₂, as given in (9). Notice that REL₁ contains the logical connective ‘&’, whereas REL₂ contains the relational variable ‘CAUSE’.

(9) **Denotation of the relative operator (REL):**

a. When it combines with a set of **temporary** states:

\[ [[[REL₁]]] = \lambda s, t. (K(s, t) \& L(s, t)) \exists s [K(s, t) \& L(s, t)], \] where s ranges over **temporary** states and t over times.
b. When it combines with a set of permanent states: 2

$$[[\text{REL}_2]] = \lambda K_{s, <i, t>}, \lambda L_{s, <i, t>}, \lambda t, \exists s [\text{CAUSE}(K(s)(t))(L(s)(t))],$$

where s ranges over permanent states and t over times and CAUSE(α)(β) reads as ‘α IS THE CAUSE OF β’.

The proposed denotation of REL₁ allows for an IHRC to receive more than one interpretation when the embedded predicate describes a temporary state. That is, it allows for an IHRC to be interpreted as bearing a causal or a concessive relation to the content of the matrix clause, in addition to a temporal intersection, depending on the matrix verb’s semantics, the embedded clause’s content, and language users’ world knowledge (and also, possibly, the discourse context). This is because the two states described by the embedded and the matrix clauses are connected by the logical connective ‘&’ and hence the exact logical relation between them is left indeterminate.

On the other hand, the proposed denotation of REL₂ ensures that an IHRC which embeds a permanent state description will always bear a causal relation to the matrix clause’s content. This is because the embedded clause gets semantically related to the matrix clause via the binary relation ‘CAUSE.’

6.3.3. Theoretical assumptions and a new semantic treatment of aspect

In order to derive the interpretation of the IHRC construction by applying the proposed semantics of pro and the IHRC, I make the following assumptions:

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2 The proposed denotation for REL₂ makes CAUSE truth-functional (just like the way it is treated in Johnston 1994), although it is often treated as a binary relation between eventualities in the literature (see, for example, Davidson 1967). For present purposes, however, the exact semantic types of the arguments of CAUSE are not essential to the present account. Hence, I leave the proposed semantics of REL₂ as it is.
First, I adopt Klein’s (1994) classification of aspect and thus assume that there are three kinds of aspect: Imperfective, Perfect, and Perfective. To accommodate the cases where the aspect of a sentence is progressive, I further posit that the Progressive has the same semantics as the Imperfective.\(^3\) Hence, I assume the following definitions for the Imperfective (Progressive), the Perfect, and the Perfective in deriving the interpretation of the IHRC construction:

(10) **Classification of aspect in the spirit of W. Klein (1994):**

**Imperf (or Prog):** The topic (or reference) time is included in the event time.

**Perfect:** The event time precedes the topic time.

**Perfective:** The event time is (properly) included in the topic time.

As the above definitions suggest, the Perfect differs from the Perfective in that, while the runtime of a perfect event precedes the topic time, the runtime of a perfective event is included in the topic time. The Perfect can be illustrated by the English sentence *When John walked in, Mary had just finished dinner.* Here, the topic time refers to the runtime of John walking in and the event time refers to the runtime of Mary having dinner. Since the event time precedes the topic time, we can say that the aspect of the sentence is perfect. On the other hand, the Perfective can be illustrated by the sentence *While John was doing the dishes, Mary finished dinner.* Here, the topic time is the interval in which John was doing the dishes and the event time is the interval in which Mary finished dinner. Suppose that John was doing the dishes for ten minutes between

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\(^3\) For the semantics of progressive aspect in Korean and Japanese, which is expressed by -ko iss- and -te-iru, respectively, see Ogihara 1998 and E. Lee 2004. For the semantics of progressive aspect in general, see, among others, Dowty 1979 and Landman 1992.
7:00 and 7:10 PM and Mary finished dinner in five minutes between 7:03 and 7:08 PM. In this scenario, the time interval of John doing the dishes includes the time interval of Mary finishing dinner. Hence, we can say that the sentence has perfective aspect.

The next important assumption that underlies my analysis concerns the semantics of aspect. Following Kratzer (1998), I assume that aspect mediates between events and times. However, I depart from Kratzer by proposing that, in addition to relating events to times, aspect also introduces a state which is derived from the set of events that it combines with. In other words, aspect denotes a function from sets of events to a function from sets of states to sets of times.

This departure is motivated by Parsons’ (1990) treatment of aspect. As discussed in Chapter 4, Parsons posits that a progressive sentence describes an in-progress state, which describes a temporary state of the event expressed by the sentence while it is in progress and a perfect sentence describes a resultant state, which holds forever after the culmination of the event described by the sentence. Furthermore, if a sentence has perfect aspect and a telic predicate, then it describes a target state, in addition to a resultant-state. According to Parsons, target state describes the state of the Theme argument of the verb after the culmination of the event described by the sentence. Given this, if Parsons is correct, then we can say that every sentence that has either progressive or perfect aspect describes some kind of state.

Although I adopt Parsons’ treatment of aspect and his classification of states to a great degree, I also diverge from him in two important respects. First, unlike Parsons, I do not differentiate between the Imperfective and the Progressive, as mentioned above. Second, I define a resultant state as a state of the Agent argument after the event.
described by a sentence is over. I further claim that this state is a (semi-)permanent state, as it may not necessarily hold forever after the event is over; for instance, it may only hold true of an event during the lifetime of the Agent, as briefly discussed in Chapter 4.

The proposed treatment of resultant states has two consequences. One is that a resultant state holds for the Agent argument of an event, be it a telic or an atelic event. The other is that this state can be described not just by a sentence with perfect aspect but also by a sentence with perfective aspect because, according to the proposed definition, it is expected to arise whenever the event described by a VP is over at the topic time.

Another point in which I will diverge from Parsons concerns the event or argument structure of each type of the three states, namely, a resultant state (R-state), a target-state (T-state), and an In-progress state (IP-state).

First, I assume that an R-state contains a Theme argument and this Theme argument is identical to the Agent argument of the event from which the state is derived.

Second, I assume that a T-state contains a Theme argument which is identical to the Theme of the event from which the state is derived (p. 235).

Third, I posit that an IP-state has the same argument structure as the event from which it is derived. That is, it contains all the arguments of the event described by the VP of a sentence (see Chapter 4 for the basic ingredients for this idea).

These assumptions about the argument structure of the three types of states are summarized in Table (11), along with the definition of each type of the states.
Table 2. Inventory of the states described by an Aspect Phrase:

<table>
<thead>
<tr>
<th>STATE</th>
<th>PROPERTIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-progress-state</td>
<td>• Described by an on-going event: e.g., the state of Mary running described by the sentence <em>Mary is running</em>.</td>
</tr>
<tr>
<td></td>
<td>• Holds as long as the event is in progress and hence is temporary.</td>
</tr>
<tr>
<td></td>
<td>• Shares all the arguments with the event.</td>
</tr>
<tr>
<td>Resultant-state</td>
<td>• Described by an event that is over: e.g., the state of Mary having run after the event described by the sentence <em>Mary (has) ran</em>.</td>
</tr>
<tr>
<td></td>
<td>• Holds as long as the Agent is alive and hence is semi-permanent.</td>
</tr>
<tr>
<td></td>
<td>• Contains a Theme argument, which is the Agent of the event from which it is derived.</td>
</tr>
<tr>
<td>Target-state</td>
<td>• Arises from a telic event that culminates: e.g., the state of the ball being on the roof which is described by the sentence <em>Mary has thrown a ball onto the roof</em>.</td>
</tr>
<tr>
<td></td>
<td>• Holds temporarily after the culmination of the event.</td>
</tr>
<tr>
<td></td>
<td>• Contains a Theme argument, which is identical to the Theme of the event from which it is derived.</td>
</tr>
</tbody>
</table>

Based on the proposed classification of states and their event structures, I propose (12) as the denotations of the three types of Aspect that I will employ in deriving the
interpretation of the IHRC construction. Here, the Perfect is divided into two kinds. One introduces an R-state and the other a T-state. For convenience, I call them PerfR and PerfT, respectively. To keep matters simple, in the proposed denotations of PerfR and Perfective, an R-state is treated as though it were a permanent state which holds forever after the event described by the VP of a sentence is completed, even though it may not necessarily hold beyond the lifespan of the Agent.

(12) Denotations of the three types of aspect:

**Imperfective:** \( \lambda P_{<t}, \lambda s, \lambda t \exists e [t \subseteq \tau(e) \& P(e) \& \text{In-progress}(s)(e) \& \forall x[\text{TR}(x)(e) \rightarrow \text{TR}(x)(s)] \& \tau(s) = \tau(e)] \)

(or Progressive) \( \forall x[\text{TR}(x)(e) \rightarrow \text{TR}(x)(s)] \& \tau(s) = \tau(e)] \)

‘the topic time included in the event time’

**PerfectR:** \( \lambda P_{<t}, \lambda s, \lambda t \exists e [\tau(e) < t \& P(e) \& \text{R-state}(s)(e) \& \text{Theme}(\text{Agent}(e))(s) \& t \subseteq \tau(s) \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)]] \)

‘the event time precedes the topic time’

**PerfectT:** \( \lambda P_{<t}, \lambda s, \lambda t \exists e [\tau(e) < t \& P(e) \& \text{T-state}(s)(e) \& \text{Theme}(\text{Theme}(e))(s) \& t \subseteq \tau(s)] \)

‘the event time precedes the topic time’

**Perfective:** \( \lambda P_{<t}, \lambda s, \lambda t \exists e [\tau(e) \subseteq t \& P(e) \& \text{R-state}(s)(e) \& \text{Theme}(\text{Agent}(e))(s) \& t \subseteq \tau(s) \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)]] \)

‘the event time included in the topic time’
Compare the proposed denotations of the three kinds of Aspect with those proposed by Kratzer (1998), which are given in (13). Note that, in (13), the denotation of Aspect includes world variables, which are of type s.

(13) **Denotations of the three types of aspect proposed by Kratzer (1998: 107):**

**Imperfective:**
\[ \lambda P<_{<s, t}>. \lambda t. \lambda w. \exists e [\tau(e) \subseteq t & P(e)(w) = 1] \]
‘the topic time included in the event time’

**Perfect:**
\[ \lambda P<_{<s, t}>. \lambda t. \lambda w. \exists e [\tau(e) < t & P(e)(w) = 1] \]
‘the event time precedes the topic time’

**Perfective:**
\[ \lambda P<_{<s, t}>. \lambda t. \lambda w. \exists e [\tau(e) \subseteq t & P(e)(w) = 1] \]
‘the event time included in the topic time’

Now a few remarks on the semantics of tense are in order. First, following Y. Ahn (1995) and S. Sohn (1995), I assume that Korean has two types of tense, namely, past and non-past, which are morphologically realized as –ess and Ø, respectively.4

Second, following W. Klein (1994), I assume that tense denotes a relation between the topic time and the utterance time. Under this view, non-past describes the relation ‘utterance time includes topic time’ and past describes the relation ‘utterance time follows topic time’.

Third, I assume that tense denotes a function from sets of times to truth-values.

Combining these assumptions, I offer (14) as the denotations of past and non-past that I will assume in the new compositional semantic analysis of the IHRC construction.

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4 I also assume that this two-way distinction of tense carries over to Japanese as well.
(14) Denotations of the two types of tense:

**Non-past:** \( \lambda M_{<t, t>} \exists \text{t}[\text{now} \subseteq \text{t} \& M(t) = 1] \)

‘the utterance time included in the topic time’

**Past:** \( \lambda M_{<t, t>} \exists \text{t}[\ \text{t} < \text{now} \& M(t) = 1] \)

‘the utterance time follows the topic time’

Finally, following Heim (1982), I assume that the operation Existential Closure, which existentially quantifies over a variable, can be applied at any point in semantic computation. As will be shown below, this operation will be employed on two occasions: (i) when interpreting the index of the raised IHRC by predicate-abstracting over the state variable denoted by its trace and (ii) when deriving the value of pro which is anaphorically linked to more than one DP.

### 6.3.4. A sample computation

In this section, I demonstrate how the proposed system derives the interpretation of the IHRC construction. Consider first (15), whose embedded aspect is imperfective.

(15) John-un [[Mary-ka kongpwuha-n]-un kes]-ul chingchanha-∅-ess-ta.
    J.-top [[M.-nom study-imprf]-rel kes]-acc praise-prf-pst-decl.

‘Mary was studying and John praised her.’

Given the conclusions I drew in Chapter 5, this sentence will receive (16) as its overt syntactic structure.
(16) The overt syntactic structure of (15):
In addition, the sentence will have (17) as its LF structure, which is created by raising the IHRC to the matrix AspectP. Here, J and K correspond to the indices of the RelP and John, and EC stands for the semantic operation Existential Closure.

(17) The LF structure of (15):
As mentioned in Chapter 5, I assume that the LF-raising of the IHRC occurs as a way of resolving the semantic type-mismatch between the denotation of the relative clause and that of *kes* (or *no*). While the IHRC denotes a function that selects for a set of states, *kes* denotes a function from states to sets of entities. Consequently, the IHRC raises and adjoins to the matrix AspectP, which is the closest node that denotes a set of states.

The LF structure given in (17) represents the following composition scheme: to begin with the VP₄ inside the embedded clause, the denotation of the verb *kongpwuha*-‘study’ applies to the denotation of Mary, yielding a set of events. This set of events then combines with the denotation of Aspect₄, resulting in a set of states. Next, this set of states combines with the denotation of the relative marker –*un*, yielding a function from sets of states to sets of times.

Let us now turn to the semantic computation of the matrix clause. First, inside the object position of the matrix verb, the raised IHRC leaves a trace in its surface position and, due to the denotation of *kes*, this trace gets interpreted as a state variable. Next, Existential Closure applies at the level of AspectP₁, as indicated in the tree (17). This operation existentially quantifies over the state variable inside the denotation of AspectP₁, mapping the node AspectP₁* into a set of times.⁵ Now the set of times denoted by AspectP₁* combines with the index node which is created by raising the IHRC. This index node introduces an *λ*-operator that binds the state variable denoted by the trace of the raised IHRC. This makes the node AspectP₁** denote a set of states. The newly created set of states combines with the denotation of the IHRC, returning a set of times. Finally, this set of times combines with the denotation of Tense, yielding a truth-value.

⁵ I analyze the aspect of the matrix clause of (15) as Perfect, because the runtime of the event described by the matrix VP precedes the topic time. If the topic time is today, for instance, then the matrix event time is prior to today.
When we apply the proposed denotations of *kes*, the feature [+definite] and REL, we obtain (18) as the truth-conditions for sentence (15). (The computation process is spelled out in Appendix.) In (15), the semantics of *pro*, i.e., the DP that contains the IHRC+*kes* string and that of the relative marker *-un* are determined as follows:

First, the *pro* does not instantiate the split-antecedent phenomenon. Hence, the variable TR inside the denotation of *kes* gets determined entirely by the discourse context by recovering a salient thematic relation from the content of the embedded clause.\(^6\)

Second, the embedded aspect is progressive and hence the embedded clause describes an in-progress state in the sense of Parsons (1990). Since this state is a temporary state, the relative marker gets translated as REL\(_1\), rather than as REL\(_2\).

(18) **The truth-conditions of (15):**

\[
\exists t [t < \text{now} \& \exists s [\exists e [t \subseteq \tau(e) \& \text{study}(e) \& \text{Agent}(Mary)(e) \& \text{In-progress}(s)(e) \& \\
\forall x [\text{TR}(x)(e) \rightarrow \text{TR}(x)(s)] \& \tau(s) = \tau(e)] \& \\
\exists e' [\tau(e') < t \& \text{praise}(e') \& \\
\text{Agent}(John)(e') \& \text{Theme}(\sigma[x [\text{TR}(x)(s)])(e') \& \text{R-state}(s')(e') \& \\
\text{Theme}(\text{Agent}(e'))(s') \& \forall t' [t \leq t' \rightarrow t' \subseteq \tau(s')]] = 1.]
\]

These truth-conditions read as follows: For some time \(t\) before now, there exists some state \(s\) such that, for some event \(e\), \(t\) is included in the runtime of \(e\) and \(e\) is a studying and its Agent is Mary and its in-progress state is \(s\) and \(s\) includes all the participants of \(e\) and

\(^6\) M. Lee (2004) and Nishigauchi (2003) offer syntactic ways in which the referent of *pro* (the internal head in their terminology) gets determined. The core idea is that the IHRC construction instantiates a thetic judgment (see also Kuroda 1976-77; 1992) and the referent of *pro* bears thetic focus or some semantic feature of a similar sort.

It is worth noting that similar approaches have been taken to the IHRC constructions in other languages as well (e.g., Basilico 1998).
the duration of s is the same as the runtime of e AND for some state s’, some event e’, the runtime of e’ is prior to t and e’ is a praising and its Agent is John and its Theme is the unique entity x such that x bears a thematic role in s and s’ is the resultant state of e’ and the Theme of s’ is the Agent of e’ and for any time interval t’, if it is identical or posterior to t, then it is included in the duration of s’.

6.3.5. Evaluating the truth-conditions for (15)

The truth-conditions we derived for sentence (15) do not specify the value of the free variable TR. This means that language users have to determine its value by considering the matrix predicate’s semantics, the embedded clause’s content, and the discourse context. But since the state described by the embedded clause contains only one argument, namely, Mary, the variable TR receives Agent as its value. When TR receives this interpretation, the sentence will be true if John praised the Theme of the in-progress state of the event described by the embedded clause. Since the Theme of this state is the Agent of the event of Mary studying, namely, Mary, it follows that the sentence will be true if John praised Mary when she was in the in-progress state of studying. This interpretation seems to match our intuitions about the meaning of the sentence. Hence, I conclude that the proposed interpretive system can derive an intuitively correct interpretation for a sentence that contains an IHRC whose aspect is imperfective.

The interpretation we derived for (15) has at least two additional welcome results. First, it makes the sentence satisfy the conditions I proposed in Chapter 4. That is, for a sentence instantiating the IHRC construction to be interpretable, (i) the embedded clause must describe a state that temporally intersects with the eventuality described by the
matrix clause and (ii) this state must contain the referent of pro. We can draw this conclusion because the truth-conditions we derived for (15) dictates that the duration of the in-progress state described by the embedded clause must include the topic time, which in turn must include the runtime of the event described by the matrix clause and, in addition, the in-progress state contains the referent of pro, namely, Mary.

Second, the truth-conditions we have obtained for (15) do not specify the logical relation between the embedded clause’s content and the matrix clause’s content. Hence, they can capture our intuitions that the embedded clause can receive either a temporal or a causal interpretation relative to the matrix clause’s content. That is, the sentence can be translated either as ‘John praised Mary when she was studying (for doing/having done X) or as ‘John praised Mary because she was studying.’

These results suggest that the proposed semantics of the IHRC construction can account for two of the defining characteristics of the construction.

First, the fact that the truth-conditions of (15) satisfy both of the conditions I proposed on the IHRC construction suggests that the present analysis has succeeded in resolving the formal linking problem presented by the construction.

Second, given that the truth-conditions in (18) allow for sentence (15) to receive multiple interpretations, we can say that the proposed system can capture the semantic variability of an IHRC with respect to the matrix clause’s content.

On the basis of these results, I conclude that the proposed semantic account of the IHRC construction is basically on the right track. In order to fully evaluate it, however, we need to test it against a wider range of data. Hence, I now turn to the next section, where I show will how the proposed interpretive system fares with the cases where the
embedded clause describes different types of states from an in-progress state and how it captures the other defining properties of the IHRC construction.

6.4. Evaluating the proposed analysis against a wider range of data

6.4.1. Cases where the embedded clause describes a resultant-state

Let us apply the proposed interpretive system to sentence (19) and see whether it can derive intuitively correct truth-conditions for sentences whose embedded clauses describe resultant states.

    J.-top [[M.-nom study-prf]-rel kes]-acc praise-prf-pst-decl.

‘Mary studied and John praised her for that.’

This sentence is identical to (15) except that the aspect of the embedded clause is Perfect, as opposed to Imperfective. This minimal difference between the two sentences gives rise to a non-trivial semantic difference: In (19), the embedded clause describes an R-state, but not a T-state, because its predicate is atelic and T-states can be described only by sentences with telic predicates. Hence, the perfect aspect marker ‘∅’ in the embedded clause is translated as Perfₐ, rather than as Perfᵣ. Since Perfₐ contains an R-state description, which holds permanently, the relative clause marker –un gets translated as REL₂. Therefore, we obtain (20) as the truth-conditions for (19). (See Appendix for the computation process.)
(20) **The truth-conditions of (19):**

\[
\exists t[t < \text{now} \& \exists s[\text{CAUSE(} \exists e[\tau(e) < t \& \text{run.away}(e) \& \text{Agent(Mary)}(e) \& \\
\text{R-state}(s)(e) \& \text{Theme(Agent}(e))(s) \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)])] \exists s'. \exists e'[\tau(e') < t \\
\& \text{scold}(e') \& \text{Agent(John)}(e') \& \text{Theme}(\sigma x[\text{TR}(x)(s)])(e') \& \text{R-state}(s')(e') \& \\
\text{Theme(Agent}(e'))(s') \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s')]])]]
\]

The truth-conditions we have obtained for (19) seem to match native speakers’ intuitions about the meaning of the sentence. As is the case with (18), in these truth-conditions, the value of the relational variable \(TR\) is left indeterminate. But it is not hard to determine the value of this variable, because the state described by the embedded clause contains only one argument, namely, Mary, who plays the Agent role in the event described by the embedded clause. Furthermore, these truth-conditions ensure that the eventuality described by the embedded clause bears a causal relation to the eventuality described by the matrix clause. That is, they correctly predict that (19) will be verified only if it is uttered in a context where Mary’s running away caused John’s scolding her.

When we compare the truth-conditions of (19) and those of (15), we can see that the proposed semantics of the IHRC construction can capture the truth-conditional differences between sentences whose embedded clauses describe temporary states and those whose embedded clauses describe permanent states. That is, it can capture the correlation between the embedded clause’s aspect and the presence or absence of an obligatory causal interpretation for it.
6.4.2. Cases where the embedded clause contains an individual-level predicate

Let us now turn to (21), where the embedded clause contains an individual-level (henceforth I-level) predicate in the sense of Carlson (1977) and see whether the proposed analysis can derive intuitively correct truth-conditions for the sentence.

(21) John-un [[Mary-ka yengliha]-n kes]-ul siikiha-∅-ess-ta.
J.-top [[M.-nom be.smart]-rel kes]-acc envy-prf-pst-decl.

‘Mary is smart and John envied her for that.’

To derive the truth-conditions of this sentence, we need to first determine its LF-structure. This sentence is essentially identical to (15) and (19) except for the embedded predicate. Hence, all we need to figure out is the structure of the embedded clause. I assume that when a sentence has an I-level predicate, the Aspect Phrase is not projected; instead, the predicate can serve as the mediator between states and times. This is because I-level predicates describe properties of entities that hold forever, so they inherently describe relations between properties of entities and times.

On this assumption, sentence (21) receives (22) as its LF-structure, where the maximal projection of the predicate yengliha- ‘be smart’ is the highest projection of the embedded clause.7

---

7 In this structure, I analyze the string of words Mary-ka yengliha- ‘Mary is smart’ as an Adjective Phrase (AdjP), even though it has been often claimed that Korean does not have an open category of Adjective (see, for instance, M. Kim 2002a). I abstract away from this issue because it is immaterial to present purposes.
Turning now to deriving the truth-conditions of sentence (20) from the LF structure given in (21), I propose that the predicate yengliha- ‘be smart’ denotes a function from entities to sets of states based on the reasoning I offered above. Since an I-level predicate describes a (semi-)permanent state, I assume that the state described by an
I-level predicate includes not only the topic time but also any time that follows it. On these assumptions, I offer (22) as the denotation of *yengliha*-

(22) **The denotation of *yengliha*- ‘be smart’:***

\[
[[yengliha]-] = \lambda x. \lambda s. \lambda t [t \subseteq \tau(s) \& \text{smart}(s) \& \text{Theme}(x)(s) \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)]
\]

Given this denotation, when *yengliha*- combines with an entity-denoting element such as Mary, we obtain a syntactic object that denotes a set of states. Hence, the Adjective Phrase *Mary-ka yengliha*- denotes a set of states. Since the denotation of the Adjective Phrase matches the semantic type of the argument of REL, it follows that the Adjective Phrase will combine directly with REL. Since this Adjective Phrase describes a set of permanent states, the relative marker -un gets translated as REL

On these assumptions, when we apply the proposed interpretive system to (21), we obtain (23) as its truth-conditions.

(23) **The truth-conditions of (21):**

\[
\exists t[t < \text{now} \& \exists s[\text{CAUSE}([t \subseteq \tau(s) \& \text{smart}(s) \& \text{Theme}(\text{Mary})(s) \& \\
\forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)]]) (\exists e'[\tau(e') < t \& \text{envy}(e') \& \text{Experiencer}(\text{John})(e') \& \\
\text{Theme}(\sigma x[\text{TR}(x)(s)])(e') \& \text{R-state}(s')(e') \& \text{Theme}(\text{Agent}(e'))(s') \& \\
\forall t'[t \leq t' \rightarrow t' \subseteq \tau(s')]])]
\]
The truth-conditions we obtained for (21) seem desirable because they ensure that Mary’s being smart is the cause of John’s envying her. That is, John envied Mary for no other reason than her being smart.

The derived truth-conditions have an additional welcome result. To see this, first, consider (24), in comparison with (21).


‘Mary is smart and John bothered her (for her smartness).’

The above sentence is identical to (21) except for the matrix predicate but it is only marginally acceptable in a neutral context because, given our world knowledge, it is not so easy to imagine that Mary’s being smart directly caused John’s bothering her, as opposed to his envying her. However, pragmatic maneuvering can increase the acceptability of the sentence. Suppose that we know that John is a seven-year-old kid who can’t stand anyone who is smart. One day a very smart kid named Mary gets transferred to his school. John can’t stand Mary because she is so smart, so he bothers her for her smartness. When uttered in this context, sentence (24) can be judged remarkably better than when it is uttered out of the blue.

This increased acceptability of (24) in the suggested context is a good result for the present analysis because it shows that, when the embedded clause describes a (semi)permanent state, the sentence can be judged acceptable to the extent that it is
possible to establish a cause-result relation between the embedded and the matrix clauses’ contents.

### 6.4.3. Cases where the embedded clause describes a target-state

Let me now show that the proposed system can also derive the correct interpretations for sentences like (25), whose embedded clauses describe T-states.


‘Mary mailed a book last month and John received it (= the book) today.’

Or ‘Although Mary mailed a book last month, John receive it only today.’

In (25), the embedded aspect is perfect and the embedded predicate is telic. Hence, the embedded clause describes not only an R-state but also a T-state. The former describes the state of Mary immediately after mailing a book to John last month and the latter describes the state of the book immediately after Mary mailed it to John last month. Since these two states contain different entities as their arguments, the pro can potentially receive (at least) two different construals. That is, it can be interpreted as construed as Mary or as the book. But the matrix predicate of this sentence selects for an argument that denotes an inanimate object. Hence, pro gets interpreted as referring to the book.
Given this interpretation of pro, we can say that, when computing the meaning of (25), the parser translates the aspect morphology of the embedded clause as Perf₁ and the relative morpheme –un as REL₁. These elements will combine with the rest of the sentence following the general composition scheme spelled out in Section 6.3.4, ultimately generating (26) as the truth-conditions of the sentence.

(26) Truth-conditions of (25):

\[
\exists t[t < \text{now} \land \exists e \exists x[\tau(e) < t \land \tau(e) \subseteq \text{last month} \land \text{mail}(e) \land \text{Agent(Mary)}(e) \\
\land \text{Theme}(x)(e) \land \text{book}(x) \land \text{T-state}(s)(e) \land \text{Theme(Theme(e))}(s) \land t \subseteq \tau(s)]] \land \\
\exists s'. \exists e'[\tau(e') < t \land \tau(e') \subseteq \text{today} \land \text{receive}(e') \land \text{Agent(John)}(e') \land \\
\text{Theme}(\text{tu[TR}(u)(s)))(e') \land \text{R-state}(s')(e') \land \text{Theme(Agent(e'))}(s') \land \\
\forall t'[t \leq t' \Rightarrow t' \subseteq \tau(s')]] = 1]
\]

These truth-conditions leave the logical relation between the embedded and the matrix clauses undetermined. Hence, they can readily capture our intuitions that the IHRC of this sentence can be interpreted either as bearing a temporal intersection relation to the matrix clause’s content or bearing a concessive relation to it—that is, they allow the IHRC to be translated as an although clause, as well as a conjoined clause, thereby making the entire sentence mean something like ‘Although Mary sent the book last month, John only got it today.’
6.4.4. Cases where pro receives a maximal, plural entity interpretation

Let us now see how the proposed interpretive system fares with sentences like (27), which are three ways ambiguous, depending on the interpretation of pro, as mentioned in Chapter 1. In a neutral context, pro is most likely to be construed as referring to the cat. But if the discourse context is such that the mouse is the focal point of attention, then pro can also be construed as referring to the mouse. Furthermore, it can also refer to the plural entity that consists of the cat and the mouse, instantiating the split antecedent phenomenon.

(27) Jinho-nun [[koyangi-ka cwi-lul coch-ko iss-n]-un
J.-top [[cat-nom mouse-acc chase-comp cop-imprf]-rel
kes]-ul capassta.
kes]-acc caught.

Reading 1: ‘A cat was chasing a mouse and Jinho caught the cat.’
Reading 2: ‘A cat was chasing a mouse and Jinho caught the mouse.’
Reading 3: ‘A cat was chasing a mouse and Jinho caught the mouse and the cat.’

Under the present analysis, the first two readings are derived as follows: First, the denotation of kes combines with the trace of the raised IHRC, which denotes a state variable. The result of this computation then combines with the denotation of the feature [+definite], resulting in a referential expression, as shown in (28). Here, the free variable $s_j$ later gets bound by the $\lambda$-operator that is introduced by the index of the raised IHRC.
Derivation of the interpretations of pro on Readings 1 and 2 of (27):

\[
[[\text{NP}]] = [[\text{kes}]]([[s_j]]) = (\text{via function application})
\]

\[
= \lambda s. \lambda x[\text{TR}(x)(s)](s_j) = (\text{via } \lambda\text{-reduction})
\]

\[
= \lambda x[\text{TR}(x)(s_j)]
\]

\[
[[\text{DP}]] = [[\text{+definite}]][[[\text{NP}]]]
\]

\[
= \lambda P. \sigma x[P(x)](\lambda y[\text{TR}(y)(s_j)])
\]

\[
= \sigma x[\text{TR}(x)(s_j)]
\]

In (28), the denotation of the DP, which corresponds to pro in our terminology, contains a free relational variable TR. Hence, its interpretation is expected to vary according to the value of TR. In sentence (27), the embedded clause describes an IP (in-progress) state which contains two arguments, namely, the Agent and the Theme. Hence, the free variable TR can receive Agent and Theme as its values. Consequently, the DP can be construed either as the entity that bears the Agent role or as the entity that bears the Theme role. That is, it can refer either to the cat or to the mouse.

We can derive the plural entity reading of pro by making a minimal change to the computation process spelled out in (28). The interpretation of the DP containing the IHRC+kes string is derived in the exactly same manner as in (28) but, along the way, the free variable TR gets existentially quantified over via Existential Closure, rather than being left free. Hence, we obtain something like (29) as the interpretation for the DP.
(29) **The interpretation of pro on Reading 3 of (27):**

\[[[DP]] = \sigma x [\exists TR[TR(x)(s_j)]]\]

Under this interpretation, the DP, which corresponds to pro, denotes the sum of all the entities that bear some, not a particular, thematic role in the state described by the embedded clause. What this means is that the referent of pro can have entities that bear different thematic roles as its atoms. Hence, in (27), pro can receive the reading where it refers to both the cat and the mouse at the same time.

These results suggest that the proposed interpretive system is flexible enough to capture the limited context-dependency of pro’s value (or the indeterminacy of the internal head) and account for the split-antecedent phenomenon, which poses challenges for the existing E-type pronoun analyses of the IHRC construction.

The proposed account has yet another welcome result. It enables us to explain why the referent of pro must bear either only one thematic role or every thematic role in the state described by the embedded clause, but not just some of the thematic roles in that state. To illustrate, consider (30) and assume the context that follows:

(30) Kyengchal-un **Bill**-i **John**-ekey **Sam**-ul sokayha-ko

Police-top B.-nom J.-dat S.-acc introduce-comp

iss-n-un kes-ul cheyphohayssta.

cop-imprf-rel kes-acc arrested.

‘Bill was introducing John to Sam and the police caught one or all of them.’

But not: ‘Bill was introducing John to Sam and the police caught two of them.’
Suppose that Bill, John and Sam are highly wanted drug dealers. Bill knows both John and Sam but the other two do not know each other. One day the three met in a secretive venue to conduct a business transaction. Unfortunately, however, the police somehow found about their plan in advance, so they showed up on the spot.

If (30) is uttered in such a context, the sentence will be judged felicitous if the police caught either only one of the three men, namely, Bill, John, and Sam, or all of them, but it will be judged infelicitous, if the police caught only two of the three men, say, John and Bill but not Sam. The unavailability of this plural but non-maximal interpretation of pro in (30) is puzzling because it is possible to imagine that one of the three drug dealers could successfully run away and hence only two of them got caught.

Under the present analysis, the lack of the intermediate plural interpretation is expected. The denotation of pro contains the sum-operator in the sense of Link (1983) and the free variable TR. Since the variable TR can be either left free or bound by an existential quantifier, the pronoun can refer either to the unique entity that bears some contextually salient thematic role in the state described by the embedded clause or to the sum of all entities that bear some role in that state. Hence, it follows that the referent of pro bears either a single or every thematic role, but not just some of the thematic roles, in the state described by the embedded clause.8

8 It may appear that the non-maximal but plural reading of pro becomes available if the floated quantifier twul-man ‘just two’ occurs in the matrix clause between kes-ul and the verb chayphohayssta, as in (i).

(i) Kyengchal-un Bill-i John-ekey Sam-ul sokayha-ko iss-n-un
Police-top B.-nom J.-dat S.-acc introduce-comp cop-impf-rel
kes-ul twul-man chayphohayssta.
kes-acc two-only arrested.
‘Bill was introducing John to Sam and the police caught just two of them.’
6.4.5. The interpretive difference between imperfective and perfect IHRCs

In this section, I show how the proposed analysis accounts for the interpretive difference between IHRCs with imperfective aspect and those with perfect aspect—that is, why the pro that occurs in the former can receive more construals than the pro that occurs in the latter.

To illustrate the phenomenon, compare (31) and (32), which are repeated from Chapter 4. The two sentences differ minimally in that the embedded aspect of the former is imperfective and that of the latter is perfect.

(31) John-un [[Mary-ka khal-lo cokak-ul
J.-top ][M.-nom knife-with sculpture-acc
mantul-nj]-un kes]-ul ppayass-ase peliessta.
make-imprf-rel kes]-acc take.away-and threw away.

‘Mary was making a sculpture with a knife and John took the sculpture from her and threw it away.’

Or: ‘Mary was making a sculpture with a knife and John took the knife from her and threw it away.’

But the occurrence of the floated quantifier in the matrix clause does not undermine my analysis, because it merely shows that the maximality interpretation of the definite description can be cancelled by the presence of a partitive quantifier in the matrix sentence.
As the English translations show, (31) can receive at least two interpretations, depending on the value of pro. In one reading, the pronoun can be construed as referring to the sculpture that Mary was working on; in the other reading, it can be construed as referring to the knife that Mary was using to make the sculpture, as the English translations show. On the other hand, sentence (32) can have only one reading for pro, namely, the one where the pronoun is construed as referring to the sculpture.9

Under the proposed analysis, this interpretive difference between the two sentences follows because, while the embedded clause of (31) describes an IP state, that of (32) describes a T-state, as the logical structures of the two sentences in (33) and (34) show, and the two states have different event and argument structures.

9 According to Makoto Kadowaki, the same phenomenon obtains in Japanese as well (personal communication).
(33) **The logical structure of (31):**

\[
\exists t [t < \text{now} \land \exists s \exists e \exists x \exists y [t \subseteq \tau(e) \land \text{make}(e) \land \text{Agent(Mary)}(e) \land \text{Theme}(x)(e) \land \text{sculpture}(x) \land \text{Instrument}(y)(e) \land \text{knife}(y) \land \text{IP-state}(s)(e) \land \forall z [\text{TR}(z)(e) \rightarrow \text{TR}(z)(s)] \land \tau(s) = \tau(e)]] \land \exists s'. \exists e' [\tau(e') < t \land \text{take away and throw away}(e') \land \text{Agent(John)}(e') \land \text{Theme}(\sigma u[\text{TR}(u)(s)])(e') \land \text{R-state}(s')(e') \land \text{Theme}(\text{Agent}(e'))(s') \land \forall t' [t \leq t' \rightarrow t' \subseteq \tau(s)] = 1]
\]

(34) **The logical structure of (32):**

\[
\exists t [t < \text{now} \land \exists s \exists e \exists x \exists y [\tau(e) < t \land \text{make}(e) \land \text{Agent(Mary)}(e) \land \text{Theme}(x)(e) \land \text{sculpture}(x) \land \text{Instrument}(y)(e) \land \text{knife}(y) \land \text{T-state}(s)(e) \land \text{Theme}(\text{Theme}(e))(s) \land t \subseteq \tau(s)]] \land \exists s'. \exists e' [\tau(e') < t \land \text{take away and throw away}(e') \land \text{Agent(John)}(e') \land \text{Theme}(\sigma u[\text{TR}(u)(s)])(e') \land \text{R-state}(s')(e') \land \text{Theme}(\text{Agent}(e'))(s') \land \forall t' [t \leq t' \rightarrow t' \subseteq \tau(s)] = 1]
\]

In the present analysis, an IP state contains all the participants of the event described by the embedded clause. Hence, pro in (31) is expected to receive more than one construal, because whatever bears a thematic role in the state described by the embedded clause can serve as its antecedent. On the other hand, a T-state contains only one argument, namely, the Theme of the embedded event, so the definite description in (32) is expected to receive only one interpretation.
6.4.6. Summary

In this subsection, I showed that the proposed interpretive system can derive intuitively correct truth-conditions for sentences whose embedded clauses have different types of aspect and hence describe different types of states. In addition, I showed that it can derive the maximal, plural entity interpretations of pro which comes about when the pronoun is anaphorically linked to split antecedents, in addition to the unique, singular interpretation which comes about in ordinary or elsewhere cases. Furthermore, I demonstrated that the proposed analysis can also derive the interpretive differences between IHRCs with imperfect aspect and those with perfect aspect.

6.5. Additional welcome results

In this section, I discuss additional welcome results of the present analysis. This section consists of three subsections. The first subsection shows that the proposed analysis can uniformly derive the interpretations of three types of IHRCs in C. Kitagawa’s (2003) classification. The next subsection demonstrates that the present analysis can account for the veridicality of the embedded clause’s content, which is a relatively unknown property of the IHRC construction in Korean and Japanese. In the last subsection, I show how the proposed analysis accounts for the IHRC construction parallels the direct perception construction in Korean (and, by extension, in Japanese).
6.5.1. A uniform account of C. Kitagawa’s three types of IHRCs

One of the notable welcome results of the proposed interpretive system is that it enables us to offer a uniform account of all the three types of IHRCs in C. Kitagawa’s (2003) classification.

We have already seen in Section 6.3.4 that the proposed analysis can derive intuitively correctly truth-conditions for the so-called standard IHRCs, where the internal head is a referential expression, that is, where the definite description is anaphorically linked to a proper name such as Mary. We need yet to see, however, whether the present system can also derive intuitively correct interpretations for the other two types of IHRCs, namely, the E-type (or quantificational) IHRCs and the operator-oriented IHRCs, where the internal head is a QP and a wh-element, respectively. In what follows, I apply the proposed interpretive system to prototypical instantiations of the two types of the IHRC construction and show that it can indeed derive intuitively correct truth-conditions for all the instantiations of the IHRC construction in C. Kitagawa’s typology.

6.5.1.1. The interpretation of the E-type IHRCs

Consider first the Korean sentence given in (35). In this sentence, the internal head of the IHRC is the QP motun kwaca ‘every cookie.’
(35) Jinho-nun [[Mila-ka nayngcangko-ey motun kwaca-lul
T.-top [[M.-nom refrigerator-loc every cookie-acc
neh-e twu-∅]-n kes]-ul phathi-ey kaci-e kassta.
put-conj aux-prf]-rel kes]-acc party-loc bring-conj went.

‘Mila put every cookie in the refrigerator and Jinho took all of them to the party.’

Under the proposed analysis, the LF-structure structure of this sentence will be identical to (16) except that the QP motun kwaca raises and adjoines to the AspectP of the embedded clause, thereby taking widest scope in the embedded clause. Given this LF-structure, the sentence will receive something like (36) as its logical structure, where the embedded clause’s denotation contains universal quantification over the entity domain but no temporal modifiers.

(36) **The logical structure of (35):**

\[
\exists t[t < \text{now} & \forall x[\text{cookie}(x) \rightarrow \exists s \exists e[t(e) < t \& \text{put in the fridge}(e) \& \text{Agent}(Mila)(e) \& \text{Theme}(x)(e) \& \text{T-state}(s)(e) \& \text{Theme}(\text{Theme}(e))(s) \&

\text{t} \subseteq \tau(s))] \& \exists e'[t(e') < t \& \text{bring to the party}(e') \& \text{Agent}(\text{Jinho})(e') \& 

\text{Theme}(\sigma u[\text{TR}(u)(s)])(e') \& \text{R-state}(s')(e') \& \text{Theme}(\text{Agent}(e'))(s') \& 

\forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)]]
\]

The truth-conditions we obtained for (35) seem to match our intuitions about its meaning. Hence, I conclude that the proposed analysis can derive the correct interpretations for sentences containing the E-type pronoun IHRCs in C. Kitagawa’s typology.
6.5.1.2. The interpretation of the operator-oriented IHRCs

Consider now sentence (37). This sentence is identical to (35) except that the head of the IHRC is a wh-word mwues ‘what’, rather than a QP.

(37) Jinho-nun [[Mila-ka nayngcangko-ey mwues-ul Neh-e
T.-top [[M.-nom refrigerator-loc what-acc put-conj
twu-∅-n kes]-ul phathi-ey kaci-e ka-ss-ni?
aux-prf]-rel kes]-acc party-loc bring-conj go-pst-Q?

‘What is such that Mila put it in the refrigerator and Jinho took it to the party?

Under the present analysis, this sentence receives something like (38) as its logical structure. This structure is not so different from (36), other than that the wh-word mwues gets interpreted as a variable bound by an existential quantifier, rather than by a universal quantifier, and the sentence denotes a set of propositions, rather than a proposition (or a truth-value), so the denotation of the sentence contains world variable.

(38) The logical structure of (37):

\[\lambda p \exists x[p = \lambda w \exists t[t < \text{now} & \text{cookie}(x) & \exists s \exists e[\tau(e) < t & \text{put in the fridge}(e) & \text{Agent}(Mila)(e) & \text{Theme}(x)(e) & \text{T-state}(s)(e) & \text{Theme}(\text{Theme}(e))(s) & t \subseteq \tau(s)](w) & \exists s'. \exists e'[\tau(e') \subseteq t & \text{bring to the party}(e') & \text{Agent}(Jinho)(e') & \text{Theme}(\sigma u[\text{TR}(u)(s)](e') & \text{R-state}(s')(e') & \text{Theme}(\text{Agent}(e'))(s') & \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)](w)]]\]
Again, these truth-conditions seem compatible with our intuitions about the meaning of sentence (37). Hence, I conclude that the proposed interpretive system can also derive the interpretations of the operator-oriented IHRCs in C. Kitagawa’s classification.

6.5.2. The veridicality of the embedded clause’s content

I noted elsewhere (M. Kim 2003, 2004a, c) that the truth of a sentence instantiating the IHRC construction in Korean always entails the truth of the embedded clause’s content.\(^\text{10}\) For convenience, I will call this property the veridicality of the embedded clause’s content.

To illustrate, consider (39) and (40). These sentences show that the content of the embedded clause is true even when the IHRC occurs in intensional contexts. In (39), the IHRC occurs under an intensional predicate –ko sip –‘want to’ and, in (40), under a modal auxiliary –eya ha- ‘have to’.

(39) Jinho-nun [[Mila-ka ppang-ul mantu-∅]-n kes]-i
     J.-top [[M.-nom bread-acc make-prf][rel kes]-nom
     mek-ko     sip-ta.
     eat-comp    want-decl.

‘Mila made bread and Jinho \textit{wants} to eat it.’

\(^{10}\) Nishigauchi (2003) shows that this property is also exhibited by the IHRC construction in Japanese.
The veridicality of the embedded clause’s content in the above sentences is evidenced by the fact that these sentences cannot be followed by the speaker’s denial of the existence of the event described by the embedded clause, as the infelicity of the second sentences in (41) and in (42) shows.

(41a)  Jinho-nun [[Mila-ka ppang-ul mantu-∅]-n kes]-i
      J.-top [[M.-nom bread-acc make-prf]-rel kes]-nom
      mek-ko sip-ta.
      eat-comp want-decl.
‘Mila made bread and Jinho wants to eat it.’

b.  #Kulentay, sasil Mila-nun ppang-ul mantul-ci
      But in.fact M.-top bread-acc make-ci
      an-h-ess-ta.
      neg-do-pst-decl.
‘But, in fact, Mila didn’t make bread.’
Further support for the veridical property of the IHRC construction comes from the fact that the truth of the embedded clause’s content is entailed by uttering the sentence that contains it, even when the IHRC+kes string is embedded within negative, interrogative, or counterfactual sentences. To see this, consider (43), (44), and (45).

(43) Jinho-nun [[totwuk-i tomangka-n]-un kes]-ul cap-ci
J.-top [[thief-nom run.away-imprf]-rel kes]-acc catch-ci
\textbf{an-h-ess-ta.}
\textbf{neg-do-pst-decl.}
‘A/the thief was running away and Jinho didn’t catch him.’
(44) Jinho-ka [[totwuk-i tomangka-n]-un kes]-ul cap-ess-ni?
J.-nom [[thief-nom run.away-imprf]-rel kes]-acc catch-pst-Q
‘Did Jinho catch the thief running away?’

(45) Manil Jinho-ka ku ttay cip-ey
if J.-nom that time home-loc
iss-ess-ta-meyn, e_i [[totwuk-i tomangka-n]-un kes]-ul
exist-pst-ind-cond, __ [[thief-nom run.away-imprf]-rel kes]-acc
cap-ess-ulthen-tey.
catch-pst-mod-decl.
‘If Jinho had been home at that time, he would have caught the thief running away.’

As in (39) and (40), the above sentences will be judged infelicitous if they are uttered in a context where the event of a thief running away did not occur in the actual world, despite the fact that the IHRC+kes strings in these sentences are under the scope of intensional operators.

It is important to note that the veridicality property of the IHRC construction is not shared by the corresponding EHRC construction. To illustrate, consider (46) and (47). Unlike in (39) and (40), one can deny the truth of the EHRC’s content immediately after uttering the sentence without contradicting himself/herself.\(^{11}\)

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\(^{11}\) This generalization applies only to restrictive EHRCs; non-restrictive EHRCs behave like IHRCs, as they also imply the truth of the embedded clause’s content. This can be illustrated by the following English sentences:
‘Jinho wants to eat the bread which Mila made.’

‘But, in fact, Mila didn’t make bread.’
(47)a. Jinho-nun [[Mila-ka e₁ mantu-∅]-n ppang]-ul J.-top [[M.-nom _ make-prf]-rel bread]-acc
mek-eya ha-n-ta.
eat-comp do-prst-decl.
‘Jinho must eat the bread which Mila made.’

b. Kulentay sasil Mila-nun ppang-ul mantul-ci But in.fact M.-top bread-acc make-ci
an-h-ess-ta.
neg-do-pst-decl.
‘But, in fact, Mila didn’t make bread.’

Under the proposed formal semantic analysis, the veridicality of the content of an IHRC is a logical consequence of the denotation of REL. I proposed above that there are two types of REL: one takes sets of temporary states as its argument (REL₁) and the other takes sets of permanent states as its argument (REL₂). These two types of REL have slightly different denotations from each other. The denotation of REL₁ contains the logical connective ‘&’, whereas the denotation of REL₁ contains the relation CAUSE, as repeated below from (9).

(48) **Denotations of the relative operator (REL):**

a. When it combines with a set of temporary states:

$$[[[\text{REL}_1]]] = \lambda K_{s, i, t} \lambda L_{s, i, t} \lambda t, t \exists s[K(s)(t) \& L(s)(t)]$$, where s is a variable over temporary states and t over times.
b. When it combines with a set of permanent states:

\[[\text{REL}_2] = \lambda \langle s, <i, t> \rangle . \lambda \langle s, <i, t> \rangle . \lambda t. \exists s [\text{CAUSE}(K(s)(t))(L(s)(t))],\]

where \(s\) is a variable over permanent states and \(t\) over times.

Although these two types of REL have rather different semantics, they both ensure that the truth of the sentence containing an IHRC will entail the truth of the content of the embedded clause. In the case of sentences where the embedded clause describes a temporary state, the veridicality of the embedded clause’s content follows, because the denotation of REL\(_1\) contains the logical connective which conjoins the embedded clause’s content and the aspect-level denotation of the matrix clause and, consequently, for the sentence to be true, both conjuncts have to be true as well. In the case of sentences where the embedded clause describes a permanent state, the embedded clause’s content is predicted to be valid because it serves as the cause of the aspect-level denotation of the matrix clause.

We can think of yet another reason why uttering a sentence containing an IHRC implies the truth of the embedded clause’s content. In the proposed interpretive system, the pronominal definite description that occurs in the IHRC construction denotes a function that takes a state and returns the unique or maximal entity that bears a thematic role to that state. Hence, if there is no state that satisfies this description, then the function denoted by the definite description cannot be defined because the restriction domain will be empty. In the proposed interpretive system, the state variable that combines with this function is essentially derived from the eventuality described by the embedded clause. Therefore, if the content of a sentence containing an IHRC is true, then the eventuality
described by the IHRC must exist in the actual world and the content of the IHRC must also be true as well.

6.5.3. Parallels between the IHRC and the direct perception constructions

As briefly mentioned in Chapter 5, the IHRC construction parallels the direct perception construction (DPC) in Korean (and, by extension, in Japanese). The two constructions are identical except for the matrix verb, as shown in (49) and (50).

(49) John-un  
\[
\text{capassta.}
\]
J.-top      
\[
\text{caught.}
\]
‘A/the thief was running away and John caught him.’

(50) John-un  
\[
tulessta.
\]
J.-top      
\[
\text{heard.}
\]
‘A/the thief was running away and John heard it (= the sound).’

In addition to the identical overt syntactic form, the IHRC and the DPC are alike in at least three respects.

First, as noted by authors like Kuroda (1992), Ohara (1993), and Fuji (1998), the time of the embedded clause of the IHRC construction cannot be later than the time of the matrix clause. A similar restriction also holds for the complement of the direct perception

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12 This section is based partly on M. Kim 2003, 2004a, c.

13 See Horie 1993b for Japanese. To my knowledge, the same facts also hold true for other languages such as Quechua (see Lefebvre and Muysken 1988). For space reasons, I do not offer the relevant data here.
verbs: the event described by the embedded clause is almost always interpreted as simultaneous with the event described by the matrix clause. To illustrate, consider (49). In this sentence, the time of the thief running way must be identical to the time of John hearing it; that is, the sentence will be judged infelicitous if John heard some sound that indicates that the thief had already run away. The exact same constraint holds for (50). This sentence will not be true if the event of the thief running away and the event of John hearing that event did not temporally intersect with each other.

Second, just as in the IHRC construction, the truth of a sentence instantiating the DPC entails the truth of the embedded clause. For instance, sentence (50) cannot be followed by the speaker’s (immediate) denial of the truth of the embedded clause, as shown in (51).


‘A/the thief was running away and John heard it.’

#Kulentey, sashil-un totwuk-i tomangka-ci anhassta

But, fact-top thief-nom run.away-ci did.not.

‘But in fact, the thief didn’t run away.’

Third, in neither construction, can the embedded clause tolerate indicative mood marking, as illustrated by in (52) and (53), repeated from Chapter 5.
(52) John-un [[totwuk-i tomangka-n(*-ta)-nun kes-ul]
J.-top [[thief-nom run.away-imprf(-ind)-rel kes-acc]
capassta.
caught.

‘A/the thief was running away and John caught him.’

(53) John-un [[totwuk-i tomangka-n(*-ta)-nun kes-ul]
J.-top [[thief-nom run.away-imprf(-ind)-rel kes-acc]
tulessta.
heard.

‘A/the thief was running away and John heard it.’

As mentioned in Chapter 5, this property is not intrinsic to the IHRC+kes string, because the complement of a factive verb can tolerate the indicative mood marker ‘-ta’, as shown in (54), despite the fact that it takes a string-identical form as an IHRC and the complement of a direct perception verb.

(54) John-un [[totwuk-i tomangka-n(-ta)-nun kes-ul]
J.-top [[thief-nom run.away-imprf(-ind)-rel kes-acc]
alassta.
knew.

‘A/the thief was running away and John knew it.’
The similarity between (52) and (53) on the one hand and the difference between (52-53) and (54) on the other hand suggest that, while the complement of a factive verb has a full clause structure, an IHRC and the complement of a direct perception verb have a truncated (or small clause) structure. If correct, this analysis partly explains why the IHRC and DPC constructions behave alike. But, in the light of the proposed semantic analysis of the IHRC construction, there is a more fundamental reason for the parallelism: the semantics of both constructions are essentially about connecting two sets of eventualities by having them share time and event participants.

Under the proposed analysis, the two sets of eventualities described by the embedded and the matrix clauses in the IHRC and the DPC constructions temporally intersect because REL relate states to times. On the other hand, they share an argument (or an event participant) because the constructions contain a pronominal definite description (i.e., pro) in the matrix clause. In the present analysis, this pronominal definite description can, in principle, refer to any unique individual as long as it bears some salient thematic role in the state described by the embedded clause. Since it is possible to assume that the sound or scene of an eventuality bears a thematic role in that eventuality, we can derive the interpretation of the DPC in a manner essentially identical to the way in which we derive the interpretation of the IHRC construction.14 That is, if we include Sound and Scene in our inventory of thematic roles, we can give a uniform account of the IHRC and the DPC with no further amendment to what I have proposed in this study.

14 In M. Kim 2004c, I have proposed a uniform way of deriving the interpretations of the two constructions. Chung and Kim 2003 have also tacitly suggested that the two constructions can receive a uniform syntactic (and semantic) treatment.
6.6. Summary

In this chapter, I offered a constrained but flexible semantic analysis of the IHRC construction within an event-based framework. Building on the insight of the existing research, I argued that the semantics of this construction is essentially concerned with (i) determining the value of a pronominal definite description (pro) and (ii) connecting the eventualities described by the embedded and the matrix clauses by raising the IHRC to a position higher than its surface position. However, I departed from the existing analyses in two crucial points.

First, unlike the existing E-type pronoun analyses (e.g., Hoshi 1995, Shimoyama 1999), I proposed that interpreting pro involves recovering a salient thematic role from the content of the embedded clause, rather than a salient property of individuals from the discourse context. Second, I departed from the existing LF-raising analyses of the IHRC (e.g., Fuji 1998, Shimoyama 1999) by proposing that the IHRC raises only up to the Aspect Phrase-level of the matrix clause, rather than all the way up to the highest maximal projection thereof, and that this movement is essentially due to the semantics of REL: the relative operator that occurs in the IHRC construction connects the set of states described by the embedded clause to the set of eventualities described by the matrix clause by assigning either a temporal intersection or a cause-result relation to them.

In addition to making these departures, I also offered a new semantic treatment of aspect: I proposed that aspect not only relates events to times but also introduces a new state and hence Aspect Phrase, which consists of Verb Phrase and Aspect, denotes a set of states.
I showed that the proposed interpretive system is constrained but flexible enough to deal with the challenges posed by the semantics of the IHRC construction. First, it accounts for some of the most recalcitrant properties of the construction such as the limited semantic variability of the definite description. Second, it correctly predicts the semantic differences between IHRCs which describe temporary states and those which describe permanent states. Third, it can derive not only the unique, singular interpretation of pro but also its maximal, plural interpretation, which comes about when the pronoun is anaphorically linked to more than one DP. Fourth, it can derive the interpretations of the three types of IHRCs in C. Kitagawa’s typology without further amendment. We also saw that the proposed analysis has at least two additional welcome results: First, it correctly predicts the veridicality of the embedded clause’s content. Second, it accounts for the parallelism between the IHRC construction and the DPC construction.
7.1. Introduction

The purpose of this chapter is to summarize the main proposals and conclusions of the present investigation and discuss their theoretical implications. Section 7.2 offers a brief summary of the main proposal. Section 7.3 serves to show that the IHRC construction parallels seemingly unrelated constructions and suggest ways to account for these parallels. Section 7.4 closes the chapter by addressing questions for future research.

7.2. The main proposals of the present study

The overarching goal of this study was to investigate how different modules of grammar interact with each other in deriving the meaning of a sentence. To this end, I probed the interpretation of the IHRC construction.

I showed that the interpretation of this construction is derived through a concerted effort between the morphosyntax, semantics, and pragmatics. More specifically, the aspect of the embedded clause and the semantics of the matrix predicate determine the interpretability of a sentence, in conjunction with the discourse context and the discourse participants’ knowledge of the world.

I argued that this intricate interplay between different realms of grammar results mainly from two factors: the pronominal definite description pro, which is phonologically realized as kes in Korean and no in Japanese, and the relative operator REL, which is realized as –un in Korean and Ø in Japanese.
First, **Pro** is responsible for the intricate cooperation between the morphosyntax, the semantics, and the pragmatics because, syntactically, it requires a clausal complement but, semantically, it selects for a free relation variable between a state and an entity, whose value is determined by the event structure of the embedded clause, the semantics of the matrix predicate, and the discourse context.

Second, REL is also partly responsible for the complex phenomenon exhibited by the interpretation of the IHRC construction because, syntactically, it is base-generated inside a DP as a complement to an N-level pronoun, namely, *kes* or *no* but, semantically, it serves as a bridge between the embedded clause and the matrix clause. That is, it connects the set of states described by the embedded clause to the set of states described by the matrix clause by assigning either a temporal or a causal relation to them depending on whether the embedded clause describes a temporary state or a permanent state. What this means is that, just like the semantics of **pro**, the semantics of REL is also sensitive to the event structure of the embedded clause.

In light of the proposed account, the IHRC construction can be viewed as an instantiation of event subordination, where two sets of eventualities (more specifically, two sets of states) are connected to each other via a relative operator and an anaphoric element that makes the two eventualities share at least one event participant. This way of looking at the state of affairs enables us to draw striking parallels between the IHRC construction and several seeming unrelated constructions from other languages, as we will see in the next section.
7.3. The parallelism between the IHRC construction and other constructions

In the next section, I show that IHRCs parallel correlatives in Hindi, and donkey-sentences, free adjuncts, and participial small clauses in English. In addition, I discuss how these parallels might follow from the proposed analysis of the IHRC construction.

7.3.1. Parallels to the correlative construction in Hindi

As authors like Dayal (1991, 1995) and M. Kim (2004b) have pointed out, the IHRC construction parallels the correlative construction in Hindi in several important respects. The correlative construction is illustrated by (1).

(1)  
\[
\text{jo laRkii khaRii hai} \quad \text{vo lambii hai}
\]
\[
\text{REL girl standing is} \quad \text{DEM tall is}
\]

‘The girl who is standing is tall.’

(Dayal 1991: 696)

First, the two constructions are both head internal, although the correlative construction need not be. Second, in both constructions, the truth of the relative clause’s content is entailed (or existentially presupposed). Third, both constructions contain a pronominal definite description in the matrix (or superordinate) clause, whose descriptive content comes from the content of the preceding relative clause: in correlatives, this definite description is realized as demonstrative pronouns (e.g., vo in (1)) and, in IHRCs, it is realized as kes or no (plus the unpronounced [+definite] feature).\(^1\)

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\(^1\) Dayal (1995) offers an E-type pronoun analysis of the demonstrative that occurs in the matrix clause of correlatives in Hindi.
In view of the proposed analysis of the IHRC construction, the parallelism between the two types of relative clause constructions can be explained as follows: in the standard analysis of the correlative construction (Dayal 1991), (1) receives something like (2) as its overt syntactic structure.\(^2\) Here, CP corresponds to a correlative clause and DEM to the demonstrative that occurs in the matrix clause.

\[
(2) \quad [\text{IP} \ [\text{CP} \ [\ldots \text{NP} \ldots V \ldots]] \ [\text{IP} \ \ldots \text{DEM} \ldots V \ldots]]
\]

In the above structure, the correlative clause is base-generated adjoined to the IP level of the matrix clause and the entire relative clause is co-indexed with a pronominal definite description that occurs in the matrix clause. If we compare this structure with the LF-structure I proposed for the IHRC construction in Chapter 5, we can see that the two structures differ only in two points. One is where the relative clause is adjoined to. The other is at what level of derivation this adjunction structure is represented: in the correlative clause construction, the adjunction structure is represented in overt syntax, as the clause is base-generated adjoined to the IP level of the matrix clause. On the other hand, in the IHRC construction, the adjunction structure is represented at LF, due to LF-raising of an IHRC to the Aspect Phrase level of the matrix clause. Given this, it is only natural that the two types of relative constructions behave alike.

But the difference between the two relative clause constructions with respect to the adjunction site of the relative clause might create some notable differences between them. For instance, it is possible that the interpretation of a correlative is not affected by

\(^2\) On the other hand, Dwivedi (1994) claims that the correlative construction has an asymmetric coordination structure, where a CP, whose head hosts the feature REL, is asymmetrically conjoined with another CP, whose head hosts the feature COREL (Chapter 4).
the aspect of the embedded clause, because the construction is not about relating two sets of states; rather, it is about relating two sets of possible worlds (if we assume that an IP is a full clause and hence it denotes a set of possible worlds). Although this idea needs to be empirically tested, to my knowledge, the correlative construction in Hindi is not subject to the same kind of restriction on the IHRC construction in Korean and Japanese; for instance, a correlative’s content needs not stand in a tight semantic relation with respect to the matrix clause’s content such as the obligatory temporal or causal relation. This suggests that the adjunction site of the relative clause might indeed create some important differences between the correlative construction and the IHRC construction.

7.3.2. Parallels to donkey-sentences

As mentioned in Chapter 2, authors like Hoshi (1995) and Shimoyama (1999) have shown that the IHRC construction parallels donkey-sentences sentences in English, which are illustrated in (3).

(3) a. If a farmer owns a donkey, he beats it.
   b. A farmer who owns a donkey beats it.

First, in both constructions, the embedded (or subordinate) clause provides a restriction domain for a quantifier by serving as its first argument. Second, the matrix clause contains a pronominal definite description. Furthermore, the descriptive content of this pronoun comes only from the content of the embedded clause.
Under the present analysis, these parallels are expected, because just like donkey-sentences, the IHRC construction also has a tripartite logical structure in the sense of Heim (1982), where the first argument of an operator (or a quantifier) provides the descriptive content for the disguised definite description that occurs in the second argument of the operator.

7.3.3. Parallels to non-restrictive (appositive) relative clauses

As discussed in some of the preceding chapters, it has been noted in the literature that IHRCs parallel non-restrictive (or appositive) relative clauses in at least two respects. First, just like appositives, IHRCs are interpreted like independent clauses with respect to the matrix clause’s contents (for discussion, see Kuroda 1976; 1992, Jung 1995, Shimoyama 1999, Fuji 1998). Second, both types of relative clauses contain some sort of pronominal definite description (Hoshi 1995, Shimoyama 1999, Kitagawa 2003).

On the basis of these parallels, several authors have even claimed that IHRCs should be treated as a kind of appositive relative clause (e.g., Jung 1995, C. Kitagawa 1996, 2003), as mentioned in Chapter 1. Although we have already seen in Chapter 1 that IHRCs cannot be analyzed as appositives, the parallelism between them still merits explanation.

Under the proposed analysis of the IHRC construction, the parallelism obtains because both IHRCs and non-restrictive relatives have a Heimian tripartite logical structure, where the first argument of an operator (or a quantifier) provides the descriptive content for the disguised definite description that occurs in the second argument of the operator.
But, if IHRCs and non-restrictive relatives indeed have a similar logical structure, why do they also show different semantic behaviors? An answer to this question might lie in the different adjunction sites of the relative clauses: while non-restrictive relatives adjoin to the IP (or CP) level of the matrix clause at the level of interpretation (Demirdache 1991), IHRCs adjoin to the Aspect Phrase level. Alternatively, it is plausible that while IHRCs are interpreted in the semantic domain, appositives are interpreted in the pragmatic domain (Potts 2003).

The suggested line of analysis enables us to account for why IHRCs are more subject to formal constraints than non-restrictive relative clauses; for instance, why IHRCs do not have their own temporal references while appositives do, and why the content of an IHRC has to bear either a temporal or a causal relation (though other semantic relations such as concession can also come about via pragmatic implicature) to the matrix clause’s content, whereas a sentence containing a non-restrictive relative clause can be interpretable even if the relative clause’s content has no direct relevance to the matrix clause’s content.

7.3.4. Parallels to free adjuncts

As alluded to in Chapter 4, the IHRC construction also parallels the absolute construction in English in several important respects.

First, in both constructions, the subordinate clause, i.e., the IHRC and the free adjunct, respectively, bears a tight semantic relation to the superordinate or matrix clause, despite the absence of an overt logical or temporal connective between the two clauses.
Second, the embedded clause receives a different interpretation depending on the discourse context but this semantic variability is delimited by the combination of several factors. To illustrate, compare (4-6) and (7-9), which are repeated from Chapter 1. The first three sentences instantiate the IHRC construction and the other three instantiate the free adjunct construction (the semantic relation inside parentheses is intended to be a less prominent relation in a neutral context).

IHRC construction

(4)  **circumstance (or causation):**

\[
\text{Jinho-nun} \quad \text{[ai-ka} \quad \text{wul-n]-un} \quad \text{kes]-ul} \quad \text{tallay-ess-ta.}
\]

\[
\text{J.-top} \quad \text{[child-nom} \quad \text{cry-imprf]-rel} \quad \text{kes]-acc} \quad \text{comfort-pst-decl.}
\]

‘Jinho comforted a/the child while she (= the child) was crying.’

(5)  **temporal precedence (or causation):**

\[
\text{Jinho-nun} \quad \text{[Mila-ka} \quad \text{swul-ul} \quad \text{mantul-∅]-un} \quad \text{kes]-ul}
\]

\[
\text{J.-top} \quad \text{[M.-nom} \quad \text{alchol-acc} \quad \text{make-prf]-rel} \quad \text{kes]-acc}
\]

\[
\text{mat-po-ess-ta.}
\]

\[
\text{taste-try-pst-decl.}
\]

‘Mila made alcohol and then Jinho tasted it.’
(6) concession (or temporal precedence):

Jinho-nun [[Mila-ka twu tal cen-ey chayk-lul
J.-top [[M.-nom two month ago-loc book-acc
ponay-∅]-n kes]-ul onul(-ey-ya) pat-ess-ta.
send-prf-rel kes]-acc today(-loc-foc) receive-pst-decl.

‘Although Mila sent a book two months ago, Jinho received it (only) today.’

Free Adjunct Construction

(7) circumstance (or causation):

Listening to the radio, John fell asleep.

(8) temporal precedence (or causation):

Having given it a full consideration, he was not for an open convention.

(9) concession (or temporal precedence):

Having suffered from a severe cold for several days, John helped other people
to move.

Third, as I showed in Chapter 4, both IHRCs and free adjuncts exhibit different
semantic behavior with respect to the matrix clause depending on whether they describe
temporary states or permanent states.  

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3 There is, in fact, yet another parallel we can draw between the two constructions. Both constructions
contain some sort of anaphoric element, although this anaphoric element is overtly realized in the IHRC
construction as kes or no, but not realized in the absolute construction (in the latter, the anaphoric element
is realized as PRO, which can be controlled by a noun phrase that c-commands it or by a contextually
If we adopt the proposed analysis of the IHRC construction and Stump’s (1985) analysis of the free adjunct construction, we can readily account for the parallelism between the two constructions.

First, the subordinate clause’s content bears a tight relation to the superordinate clause’s content because, just as the embedded clause of the IHRC construction serves as the first argument of REL and the matrix clause serves as its second argument, the denotation of a free adjunct serves as the first argument of the logical relational variable L and the denotation of the matrix clause serves as its second argument.

Second, the reason why IHRCs and free adjuncts exhibit a similar kind of semantic variability relative to the matrix clauses’ content is that the semantics of both constructions has enough room for pragmatics to come into play. In the case of the former, the denotation of REL leaves the semantic relation between the two clauses intrinsically indeterminate, and in the case of the latter, the logical connective L is a free variable whose value can vary depending on the discourse context.

The range of semantic relations that can hold between an IHRC and its matrix clause or a free adjunct and its matrix clause is predicted to be delimited, however, because the embedded clause’s content must bear either a temporal or a causal (or logical) relation to the matrix clause’s content. In the IHRC construction, the denotation of REL ensures this limited variability. On the other hand, in the free adjunct construction, the logical structure contains a free temporal relational variable M, in addition to the salient noun or a generic noun phrase such as we or they. See Stump 1985). Given the similarity between the two constructions, it may not be too farfetched to treat PRO as a kind of definite description. I leave further investigation of this matter for another occasion.
logical variable L. Consequently, the free adjunct’s content bears a logical and a temporal relation to the matrix clause’s content.

Finally, in both constructions, the interpretation of a sentence varies depending on what kind of state the embedded clause describes, because different types of state descriptions can combine with different types of operators.

### 7.3.5. Parallels to participial small clauses

The IHRC construction also parallels participial small clauses and complements of direct perception verbs in English (and many other languages such as German and Italian), which are illustrated in (10) and (11), respectively.

\[(10) \quad \text{Typical participial small clauses in English:} \]

John *caught* the thief running away.

\[(11) \quad \text{The direct perception construction in English:}\]^{4}

John *heard* the thief running away.

First, both IHRCs and small clauses have truncated structures: in this study, I posit that IHRCs consist of Aspect Phrase. Interestingly, Felser (1999) also claims that participial (and verbal) small clauses in English have the structure of Aspect Phrase on the grounds

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^{4} It is important to differentiate the direct perception construction from the indirect perception construction, which is illustrated in (i).

(i) John heard *(that)* the thief *ran* away.

Unlike (11), this sentence can be true even if John did not actually hear the sound of the thief running away.
that they cannot have their own temporal reference independent of the matrix clause and yet they can still bear aspactual morphology such as –ing and –ed, thereby standing in a temporal simultaneity relation to the eventuality expressed by the matrix clause.5

Second, as I showed in Chapter 6, the truth of a sentence instantiating the IHRC construction entails the truth of the embedded clause’s content. It is well-known that complements of direct perception verbs and verbal or participial small clauses show a similar behavior (see Barwise 1981, Higginbotham 1983). For instance, sentences (10) and (11) above will be infelicitous if they are uttered in a context where the event of the thief running away did not occur in the actual world. Hence, they cannot be followed by the speaker’s denial of the truth of the embedded clause without inducing a pragmatic anomaly, as shown in (12) and (13).

(12) John caught the thief running away. #But, in fact, the thief didn’t run away.

(13) John heard the thief running away. #But, in fact, the thief didn’t run away.

Third, both the IHRC construction and the small clause construction contain an anaphoric element, although it is phonologically realized as kes or no (plus the [+definite] feature) in the IHRC construction and as a phonologically empty category PRO in the small clause construction (see Guasti 1993, Felser 1999).

In view of the semantic treatment of the IHRC construction I offered in this study, these parallels between the IHRC construction and the direct perception construction do

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5 Guasti (1993) posits that complements of direct perception verbs in English have a structure where an AGRSP, which is a kind of Agreement Phrase that is generated below TenseP, embeds a VP. On the other hand, Basilico (2002) argues that they consist of a Topic Phrase which embeds a VP.
not come as a surprise. The two constructions parallel each other because they have a similar semantics and syntax.

We can say that the two constructions have a similar semantics because, just like what I claim about the IHRC construction, several authors have suggested that the semantics of participial small clauses in English (and other languages) concerns connecting the set of eventualities described by the embedded to the set of eventualities described by the matrix clause by having them share a temporal reference and an event participant (e.g., Felser 1999, Rothstein 2004).  

We can also conclude that IHRCs and small clauses have a similar syntactic structure because they share two most crucial defining syntactic characteristics. First, both constructions contain a morpheme which converts a verbal category into an adjectival (or adnominal) category and which also carries the information about the aspect of the embedded clause, namely, the relative markers –un in Korean and ∅ in Japanese, and the participial morphemes –ing and –ed. Second, the matrix clauses of the two types of clauses contain some sort of pronominal element which is interpreted as anaphorically linked to an entity that is part of an eventuality described by the clause that appears first in the construction, be it the embedded clause or the matrix clause.

Given these parallels between the two constructions, we can employ the same formal mechanism in interpreting them, one possibility of which being what I proposed in this study. Under the proposed analysis, deriving the semantics of the small clause construction will essentially involve two things. One is to have some sort of operator connect the denotation of the embedded clause to an aspect-level denotation of the matrix

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6 Rothstein (2004) captures this semantic characteristic of small clauses by invoking an independent semantic operation called “Time-Participant (TP) Connect,” rather than by deriving it from their syntactic structures.
clause, thereby ensuring that the sets of eventualities described by the two clauses will share the time reference. The other is to make the content of the matrix clause provide the descriptive content for PRO which occurs in the embedded clause, thereby making the eventualities described by the embedded and the matrix clauses share an event participant.

7.4. Implications of the present study and topics for future research

The present study shows that the IHRC construction provides a nice window into event structure. In particular, it suggests that sentences with different types of aspect describe different states, which in turn have different event structures with different participants. It also suggests that there is a connection between the semantics of definite descriptions and event structure.

Furthermore, this study implies that the semantics of REL can be flexible enough to combine with any kind of set-denoting terms, regardless of whether the set contains entities, eventualities, or possible worlds. Positing a flexible semantics of REL gives us a way to account for the difference between the IHRC construction and the EHRC construction: the two types of RC constructions differ from each other because, while the REL that occurs in the restrictive EHRC construction selects for sets of entities, the one that occurs in the IHRC construction selects for sets of states.

The conclusions drawn from this investigation raise several important questions. Of these, the two most notable are as follows:

(i) Why are E-type pronouns subject to different licensing conditions from pro?

(ii) Why do relative clauses come in such variety, both in form and meaning?
Although offering fully satisfactory answers to these questions will have to be deferred for future, in what follows, I would like to suggest some possible lines to pursue.

In answer to the first question, I speculate that the difference between a typical E-type pronoun and pro might essentially boil down to the morphosyntactic differences between them: while pro requires a syntactic clausal complement, a typical E-type pronoun does not. The basis of this idea comes from the following facts:

In Korean and Japanese traditional grammars, the morphemes kes and no, which make up pro, are treated as “defective nouns,” along with nouns such as kos ‘place’ ttay ‘time’, kil ‘way’, swu ‘possibility’ in Korean, because they cannot occur alone; that is, it must be accompanied by some sort of adjectival material such as a relative clause, a demonstrative and a possessive phrase. In the case of the IHRC construction, these defective nominals require a gapless relative clause as their complements. Hence, their denotations must combine with the denotations of the relative clauses or the traces thereof if the relative clauses move out of the noun phrase inside of which they were generated. Consequently, the content of kes or no and, ultimately, the semantics of pro, is bound to be restricted by the content of the relative clause.

On the other hand, the morphemes that occur as E-type pronouns in Korean and Japanese (and also in English) do not have such morphosyntactic requirement as kes or no and hence they can occur by themselves without having to be accompanied by adjectival material.7 Hence, it follows that their semantics will not be dependent on the semantics of the clause that immediately precedes or c-commands them. This accounts

---

7 In fact, pronouns in Korean and Japanese are made of some demonstrative element followed by a pronominal defective nominal (e.g., kukes, which literally means ‘that thing’). Hence, in a way, they have already fulfilled the requirement of the defective nominals which comprise them.
for why E-type pronouns can be anaphorically linked to noun phrases that are relatively “far away” from them, as I showed in Chapter 4.

The question that arises is: why do E-type pronouns require overt licensors when pro does not? An answer to this question might be found in Elbourne 2001: Elbourne claims that E-type pronouns instantiate NP ellipsis. That is, they spell out a definite article with an NP sister which is deleted in phonology, as depicted in (14), where $\emptyset$ stands for elided material (This structure is designed for head-final languages).

\[
\begin{array}{c}
\text{(14)} \\
\text{DP} \quad \text{NP} \\
\quad \text{D} \\
\quad [\text{+definite}] \\
\quad \emptyset \\
\quad \text{pronoun}
\end{array}
\]

Under the view endorsed by Elbourne, English E-type pronouns such as he and it that occur in the donkey sentence like (3a), repeated below as (15), can be spelled out as the farmer who owns a donkey and the donkey which is owned by the farmer, respectively.

(15) If a farmer owns a donkey, he beats it.

Elbourne argues that interpreting an E-type pronoun involves recovering the value of the elided NP from the discourse context. The standard assumption is that ellipsis requires a linguistic antecedent (be it VP ellipsis or NP ellipsis) (see, among others,
Hankamer and Sag 1976, Williams 1977, Kennedy and Merchant 2000). Thus, Elbourne’s analysis predicts that the potential antecedent of an E-type pronoun must be phonetically realized in the preceding discourse; if not, a salient property that can restrict the denotation of the pronoun cannot be recovered and, consequently, the pronoun cannot be interpretable.

Turning now to the question of why relative clauses come in great varieties, in view of the proposed analysis of the IHRC construction, it seems that the answer might lie in the semantics of REL. Relative clauses exhibit a wide range of cross-linguistic variation because the semantics of REL is flexible enough to combine with any kind of sets, regardless of whether they contain entities, eventualities, or possible worlds.

It is, however, well-documented that, even among IHRC constructions, there is a great syntactic and semantic diversity cross-linguistically (for a good overview, see Grosu 2002; for IHRC constructions in individual languages or language families, see, among others, Cole 1987 and Hastings 2002 for Quechua, Williamson 1987 for Lakota, Culy 1990 for various languages, Basilico 1996 for Yuman languages, Hiraiwa 2003 for Buli). Obviously, the flexible semantics of REL cannot account for the wide range of variation among relative clauses, because there is so much flexibility its semantics can have.

Authors like Watanabe (2003a, 2003b) and Nishigauchi (2003) have recently suggested that the typological variability of relative clauses might stem from the combination of several factors such as differences in the noun phrase internal structure, quantification, focus, and \textit{wh}-operator movement among languages that have the IHRC construction. I leave further investigation of this topic to future research.
APPENDIX
SAMPLE DERIVATIONS^1

1. Derivation of the truth-conditions for (15) in Chapter 6 based on the LF structure (17)

\[
[[\text{NP}]] = [[kes]][[[s_j]]] = (\text{via function application})
\]
\[
= \lambda s.\lambda x[\text{TR}(x)(s)](s_j) = (\text{via } \lambda\text{-reduction})
\]
\[
= \lambda x[\text{TR}(x)(s_j)]
\]

\[
[[\text{DP}]] = [[+\text{definite}]][[[\text{NP}]]]
\]
\[
= \lambda P.\sigma x[P(x)](\lambda y[\text{TR}(y)(s_j)])
\]
\[
= \sigma x[\lambda y[\text{TR}(y)(s_j)](x)]
\]
\[
= \sigma x[\text{TR}(x)(s_j)]
\]

\[
[[\text{V'}]] = [[\text{chingchangha-}}][[[\text{DP}]]]
\]
\[
= \lambda x.\lambda y.\lambda e[\text{praise}(e) \& \text{Agent}(y)(e) \& \text{Theme}(x)(e)](\sigma x[\text{TR}(x)(s_j)])
\]
\[
= \lambda y.\lambda e[\text{praise}(e) \& \text{Agent}(y)(e) \& \text{Theme}(\sigma x[\text{TR}(x)(s_j)])(e)]
\]

\[
[[\text{VP}_1]] = [[\text{VP}}][[[t_k]]]
\]
\[
= \lambda y.\lambda e[\text{praise}(e) \& \text{Agent}(y)(e) \& \text{Theme}(\sigma x[\text{TR}(x)(s_j)])(e)](x_k)
\]
\[
= (\text{via } \lambda\text{-reduction})
\]
\[
= \lambda e[\text{praise}(e) \& \text{Agent}(x_k)(e) \& \text{Theme}(\sigma x[\text{TR}(x)(s_j)])(e)]
\]

^1 In what follows, I suppress the assignment function g in computing the truth-conditions of the sentences.
[[perfective]] = \lambda P_{< t} \cdot \lambda s, \lambda t_i \cdot \exists e[\tau(e) \subseteq t \land P(e) \land \text{R-state}(s)(e) \\
\text{& Theme(Agent(e))(e) & \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)]]}

[[AspectP_1]] = [[perfective]]([[VP_1]])
= \lambda P_{< t} \cdot \lambda s, \lambda t_i \cdot \exists e[\tau(e) \subseteq t \land P(e) \land \text{R-state}(s)(e) \\
\text{& Theme(Agent(e))(e) & \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)]](\lambda e[\text{praise}(e) \land \text{Agent}(x_k)(e) & \\
\text{& R-state}(s)(e) \land \text{Theme}(\sigma x[\text{TR}(x)(s_j)])(e)]

[[AspectP_{1*}]] = [[J]]([[AspectP_{1*}]])
= (via existential quantification over the state variable)
= \lambda s, \lambda t \cdot \exists e[\tau(e) \subseteq t \land \text{praise}(e) \land \text{Agent}(x_k)(e) \land \text{Theme}(\sigma x[\text{TR}(x)(s_j)])(e) \\
\text{& R-state}(s)(e) \land \text{Theme}(\text{Agent}(e))(e) & \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)]]

[[VP_4]] = [[kongpwuha-]]([[Mary]]) = (via function application)
= \lambda x. \lambda e[\text{study}(e) \land \text{Agent}(x)(e)](Mary)
= \lambda e[\text{study}(e) \land \text{Agent}(Mary)(e)]

[[Imperf]] = \lambda P_{< t} \cdot \lambda s, \lambda t_i \cdot \exists e[t \subseteq \tau(e) \land P(e) \land \text{In-progress}(s)(e) \land \forall x[\text{TR}(x)(e) \\
\rightarrow \text{TR}(x)(s)] \land \tau(s) = \tau(e)]]
[[AspectP4]] = [[Imperf]]([[VP4]])

= \lambda P_{<s, \tau, t>}. \lambda s, \lambda t. \exists e[t \subseteq \tau(e) & P(e) & \text{In-progress}(s)(e) & \forall x[TR(x)(e) \rightarrow TR(x)(s)] & \tau(s) = \tau(e)]([[\text{study(e) & Agent(Mary)(e)}]])

= \lambda s, \lambda t. \exists e[t \subseteq \tau(e) & \text{study(e) & Agent(Mary)(e)} & \text{In-progress}(s)(e) & \forall x[TR(x)(e) \rightarrow TR(x)(s)] & \tau(s) = \tau(e)]

[[RelP]] = [[-un]]([[AspectP4]])

= [[REL1]]([[AspectP4]])

= \lambda K_{<s, \tau, t>}. \lambda L_{<s, \tau, t>}. \lambda t. \exists s[K(s)(t) & L(s)(t)]([[\text{In-progress}(s)(e) & \forall x[TR(x)(e) \rightarrow TR(x)(s)] & \tau(s) = \tau(e)]])

= \lambda L_{<s, \tau, t>}. \lambda t. \exists s. \exists e[t \subseteq \tau(e) & \text{study(e) & Agent(Mary)(e)} & \text{In-progress}(s)(e) & \forall x[TR(x)(e) \rightarrow TR(x)(s)] & \tau(s) = \tau(e)] & L(s)(t)]

[[AspectP1***]] = [[RelP]]([[AspectP1**]])

= \lambda L_{<s, \tau, t>}. \lambda t. \exists s. \exists e[t \subseteq \tau(e) & \text{study(e) & Agent(Mary)(e)} & \text{In-progress}(s)(e) & \forall x[TR(x)(e) \rightarrow TR(x)(s)] & \tau(s) = \tau(e)] & L(s)(t)]

= \lambda t. \exists s. \exists e[t \subseteq \tau(e) & \text{study(e) & Agent(Mary)(e)} & \text{In-progress}(s)(e) & \forall x[TR(x)(e) \rightarrow TR(x)(s)] & \tau(s) = \tau(e)] & \exists e'[\tau(e') \subseteq t & \text{praise(e')} & \text{Theme}(Agent(e))(s) & \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)]]

= \lambda t. \exists s. \exists e[t \subseteq \tau(e) & \text{study(e) & Agent(Mary)(e)} & \text{In-progress}(s)(e) & \forall x[TR(x)(e) \rightarrow TR(x)(s)] & \tau(s) = \tau(e)] & \exists s'. \exists e'[\tau(e') \subseteq t & \text{praise(e')} & \text{Theme}(Agent(e))(s) & \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)]]
Agent(x_k)(e') & Theme(\sigma x[TR(x)(s)](e') & R-state(s')(e') & 
Theme(Agent(e'))(s') & \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s')]"

[[Past]] = \lambda M_{\langle i,t \rangle}. \exists t[t < now & M(t) = 1]

[[Tense']] = [[[Past]][[[AspectP_1**]]])
= \lambda M_{\langle i,t \rangle}. \exists t[t < now & M(t) = 1](\lambda t. \exists \exists e[t \subseteq \tau(e) & study(e) & Agent(Mary)(e) &
In-progress(s)(e) & \forall x[TR(x)(e) \rightarrow TR(x)(s)] & \tau(s) = \tau(e)] & \exists s'. \exists e'[\tau(e') \subseteq t & praise(e') & Agent(x_k)(e') & Theme(\sigma x[TR(x)(s)])(e') &
R-state(s')(e') & Theme(Agent(e'))(s') & \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s')]])
= \exists t[t \subseteq now & \exists \exists e[t \subseteq \tau(e) & study(e) & Agent(Mary)(e) &
In-progress(s)(e) & \forall x[TR(x)(e) \rightarrow TR(x)(s)] & \tau(s) = \tau(e)] &
\exists s'. \exists e'[\tau(e') < t & praise(e') & Agent(x_k)(e') & Theme(\sigma x[TR(x)(s)])(e') &
R-state(s')(e') & Theme(Agent(e'))(s') & \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s')] = 1]

[[Tense'']] = (K)([[Tense']])
= (via predicate abstraction over the entity variable x_k)
= \lambda x_k. \exists t[t < now & \exists \exists e[t \subseteq \tau(e) & study(e) & Agent(Mary)(e) &
In-progress(s)(e) & \forall x[TR(x)(e) \rightarrow TR(x)(s)] & \tau(s) = \tau(e)] &
\exists s'. \exists e'[\tau(e') \subseteq t & praise(e') & Agent(x_k)(e') & Theme(\sigma x[TR(x)(s)])(e') &
R-state(s')(e') & Theme(Agent(e'))(s') & \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s')] = 1]

[[TenseP]] = [[[Tense'']]([[John]])
=\lambda x_k.\exists t < \text{now} & \exists s[\exists e[t \subseteq \tau(e) & \text{study}(e) & \text{Agent(Mary)}(e) & \\
\text{In-progress}(s)(e) & \forall x[\text{TR}(x)(e) \rightarrow \text{TR}(x)(s)] & \tau(s) = \tau(e)] & \exists s'.\exists\tau'(t \subseteq t & \\
\text{praise}(e') & \text{Agent}(x_k)(e') & \text{Theme}(\sigma_x[\text{TR}(x)(s)])(e') & \text{R-state}(s')(e') & \\
\text{Theme}(\text{Agent}(e'))(s') & \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s')]] = 1](\text{John})
\\
= \exists t < \text{now} & \exists s[\exists e[t \subseteq \tau(e) & \text{study}(e) & \text{Agent(Mary)}(e) & \\
\text{In-progress}(s)(e) & \forall x[\text{TR}(x)(e) \rightarrow \text{TR}(x)(s)] & \tau(s) = \tau(e)] & \exists s'.\exists\tau'(t \subseteq t & \\
\text{praise}(e') & \text{Agent}(\text{John})(e') & \text{Theme}(\sigma_x[\text{TR}(x)(s)])(e') & \text{R-state}(s')(e') & \\
\text{Theme}(\text{Agent}(e'))(s') & \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s')]] = 1]

2. Derivation of the truth-conditions for (19) in Chapter 6²

\[[\text{VP}_1]\] = \[[\text{VP}]](\[[t_k]\])

= \lambda y.\lambda e[\text{praise}(e) & \text{Agent}(y)(e) & \text{Theme}(\sigma_x[\text{TR}(x)(s_j)])(e)](x_k)

= \lambda e[\text{praise}(e) & \text{Agent}(x_k)(e) & \text{Theme}(\sigma_x[\text{TR}(x)(s_j)])(e)]

\[[\text{Perfective}]\] = \lambda P_{\langle 1, v \rangle}.\lambda s.\lambda t_i.\exists e[\tau(e) \subseteq t & P(e) & \text{R-state}(s)(e) & \\
\text{Theme}(\text{Agent}(e))(s) & \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)]]

\[[\text{AspectP}_1]\] = \[[\text{Perfective}]](\[[\text{VP}_1]\])

\(= \lambda P_{\langle 1, v \rangle}.\lambda s.\lambda t_i.\exists e[\tau(e) \subseteq t & P(e) & \text{R-state}(s)(e) & \\
\text{Theme}(\text{Agent}(e))(s) & \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)]](\lambda e[\text{praise}(e) & \text{Agent}(x_k)(e) & \text{Theme}(\sigma_x[\text{TR}(x)(s_j)])(e)])

\(= \lambda s.\lambda t_i.\exists e[\tau(e) \subseteq t & \text{praise}(e) & \text{Agent}(x_k)(e) & \text{Theme}(\sigma_x[\text{TR}(x)(s_j)])(e) & \text{R-}²

² I assume that the LF structure of (19) is identical to (17) except that the embedded aspect is perfect, rather than imperfective.
state(s)(e) & Theme(Agent(e))(s) & \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)]

[[AspectP_1^*]] = (via existential quantification over the state variable inside the denotation of AspectP_1)
= \lambda t.\exists s.\exists e[\tau(e) \subseteq t \& \text{praise}(e) \& \text{Agent}(x_k)(e) \& \text{Theme}(\sigma x[\text{TR}(x)(s_j)])(e) \& \text{R-state}(s)(e) \& \text{Theme}(Agent(e))(s) \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)]]

[[AspectP_1^{**}]] = [[J]]([[AspectP_1^*]])
= (via predicate abstraction over the state variable s_j)
= \lambda s_j.\lambda t.\exists s.\exists e[\tau(e) \subseteq t \& \text{praise}(e) \& \text{Agent}(x_k)(e) \& \text{Theme}(\sigma x[\text{TR}(x)(s_j)])(e) \& \text{R-state}(s)(e) \& \text{Theme}(Agent(e))(s) \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)]]

[[VP_4]] = \lambda e[\text{study}(e) \& \text{Agent(Mary)(e)}]

[[AspectP_4] = [[Perfect]]([[VP_4]])
= \lambda P_{\prec, \triangleright} s, \lambda t.\exists e[\tau(e) < t \& P(e) \& \text{R-state}(s)(e) \& \text{Theme}(Agent(e))(s) \& t \subseteq \tau(s) \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)]][\lambda e[\text{study}(e) \& \text{Agent(Mary)(e)}])
= \lambda s, \lambda t.\exists e[\tau(e) < t \& \text{study}(e) \& \text{Agent(Mary)(e)} \& \text{R-state}(s)(e) \& \text{Theme}(Agent(e))(s) \& t \subseteq \tau(s) \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)]]

[[RelP]] = [[-\text{uni}]]([[AspectP_4]])
= [[\text{REL}_2]]([[AspectP_4]])
\(= \lambda K_{s, t} \lambda L_{s, t} \lambda t_i. \exists s[\text{CAUSE}(K(s)(t))(L(s)(t))](\lambda s, \lambda t_i. \exists e[\tau(e) < t \& \text{study}(e) \& \text{Agent(Mary)(e)} \& \text{R-state}(s)(e) \& \text{Theme}(\text{Agent(e)})(s) \& t \subseteq \tau(s) \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)])]

\(= \lambda L_{s, t} \lambda t_i. \exists s[\text{CAUSE}(\exists e[\tau(e) < t \& \text{study}(e) \& \text{Agent(Mary)(e)} \& \text{R-state}(s)(e) \& \text{Theme}(\text{Agent(e)})(s) \& t \subseteq \tau(s) \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)])](L(s)(t))]

[[\text{AspectP}_1***]] = [[\text{RelP}]]([[\text{AspectP}_1**]])

\(= \lambda L_{s, t} \lambda t_i. \exists s[\text{CAUSE}(\exists e[\tau(e) < t \& \text{study}(e) \& \text{Agent(Mary)(e)} \& \text{R-state}(s)(e) \& \text{Theme}(\text{Agent(e)})(s) \& t \subseteq \tau(s) \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)])](L(s)(t))]

(\lambda s_j, \lambda t. \exists s[\tau(e) \subseteq t \& \text{praise}(e) \& \text{Agent(x_k)(e)} \& \text{Theme}(\sigma x[\text{TR}(x)(s_j)])(e) \& \text{R-state}(s)(e) \& \text{Theme}(\text{Agent(e)})(s) \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)])])

\(= \lambda L_{s, t} \lambda t_i. \exists s[\text{CAUSE}(\exists e[\tau(e) < t \& \text{study}(e) \& \text{Agent(Mary)(e)} \& \text{R-state}(s)(e) \& \text{Theme}(\text{Agent(e)})(s) \& t \subseteq \tau(s) \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)])](L(s)(t))]

[[\text{Tense}']] = [[\text{Past}]]([[\text{AspectP}_1***]])

\(= \lambda M_{s, t} \lambda t. \exists t[t < \text{now} \& \text{M}(t) = 1](\lambda s, \lambda t_i. \exists e[\tau(e) < t \& \text{study}(e) \& \text{Agent(Mary)(e)} \& \text{R-state}(s)(e) \& \text{Theme}(\text{Agent(e)})(s) \& t \subseteq \tau(s) \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)])])

(\exists s'. \exists e'[\tau(e') \subseteq t \& \text{praise}(e') \& \text{Agent(x_k)(e')} \& \text{Theme}(\sigma x[\text{TR}(x)(s)])(e') \& \text{R-state}(s')(e') \& \text{Theme}(\text{Agent(e')})(s') \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s')])])
= \exists t[t < now \& \exists s[\text{CAUSE}(\exists e[\tau(e) < t \& \text{study}(e) \& \text{Agent(Mary)}(e) \& \text{R-state}(s)(e) \& \text{Theme}(\text{Agent}(e))(s) \& t \subseteq \tau(s) \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)]])(\exists s'.\exists e'[\tau(e') \subseteq t \& \text{praise}(e') \& \text{Agent}(x_k)(e') \& \text{Theme}(\sigma x[\text{TR}(x)(s)])(e') \& \text{R-state}(s')(e') \& \text{Theme}(\text{Agent}(e'))(s') \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s')]] = 1.]

[[\text{Tense}''']] = ([K][(\text{Tense}'')])

= (\text{via predicate abstraction over the entity variable } x_k)

= \lambda x_k.\exists t[t < now \& \exists s[\text{CAUSE}(\exists e[\tau(e) < t \& \text{study}(e) \& \text{Agent(Mary)}(e) \& \text{R-state}(s)(e) \& \text{Theme}(\text{Agent}(e))(s) \& t \subseteq \tau(s) \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)]])(\exists s'.\exists e'[\tau(e') \subseteq t \& \text{praise}(e') \& \text{Agent}(x_k)(e') \& \text{Theme}(\sigma x[\text{TR}(x)(s)])(e') \& \text{R-state}(s')(e') \& \text{Theme}(\text{Agent}(e'))(s') \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s')]] = 1.](\text{John})

[[\text{TenseP}]] = [[\text{Tense}''']](\text{[[John]]})

= \lambda x_k.\exists t[t < now \& \exists s[\text{CAUSE}(\exists e[\tau(e) < t \& \text{study}(e) \& \text{Agent(Mary)}(e) \& \text{R-state}(s)(e) \& \text{Theme}(\text{Agent}(e))(s) \& t \subseteq \tau(s) \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)]])(\exists s'.\exists e'[\tau(e') \subseteq t \& \text{praise}(e') \& \text{Agent}(x_k)(e') \& \text{Theme}(\sigma x[\text{TR}(x)(s)])(e') \& \text{R-state}(s')(e') \& \text{Theme}(\text{Agent}(e'))(s') \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s')]] = 1.](\text{John})

= \exists t[t < now \& \exists s[\text{CAUSE}(\exists e[\tau(e) < t \& \text{study}(e) \& \text{Agent(Mary)}(e) \& \text{R-state}(s)(e) \& \text{Theme}(\text{Agent}(e))(s) \& t \subseteq \tau(s) \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s)]])(\exists s'.\exists e'[\tau(e') \subseteq t \& \text{praise}(e') \& \text{Agent}(x_k)(e') \& \text{Theme}(\sigma x[\text{TR}(x)(s)])(e') \& \text{R-state}(s')(e') \& \text{Theme}(\text{Agent}(e'))(s') \& \forall t'[t \leq t' \rightarrow t' \subseteq \tau(s')]] = 1.]}


Hoshi, Koji. 1995. Structural and interpretive aspects of head-internal and head-external relative clauses, University of Rochester: Doctoral dissertation.


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